Contributions to Economics

Ümit Hacioğlu
Hasan Dinçer *Editors*

Global Financial Crisis and Its Ramifications on Capital Markets

Opportunities and Threats in Volatile Economic Conditions

Springer

Contributions to Economics

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Foreword

Understanding human behavior begins with questioning our own passions, desires, and expectations with respect to future benefits. In this effort, we should be aware of risks and ambiguities in the external environment surrounding us. We all have concerns about using certain words because we find their meaning vague. For a student or an investor, "crisis" is not such a simple word. Defining this confusing concept, for example, "*any event that is, or is expected to lead to, an unstable and dangerous situation affecting an individual, group, community, or whole society*" or "*a condition that presents an unstable situation with devastative effects on our investment position, occur abruptly, with little or no warning*," does not help scholars so much. Is the concept of "crisis" linked with our efforts of maximizing our benefits or just a systemic issue?

It becomes meaningful when you look up the concept including your attitude, desire, or position on any kind of action in the external environment. The concept of crisis referring to either financial or economic means can be ponderous. But the definition should not be illuminating the subject "crisis that indicates how stress transforms and how it should be interpreted in terms of economic or financial means; stress surrounding the actions of all parties causing negative effects on each opposing parties."

This book gathers colleagues and professionals across the globe from multicultural communities to understand the nature of global financial crisis and its ramifications on capital markets with a new design and innovative practices for the entire global society of financial services industry.

The authors of these chapters have accepted a challenge. The global financial crisis is the most studied subject in the field, so how can the contributions in this book help us to interpret the impacts of it on capital markets? These effects on investment positions or new ways out of global financial crisis are hardly the answers. I prefer people to make their positions clear in their research and do not want to tell what outputs they should be expecting from the content of the book.

The inclusion of the words "global," "crisis," and "ramifications" in the title does nothing to lessen the challenge facing the authors. Global financial crisis

within its historical context has been theoretically explained in the first part. The case studies that are geographically fragmented are about stock markets, banking system, price fluctuations, and calendar anomalies during crisis, market volatility, and risks in emerging markets. Although there are contributions from Serbia, France, Norway, Greece, Hungary, Italy, India, Nigeria, Saudi Arabia, Australia, and South Africa, this book mainly reflects work from Turkey and Western Europe. Accordingly, the question of "How should scholars from the USA have tackled these issues" arises?

The final challenge to the contributors is the subtitles of "Opportunities and Threats in Volatile Economic Conditions." Are they attempting to apply the traditional models of assessing the global financial crisis or to replace those traditional models with something new?

How do the authors address these multiple opportunities and threats in volatile economic conditions and what does the book have to tell us?

Its first lesson is that there is no consensus on the cycle of financial crisis and probably never will be. The latest global financial crisis is merely the latest turmoil that we experienced and see unreasonable conditions or losses in the next decades. The author of the opening chapter, Dr. Tatliyar, evaluates the 2008–2009 financial crises from the historical context as the largest one since *Great Depression* of the 1930s. Several reasons are asserted in this chapter and question why such a massive crisis happened in the first place. He addresses the causes of the global financial crisis were, ostensibly, the formation of a housing bubble and ensuing subprime mortgage crisis in the US economy. However, the true story of the crisis is much more complicated than this. Actually, the fundamental causes, which stemmed from *systemic* problems in the global economy, paved the way for economic instabilities throughout the world and numerous financial crises occurred from 1980s on. Dr. Kontić evaluates economic crisis and the changes in the functioning of international financial institutions in European developing countries. Dr. Kontić assesses the international financial institutions' response to the global economic crisis in the European developing countries. In their response to the global crisis, the international financial institutions have increased funds for shock financing as well as significantly reformed their instruments. Dr. Kuzucu briefly describes the regulatory changes in bank capital, shadow banking system, trading and financial reporting of the financial products, and credit rating agencies. The criticisms to bank capital regulations are presented.

Market anomalies and price fluctuations in capital markets during crisis in the third part have been guiding investors to clarify their positions during the recession period. Dr. Yalaman and Dr. Saleem forecast emerging market volatility in crisis period comparing traditional GARCH with high-frequency-based models. Dr. Vasileiou figures out the calendar anomalies in stock markets during Financial Crisis. Dr. Akbalık and his colleague assess the day of the week effect in the stock markets of fragile five countries after 2008 Global Financial Crisis.

Some of the contributing authors build on assessment of financial stability in emerging markets, business cycles, and impact of crisis, economic recovery, and sectoral developments.

The virtue of this book, Dr. Hacıoğlu and Dr. Dincer's earlier collection of studies and editorial series on Finance and Banking, is that it exposes and explores the challenges of working at the frontiers of theory and practice. It is also very hard to gather international scholars from different countries in this specific field due to time constraints and significant geographical distance. The passion and scholarly attitude behind the project has eliminated all boundaries and obstacles during editorial process. Academics are motivated to work hard to foster the parts of this book as an interesting contribution about an attempt by different countries just like developing a joint venture.

I believe this book will provide valuable insight to satisfy the readers' varying expectations regarding the practice of global finance. Accordingly, readers who are involved in this book will find much more that they can calibrate with their own experience in building better practices for the future.

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Ali Osman Gürbüz

Preface

The latest global financial crisis and its ramifications on capital markets have led to a growing attention on investment decisions in emerging markets. During the year, doubts related to the debt crisis in the Euro zone also caused anomalies and price fluctuations in the global financial markets. Risky developments, price fluctuations, increasing rate of unemployment, and the lack of regulatory adaptations in the financial system became the source of concerns for decision makers and professional investors.

The financial ramifications of instability in the economic system and its imbalances caused significant constraints on the performance of banking system and the functionality of trade mechanism in emerging markets. Additionally, the current market conditions and systemic issues in emerging markets significantly possess risks to stability in financial system. Negative conditions also deteriorate the sufficient market access by emerging market borrowers across the globe. Notwithstanding this, the volatile environment in global financial system should be assessed based on its risks and returns for many investors.

In this book, it is aimed to assess the 2008–2009 Financial crises with its ramifications on capital markets from a multidisciplinary perspective. The authors of the chapters in this publication have contributed to the success of our work by the inclusion of their respective studies.

This book is composed of four contributory parts. The first part evaluates the 2008–2009 financial crises in historical context, International Financial Institutions, and Regulatory developments. The distinguished parts of the first part cover the evaluation of financial crisis, global economy, Euro Crisis, international financial centers, and monetary coordination with regulatory advances. This book continues with Part II by assessing the business cycles and financial stability in emerging markets. In Part II, external financial conditions, global imbalances, financial instability, economic outlook, and the effects of economic crisis on emerging markets have been assessed. The next part covers empirical studies on market anomalies and price fluctuations in capital markets during crisis. Stock markets, banking system, price fluctuations, and calendar anomalies during crisis, market volatility, and risks in emerging markets are some topics in this part. Finally, the

last part demonstrates the impact of crisis, economic recovery, and sectoral developments.

The authors of the chapters in this premium reference source in the field with the contribution of scholars and researchers overseas from different disciplines examined the ramifications of global financial crisis on capital markets, financial stability in emerging markets, price fluctuations and anomalies in capital markets during the recession, and sectoral developments by assessing critical case studies. Consequently, this book gathers colleagues and professionals across the globe from multicultural communities to design and implement innovative practices for the entire global society of finance and banking. We believe this book with its scope and success makes it even more attractive for readers and scholar in this field.

Istanbul, Turkey
August 2016

Ümit Hacıoğlu
Hasan Dinçer

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The final words of thanks belong to our families and parents separately: Dr. Hacıoğlu would like to thank his wife Burcu and his son Fatih Efe as well as his parents; Dr. Dincer would like to thank his wife Safiye as well as his parents. They deserve thanks for their enthusiasm, appreciation, help, and love. Their pride in our accomplishments makes it even more rewarding to the editors.

Istanbul Medipol University
Istanbul, Turkey
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Ümit Hacıoğlu
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Contents

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Part I
2008–2009 Financial Crisis, International Financial Institutions and Regulation

The 2008–2009 Financial Crisis in Historical Context

Mevlüt Tatlıyer

Abstract The 2008–2009 financial crisis was the largest since *Great Depression* of the 1930s. Several reasons were asserted on why such a massive crisis happened in the first place. However, most of the explanations put forth were about proximate causes of the crisis and very little attention was given to the underlying and fundamental causes of it. The causes of the global financial crisis were, ostensibly, the formation of a housing bubble and ensuing subprime mortgage crisis in the US economy. However, the true story of the crisis is much more complicated than this. Actually, the fundamental causes, which stemmed from *systemic* problems in the global economy, paved the way for economic instabilities throughout the world and numerous financial crises occurred from 1980s on. These fundamental causes include (a) failure of transforming economies from extensive-production to intensive-production, (b) the rise of the neoliberalism, (c) ensuing financialization of the world economy and (d) global instabilities witnessed in the neoliberal era.

1 Introduction

The global financial crisis began in 2008 and still lingers on *in a sense*. It has been the biggest crisis since the *Great Depression* of 1929, which, in part, paved the way for World War II (WWII). After the US subprime mortgage crisis burst out, it was all clear that this crisis would be with us for a long time. Although the economic recession that followed the financial crisis has officially ended in 2012, it has not in a practical sense. In other words, the specter of the global economic crisis is still haunting us.

Why did this crisis happen in the first place? There is no an easy answer to this question. One of the proximate causes of the crisis was troubles in the US subprime mortgage market. But this is not the whole story. Far from it. . . There are numerous

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factors underlying global financial crisis and one must look beyond the recent history and proximate "financial" causes in order to understand why this crisis happened in the first place and maybe more importantly, why it still persists.

In the next four sections the fundamental causes which gave way for global financial crisis are discussed. In the second section, we discussed how the failure of shifting from extensive-production to intensive-production resulted in the financialization of the world economy. In the third section the rise of the neoliberalism and in the fourth section the financialization of the world are examined. The role of the global instabilities, which are part and parcel of the neoliberal era, in the making of the global financial crisis is discussed in the fifth section. In the last section, proximate causes of and the global reaction to the financial crisis are analyzed.

2 From Extensive-Production to Intensive-Production?

The world economy and particularly industrialized economies had suffered low economic growth rates between two world wars. In that period, the average economic growth rate was 1.19 % for the Western Europe and 0.86 for the Eastern Europe. The US performed better in this time interval with a 2.84 % of annual economic growth. The average economic growth rate for the whole world in this period was only 1.82 %. After WWII things changed dramatically. Almost all of the regions in the world saw their economic growth rates boomed. This was all the more important for the industrialized countries and especially for the US, since US was dominating the world economy by a large margin.

In the period of 1950–1973, Western Europe grew by 4.79 % in a year on average and Eastern Europe fared even better with a 4.86 %. US economy also increased its economic growth rate by some 1 % point to reach nearly 4 %. It should be noted that this period witnessed the so-called Japanese miracle. Japanese economy grew incredibly in this period by over 9 % annually on average. Until that time, no economy in the world could imagine such a high growth rate, let alone achieving it. Overall, the world economy grew by some 5 % in a year on average between 1950 and 1973 (Maddison 2007).

The economic expansion experienced by industrialized countries in the three decades after WWII was largely due to *extensive production* such that these countries mobilized all their resources to rebuild their cities and infrastructures, as well as their factories and machineries which had been devastated in WWII. Moreover, in this period; populations boomed, higher education expanded enormously and women entered to the labor force *en masse*. Lastly, but absolutely not leastly, governments of industrialized countries around the world got bigger and bigger all the way up to the 1970s thanks to highly cherished *Keynesian* economic policies and *welfare-regimes*. All these reasons, among others, rendered extensive production possible. We should note that in this period, "lagged-behind" Europe closed the gap between them and the US, partly with the help of the US itself. In

fact, France remembers this period as *Les Trente Glorieuses,* or *The Glorious Thirty*. Technological advancement achieved between two world wars and in WWII has also played a part in the post-war expansion and increased productivity levels to some extent. However, the main engine of the economic growth in that period was extensive production (Eichengreen 2008).

The fundamental causes of this economic expansion started to fade away in the late 1960s and early 1970s. The party was coming to an end. Economic growth rates declined steeply and industrialized countries never made up the lost ground thereafter. (Even unemployment rates rose to much higher levels *permanently* in Europe, such that once having had lower unemployment rates than US, they are now witnessing much higher rates.) Western Europe grew only 2.21 % annually on average for the next three decades. Eastern Europe fared even worse with only 1.01 of growth rate. The decline in the US was limited compared to Europe. US economy expanded on average by some 3 % annually. However, we should stress that this growth was mostly achieved by the incredible expansion of the financial industry in US. On the other hand, the economic expansion in Asia which was led by China, India and other several East Asian countries kept on and even gathered pace after the 1970s (Maddison 2007) (Table 1).

Once this one-time extensive-production-led economic expansion started to wane, it was all too hard to sustain growth rates attained before, because this time what was needed was *intensive production*, which can be achieved purely by productivity rises, and this was not an easy task. Therefore, when industrialized countries faced with the hardships of the intensive production, they tried to expand the *extensive production frontier* with financialization of the world economy within the framework of neoliberalism.

3 The Rise of Neoliberalism

In the 1970s, global economic and financial order, which was established during WWII in 1944 and is commonly called as Bretton Woods era, collapsed dramatically. (However, this collapse was not a cause, but a result of the economic and financial tectonic movements attained by the world in that period.) In the late 1970s and early 1980s *neoliberalism* rose to the foreground and replaced shattered Bretton Woods system. Neoliberal paradigm was much more of a political ideology than a philosophical one and this replacement was more of a political process than an economic one. That is, without backing of certain "powerful" political and economic actors and institutions, this process could not be experienced such that.

Indeed, neoliberalism itself was first propagated in political arenas. This paradigm, also known as *Washington consensus* or in a narrower sense *Supply-Side Economics*, was preached by the US government itself and started to known as *Reaganomics,* after the then-president Ronald Reagan. Similar things experienced in UK and policies pursued in the name of this *new* ideology were named as *Thatcherism,* after the "iron lady" Margaret Thatcher. The fundamental creed of

Table 1 Economic growth rates of certain countries and geographical areas

Country/Area	1913–1950	1950–1973	1973–2001
Western Europe	1.19	4.79	2.21
Eastern Europe	0.86	4.86	1.01
USSR	2.15	4.84	−0.42
US	2.84	3.93	2.94
Latin America	3.42	5.38	2.89
Japan	2.21	9.29	2.71
China	−0.02	5.02	6.72
India	0.23	3.54	5.12
Asia (Other)	2.19	6.00	4.61
Africa	2.57	4.43	2.89
World	1.82	4.90	3.05

Source: Maddison 2007: 640

the neoliberal paradigm was the market supremacy in which the best government was the smallest government and the more liberalized and unconstrained an economy the better it was. This ideology has been suggested and *enforced* wherever possible in the world through institutions such as IMF and World Bank, and gained colossal prevalence. Without these efforts, financialization of the world to this extent could not be possible at all. Hence since 1980s financial industries throughout the world were largely liberalized under the auspices of IMF and World Bank.

Deregulation process has gone the furthest in the US financial industry. Given the magnitude of US industry and its prominence in the world, this deregulation process would have far and wide repercussions throughout the world, and indeed it had.

US financial industry gradually but steadily has been deregulated in 1980s and 1990s. In 1980, Depository Institutions Deregulation and Monetary Control Act (DIDMCA) repealed so-called *Regulation Q* provision of Glass-Steagall Act of 1933 and abolished interest rate ceilings on deposit accounts. In 1982, Garn-St. Germain Depository Institutions Act (GGDIA) deregulated *Savings & Loans Associations* (S&Ls) almost entirely and rendered them more of a traditional bank than of a mortgage institution. In 1994, Riegle-Neal Interstate Banking and Branching Efficiency Act abolished restrictions on interstate banking and branching. Most importantly, in 1999, Gramm-Leach-Bliley Act repealed Glass-Steagall Act entirely.

Glass-Steagall Act was already breached with the *reinterpretations* of Federal Reserve in 1980s and 1990s under the presidency of Alan Greenspan. In the early years of his tenure at Fed, banks were allowed to engage in certain securities with a 10 % upper limit threshold. Moreover, in 1996, bank holding companies were allowed to make investment banking operations with an upper limit threshold of 25 % of revenues. This threshold was effectively meaningless, because almost all of the institutions could manage to stay away from it. Finally, in 1999, Gramm-Leach-Bliley Act repealed all the restrictions in the financial industry. Now financial

institutions could engage in any activity—banking, securities, and insurance operations- freely (Sherman 2009).

Deregulations paved the way for big mergers in financial industry in the US. As of 1970, the five biggest banks were holding 17 % of the assets in this industry. This share rose to 52 % in 2012. In addition, the total assets of the five largest banks (i.e., Citi Group, JP Morgan, Wachovia, Wells Fargo and Bank of America) rose from 2.2 trillion dollars to 6.8 trillion dollars in just 9 years, from 1998 to 2007. Even greater expansion experienced by investment banks. Total assets of the five largest investment banks (namely, Merrill Lynch, Lehman Brothers, Bear Stearns, Morgan Stanley and Goldman Sachs) nearly quadrupled in this period, from nearly 1 trillion dollars to 4 trillion dollars (Om-Ra-Seti 2012).

In line with the rise of the *neoliberal paradigm,* the invention and rapid expansion of the derivatives (e.g., credit default swaps, or CDSs and collateralized debt obligations, or CDOs) in the 1980s and 1990s further unstabilized the finance industry. These products were largely unregulated. There were very weak efforts to regulate these financial products, but these already timid efforts were strangled by the mainstream policymakers, including Fed chairman Alan Greenspan and Treasury Secretary Robert Rubin. Moreover, with the Commodity Futures Modernization Act of 2000, the derivatives were exempted from regulation. To no surprise, the outstanding nominal value of derivatives expanded enormously since 1980s and reached 106 trillion dollars in 2001. And in the next 7 years, it expanded much more rapidly and reached 531 trillion dollars in 2008 (Sherman 2009).

4 Financialization of the World Economy

In the 1970s, gold-backed dollar regime and fixed currency era ended and more and more countries started to adopt floating exchange rate regimes. As of 1970, 97 % of IMF's member countries had fixed exchange rates. This ratio declined steeply to 39 % by 1980 and was only 11 % as of 1999 (Reinhart 2000).

Yet this was not the whole story. With the so-called *deregulation* process starting from 1980s within the framework of *neoliberalism* further transformed the financial sector and accordingly, economic order of the world deeply. Here we see the interplay of economic and financial processes. The latter had a big influence on the former, and in turn the former deeply transformed the latter. Moreover, any story of this crisis without due regard to the roles of the governments around the world would be deeply flawed. Financialization of the world was much less a natural and *economic* process than a *political* and *ideological* one.

In the neoliberal era, developing countries were significantly incorporated into the world economy. This was an important transformation, since in the Bretton Woods era, developing countries had not much role in the international trade and global economy. They had been implementing import-substitution policies and their financial and economic openness levels were rather limited. However, numerous developing and emerging countries started to adopt export-oriented economic

policies (e.g., elimination of the barriers in front of the international trade, such as customs and tariffs) with the advent of neoliberalism, and "advices" and "enforcements" of the WTO, IMF and World Bank.

More importantly, the restrictions on the international capital flows and interest rates have almost totally eliminated in the neoliberal era, in both industrialized and developing countries. This meant a much more *free* financial setting than that of the Bretton Woods era in which capital movements were largely restricted and interest rate were determined by the governments.

Incorporation of the developing countries to the world economy and financialization of the whole world were a direct response to the structural economic crisis of the 1970s. However, there were and *are* numerous drawbacks of this response of neoliberalism to the woes of the world economy. Basically, all the transformations in the world economy and finance were almost nothing to do with the productivity levels of the countries. Incorporating developing economies to the world economy and expanding financial realm to the levels of not seen before were not sufficiently influential responses to the *systemic* crisis. In fact, these were superfluous and temporary responses to deeply structural and entrenched problems. In addition, they had colossal side effects: In this era, the world has become a much more unstable place and global imbalances deteriorated to unprecedented levels.

In addition, not only the financialization of the world reached its limits, but also a myriad number of new financial products such as futures and swaps started to enter the financial markets thanks to the deregulation process of the 1980s and 1990s. These financial products became increasingly complex and hard-to-understand even by the professionals producing and selling them such as CDOs and MBSs. (And these very financial products became one of the proximate causes of the 2008–2009 financial crisis.)

Financialization of both developing and industrialized countries was a direct result of the struggle to expand *extensive production frontier*. Financialization process included *deregulation process*, *invention of myriad number of financial products, forced-elimination of the barriers to the international capital flows*. This way, finance with all of its "invented" products has become a brand new industry for the global economy. And this industry expanded tremendously. Once again, having hard time with intensive production, the economic system circumvented this problem and found a way to extend horizontally the production base. However, this "production" was not a real one and this very problem caused most of the troubles the world economy witnesses today.

Financialization of the world economy was not the only response to declining economic prospects of the industrialized countries. As we said before, another avenue for extending production base was the incorporation of the developing countries to the world-economic-system both financially *and* economically. Thanks to the forced-elimination of the barriers to the international trade, just like the international capital flows, and abandoning import-substitution economic structure and embracing export-led growth strategy, industrialized countries happened to find new markets for their products, hence *extensive production*.

In this *highly financialized world economy*, economic instabilities have become all too common, as expected. Without any constraint, finance industry expanded tremendously and permeated every aspect of the real economy and caused major instabilities in the world economy. Numerous financial crises occurred but most of these were brushed away as idiosyncratic phenomena and not seen as systemic crises. For example, 1997 East Asia financial crisis was largely seen as a current-account-deficit crisis, though these deficits did not warrant a financial crisis at all. Even if this was the underlying cause of the crisis, it was a proximate cause, not an ultimate one.

IMF and World Bank were the biggest preachers *and* enforcers of this agenda and ideology, which was pure neoliberalism. One-size-fit-all *liberalization* preaching was the only take-home message to almost all of the countries who experienced financial crises. However, this situation started to change with the 2008–2009 global economic crises, because not only the biggest crisis occurred after the global depression of the 1930s, but there were now mounting evidence against *neoliberalism* and it was now hard to defend this ideology without serious reserves. Even IMF, the leading proponent and *enforcer* of this understanding, abandoned preaching with great enthusiasm its benefits and started to have a more or less balanced view.

5 Global Instabilities

The world has become a much more unstable place in the *neoliberal era* in which international capital movements were almost completely freed and floating exchange rate regimes were adopted by nearly all of the countries, in comparison with the *post-war* Bretton Woods system in which international capital movements were highly restricted and currencies were pegged to US dollar, which in turn pegged to gold. In addition, thanks to the efforts of the GAAT and afterwards WTO, restrictions on trade have largely been eliminated for particularly developing countries in this era. Hence, the most salient feature of this era was *liberalization*.

However, this liberalization process came with its very serious side effects. In the Bretton Woods era, there were very few financial crises. Then things changed very badly. Since the 1980s the world experienced over a hundred and fifty financial crises. Some countries accumulated more and more current account deficits, and others gathered more and more reserves.

In this period, the leading deficit country in the world has been US. In almost all of the years in the *neoliberal era,* current account balance of US was negative. After 1991, current account deficit of US gradually increased and came to unprecedented levels in the 2000s up to the global financial crisis of 2007–2008. In the peak year of 2006, the US current account deficit reached almost 6 % of its GDP (Fig. 1). In the 2005–2007 period average current account deficit in the world was some 1.3 trillion dollars and US alone accounted for 57 % of all of the current account deficit in the world with 749 billion dollars deficit. The combined current account deficit share in

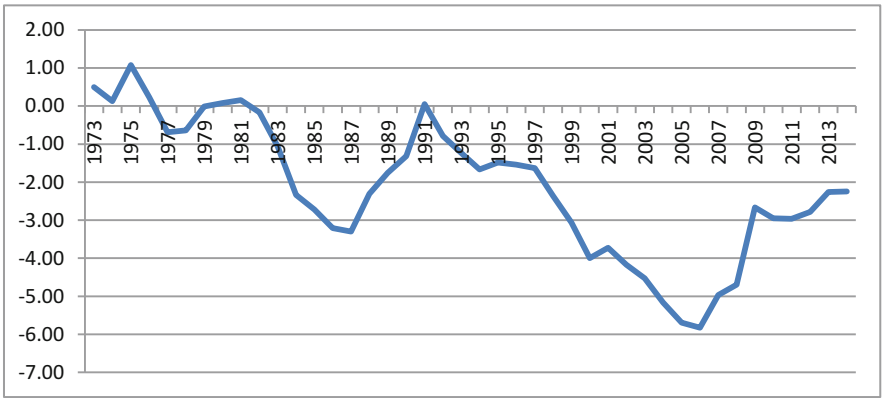

Fig. 1 Current account deficit of US (%). Source: US Bureau of Economic Analysis (2015) and author's own calculations

the world of the next four countries (Spain, UK, Australia and Italy, respectively) was only 22 % (World Bank 2009).

How did US manage to have such an enormous level of current account deficit? This has been a popular question and has attracted a great deal of discussion for the last two decades. Some blamed the so-called *global saving glut*, others accused China and Japan of artificially keeping their exchange rates low, and yet others put the blame on low US saving and high budget deficits, and dollar's unique position as the global currency (Bernanke 2005; Blanchard 2007; Blanchard et al. 2005; Clarida 2005). This discussion has not been settled, though all the explanations revolve around the fact that US has a unique position in the global economy and all the reasons set forth for this deficit conundrum seem to have some truth in it.

Bretton Woods system had a major deficiency emanating from the unique position of the dollar. Triffin (1960) first identified this problem and dubbed *Triffin dilemma*. In the gold-dollar system, US dollar was international reserve currency and had a key role in international transactions as well as being the major international investment currency. Thanks to that huge universal demand for the US dollar, Triffin suggested that this gold-dollar system could not be sustained as foreign liabilities of US would grow more and more to the point that US could not convert the dollar into gold at 35 dollars an ounce (Triffin 1978). Triffin proved right in the 1970s when Bretton Woods system collapsed.

However, US dollar kept its unique position as the international reserve currency and major international investment currency in the neoliberal era. Moreover, in this era, thanks to the elimination of the restrictions on the international capital movements and interest rates and the deregulation process, which freed the financial industry from almost any restrictions, strengthened the already predominant status of the US dollar. Therefore, the reasons, which gave way to the Triffin dilemma, did not disappear and even intensified. Therefore, US economy started to attract more

and more international capital in the neoliberal era and in turn, US financial industry grew dramatically to the unprecedented levels and led to the dot-com bubble in the 1990s and housing bubble in the 2000s, which burst out and resulted in the global financial crisis.

Aside from the unique position of the US dollar, the US monetary policy in the first years of the neoliberal era paved the way for further strengthening of the US dollar and US financial industry. In the 1970s and 1980s oil-exporting countries accumulated large sums of petrodollars and these surplus funds have been eventually parked in US investment and commercial banks. On the other hand, developing countries were in dire need thanks to these very oil shocks and these banks provided the money, which was denominated in US dollars, to these countries. Hence, these investment and commercial banks became more and more lenders to foreign governments, such that these governments were even encouraged to borrow heavily when they were not in need.

Then came the change in the US monetary policy. With the adoption of the neoliberal principles, US Federal Reserve changed its course in 1979 and raised interest rates to unprecedented levels in order to decrease inflation rate, which reached to two-digits then. Interest rates have been increased gradually and reached the peak of 16.4 % in 1981. This policy switch had very adverse repercussions throughout the world, for particularly developing countries that heavily indebted in US dollars.

These countries saw their debt obligations soared and had very difficult times. First Mexico in 1982 and then others fell into financial crises in this period. Preaching for neoliberal principles, IMF and World Bank enforced these troubled countries to implement structural *neoliberal* reforms, such as eradication of the barriers to trade and international capital movements, and privatization, and also cuts in welfare spending. In this way, these countries have been integrated to the international financial industry one after another (Harvey 2005).

In this period of tight monetary policy implemented by Federal Reserve president Paul Volcker, real exchange rate of US dollar appreciated by some 50 % in just 6 years. The US dollar became even more attractive to global investors and US economy has been flooded with international capital, to the detriment of other countries and particularly developing countries, which saw their economies drained of capital in this period. Thus US current account deficit rose from near zero to 3 % of GDP. In addition, numerous countries were forced to tighten their monetary policy and raise their interest rates too. Hence together with US, numerous countries experienced economic depression or crisis in this period, not to mention global turmoil.

Federal Reserve ended tight monetary policy era in 1985 and US real exchange rate returned to its previous levels in 2 years and US current account deficit diminished gradually and came to near zero percent level in 1991. However, from then on, US current account deficit increased step by step up to the global financial crisis, regardless that real exchange rate were appreciating or depreciating, simply because of the global currency status of US dollar.

While US had some 57 % of global current account deficit in the 2005–2007 period, just three countries, namely China (26 %), Japan (18 %) and Germany (15 %), had 59 % of global current account surplus.

China started to transform its economy radically in 1980s with a fierce inclination to exports. In order to achieve this goal, among others, China adopted the policy of depressing its exchange rate. In addition, while Chinese export started to lose its momentum, China was accepted to the WTO and most of the hindrances that Chinese economy face were eliminated. Hence Chinese exports accelerated dramatically and rose to unprecedented levels in 2007 surpassing 10 % of its GDP (World Bank 2015).

Japanese economy fell into depression in the 1990s and it is yet to recover it after more than 25 years. In order to revive the economy Japan pursued very loose monetary policy and depressed the value of its exchange rate. However, to no avail. With a rapidly aging population and depreciated currency, domestic demand weakened gradually and Japanese exports expanded enormously. Hence so-called Japanese saving glut...

On the other hand, with the introduction of *Euro*, the "machine" of Europe, Germany started to run more and more current account surplus up to the 2008–2009 financial crisis. While, in the 1990s Germany ran current account deficits in the orders of 0.5–1.0 % of its GDP, Germany poised to run current account surplus in the orders of 6.0–7.0 % of its GDP in the 2000s. However, the overall current account position of the European Union is more or less in equilibrium and share of the current account surplus of the Germany in the global imbalances is limited. But the instabilities *within* the European Union itself have been a major concern for the world economy for the recent years.

Thanks to the unique role of the US dollar as being the predominant currency of the world economy and the leading role of the US financial industry *and* the financialization of the world economy, it is very natural for US to attract capital throughout the world and run current account deficit, especially when there is a shortage of investment and *consumption* relative to saving (Clarida 2005). However, this very structure of the world economy paved the way for the important global instabilities and eventually the 2008–2009 global financial crisis.

6 And the Crisis Happens

In the neoliberal era, the world has seen more than one-hundred-and-fifty financial crisis in comparison with few financial crises up to that point. It was rather apparent that something was wrong with the global financial and economic system. First, Latin America experienced several financial crises and the 1980s are now remembered as *lost decade* for them. In the 1990s, East Asian countries faced harsh financial crises, among many crises experienced by both developing and industrialized countries, such as Brazil, Turkey, Argentina, UK, Japan and USA itself. In

this respect, although almost no one could foresee the catastrophic 2008 financial crisis, it was by no means very surprising.

When the global financial crisis struck, several explanations regarding why it happened were put forth. However, most of the explanations were revolving around US subprime mortgage crisis and could not go further and deeper from that point. While these proximate "financial" causes indeed resulted in this global crisis, they were not the fundamental causes at all. As we discussed above, failure to shift the global economy from extensive production to intensive production paved the way for *neoliberal era* and financialization of the world economy thanks to the significant political efforts and globalization process. In this neoliberal era financial industry expanded enormously and financial firms obtained very handsome profits. As the magnitude and importance of the financial industry increased, so the lobbying power of them as well throughout the world. Therefore financial industry and their profits kept growing without a restraint. However, all of these came with a lethal cost. This could not go on forever, because the ground on which the financial building was rising was not very solid and indeed there were numerous *financial earthquakes* designating that in this era, including the so-called dot-com bubble and its eventual burst.

Financial firms in the neoliberal era grew unboundedly and they systematically did underestimate the risks to which they were exposed. As they overlooked and downplayed the risks they faced, these risks multiplied. Toxic assets based on very shaky mortgage loans were treated and seen as first class assets by financial firms who were producing and buying them. And credit rating agencies, who should supposedly had overseen the financial firms and their risk exposures, were no different from them when it comes to risk-negligence and even risk-blindness, and gave AAA credit ratings to these now-junk assets.

So while US government paved the way for financial industry to grow unboundedly by eliminating all the regulations and constraints, partly thanks to the enormous lobbying effort of these very financial firms, in turn, financial industry saw no problem in capitalizing on this opportunity in full extent without worrying about financial risks at all. This meant an upward spiral for the financial industry, thus *reckless finance unchained*. A revealing example came from former Citigroup CEO Chuck Prince who was very reckless about these financial risks and even growing troubles of the financial markets when the financial crisis was just starting to unfold back in 2007 that he was asserting that "when the music stops, in terms of liquidity, things will be complicated. But as long as the music is playing, *you've got to get up and dance*. We're still dancing" (*italics* are mine).[1]

Financial industry took a big boost in the beginning of the 2000s with the introduction of easy monetary policy by *Federal Reserve*. This policy fattened financial industry even further and set the stage for a full-blown housing bubble

[1]Financial Times interview with former CEO of Citigroup, Chuck Prince. July 9, 2007. Accessed on December 12, 2015. http://www.ft.com/cms/s/0/80e2987a-2e50-11dc-821c-0000779fd2ac.html#axzz3u6LRaWe5.

after just a few years from the dot-com bubble. However, the arguments and concerns with regards to the apparently-emerging housing bubble were dismissed by Fed officials and *leading experts* including Nobel laureates from within and outside the government numerous times. Mainly, Fed saw no problem in the rapidly rising house prices throughout the US, as price stability was conceived only as stable inflation rate, i.e. price stability of the consumer basket. (Why house prices were not of a concern at all, as, for example, apple prices should have been watched closely was a big mystery then.) Therefore, Fed could not tell whether there was a housing bubble on theoretical grounds and even if there was one, it could not take any action regarding that, since market forces were at play in the making of the housing prices and it could not tell whether this constituted a problem *at all*. Even if there was a problem market forces themselves would and should take care of it. For example, former Fed president Alan Greenspan was suggesting in 2005 that there were no bubble in house prices, only "froth" in *some local markets*. Next Fed president Ben Bernanke was no different with regards to the housing bubble. He was suggesting in a congressional address, just days before he was nominated by then President Bush to become next Fed chairman, that increases in house prices by nearly 25 % over the past 2 years "largely reflect strong economic fundamentals." (Henderson 2005).

Even on February 2007, as a Fed president, Bernanke was still very optimistic about the economy that he even saw a "reasonable possibility that we'll see some strengthening in the economy sometime during the middle of the new year." Yes, that was just when the global financial crisis was starting to take off! He went even further and alleged that "there's not much indication at this point that subprime mortgage issues have spread into the broader mortgage market, which still seems to be healthy. And *the lending side of that still seems to be healthy*" (*italics* included) (Sanchez 2009).

While financial industry downplayed and overlooked the risks they were taking on, US policy makers, who supposedly should be reminding them of these financial risks, actually helped them in turning a blind eye on this. Yes, US monetary and financial policy makers did not just deregulate the financial industry almost totally and eradicate nearly all the constraints they encountered, but these policies also caused a lethal moral hazard in which financial industry now could be able not to worry about the risks to which they were exposed. They just transferred these risks to the government sponsored mortgage institutions (GSEs), namely Fannie Mae and Freddie Mac, who accounted for some 40–60 % of all US mortgages back in the eve of the global financial crisis. Commercial banks simply bundled the mortgages they lent to the customers and created mortgage-backed securities (MBSs) and collateralized debt obligations (CDOs) and credit rating agencies stamped these financial products with first class ratings. In the end, these MBSs and CDOs were sold to the GSEs. Thus all the financial risks were transferred to government-sponsored organizations. US government actively backed these MBSs and explicitly encouraged banks to lend mortgages to the customers, regardless of their ability to pay off their debts. Gradually banks started to lend mortgages even to the people who had no job or no income. Thus the term *NINJA* (no income, no job, no assets) emerged.

As a result, the proximate causes of the global financial crisis were intertwined. On the one hand there was recklessness of the financial industry, which downplayed and even turned a blind eye to the massive risks they were exposed. On the other hand, there were political actors including Fed officials and people in the US government itself, who were supposedly in charge of the overseeing and supervising of the financial industry and the economy in general but failed to take necessary steps and even encourage financial firms to leverage further and take on even more risks.

The housing bubble burst out in slow motion when Fed started to adopt increasingly tighter monetary policy starting from 2004 due to the inflationist pressures in the economy. In 2003, the federal funds rate had been lowered to just one percent. In 2004 rates were increased five times and reached to 2.25 %. The conclusive blow came in 2005. In this year Fed raised federal funds rate eight times to 4.25 %. Numerous borrowers started to default on their mortgages. The situation even worsened next year for the mortgage borrowers. The newly appointed Fed governor Ben Bernanke raised federal funds rate even further to 5.25 % in four steps. The financial crisis started to unfold in this year. More and more borrowers started to default and the next year Fed decreased federal funds rate to 4.25 % as it feared a recession. In very this year—2007—Fed governor Bernanke was expecting an economic recovery in the mid-2008. However, things would get increasingly gloomier in the coming years. In 2008, the financial crisis started to envelope gradually all the financial industry. However, until the failure and bankruptcy of Lehman Brothers, the scope and intensity of the crisis were downplayed. In August 2008, with the bankruptcy of this giant financial firm, the dismal face of the global financial crisis was seen vividly and it was understood what the world was up to.

After the burst of the dot-com bubble in 2000, US economy fell into a recession. In 2001, Fed lowered federal funds rate eleven times from 6.6 to 1.75 % and showered the economy with liquidity. Among other reasons, Fed's reaction of very easy monetary policy to the burst-out of the dot-com bubble helped form another bubble, that is housing bubble. However, the response of Fed to the burst-out of the housing bubble and eventual global financial crisis were no different at all in nature to its response to previous bubble—dot-com bubble—and eventual recession. Actually, Fed got even fiercer and saw even much greater liquidity, which was one of the main reasons of the global financial crisis in the first place, as the remedy to it. The world had not seen such a showering of liquidity in such a short time span. With three separate quantitative easings, assets of Fed more than quadrupled in just 6 years from 870 billion dollars to 4.4 trillion dollars! Fed bought massive amounts of mortgage-backed securities as well as bonds from the secondary markets. Thus, Fed effectively bailed out troubled financial industry with newly printed money. In addition, Fed lowered federal funds rate rapidly to effectively near zero percent to stay there for the next 6 years, for now.

On the other hand, US government was quick to react to the financial crisis and enacted The *Emergency Economic Stabilization Act of 2008*. With this law US government was authorized to spend up to 700 billion dollars and initiated *Troubled Asset Relief Program* (TARP) in order to restore stability in the financial industry.

In other words, thanks to this law several financial firms have been bailed out. In addition, US government took over Fannie Mae and Freddie Mac—which were at the center of the forming of the housing bubble- and a giant insurance company, American International Group (AIG).

The financial crisis was originated in the US an it quickly spread to the whole world through multinational companies and financial firms from all over the world who had these toxic financial products in their portfolios. (In the following years European Central Bank (ECB) would start its own quantitative easing in order to get the European economy out of recession and boost the economy.) This financial crisis resulted in economic recessions throughout the world and industrialized countries were affected the most. Developing countries such as China, India and Turkey were the least affected by the crisis and the first to recover from it.

As of today, although the global economic recession ended officially years ago, the recovery proved to be very sluggish and it is very hard to say that the world economy has left behind the global financial crisis. This is very normal, given that responses to the crisis were aimed at only proximate causes, and the fundamental causes leading to the global financial crisis remain totally intact and even were aggravated by how proximate causes were treated.

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Global Economy at Turmoil

Gökçe Çiçek Ceyhun

Abstract When 2008–2009 global financial crisis has erupted most of people supposed that it was a temporal process and might be end with financial precautions and macroeconomic solutions. Actually it was quite difficult to forecast that the crisis would spread all around the world and would influence financial, socio-economic and political life of most of the people. Honestly the impact of the crisis' trace still has not been removed today and it has taken longer than expected. Some of the global economic activities which got slower with the turmoil, could not reach to the levels of pre-crisis even today. This chapter discusses 2008–2009 global financial crisis and its impacts on the global economic activities by investigating crisis history and its economic effects on some sectors and countries by reviewing literature.

1 Introduction

Many economists report that the global economy is in crisis, and the implications of the crisis have detrimental effects on the financial markets. Despite all recovery efforts, the world is still in a deeply depression in terms of global stock markets. The volatility in the market is still surprising the investors and the economists. The growth outlook for the world is giving up hope because of the news related with recession. Besides, a number of radical economists believe that the next economic stagnation will hit the world in 2017. The question is what the effects of turmoil on global economic activities are and which precautions can be taken for the recovery.

According to Roach (2007), for the second time in 7 years, the bursting of a major-asset bubble has inflicted great damage on world financial markets. In both cases, the equity bubble in 2000 and the credit bubble in 2007, central banks were asleep at the switch. The lack of monetary discipline has become a hallmark of

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unfettered globalization. Central banks have failed to provide a stable underpinning to world financial markets and to an increasingly asset-dependent global economy. In recent years, economic crisis has attracted the attentions among all kinds of crises. In contradistinction to other crisis, financial crises have great influences on countries or regions all around the world (Grewal and Tansuhaj 2001). When compared with the financial and economical failures and shocks, the global financial crisis in 2008 is majorly appeared as the worst since the Great Depression. It was especially violent for the companies that depend seriously on financial assets for fund operations (Goetzmann et al. 2010).

In the course of stimulation and inevitable causes of turmoil that have given a shock to the global economy since 2008, were fundamentally financial. It was obviously understood that the underlying reason of the crisis was particularly macroeconomic imbalances. In these circumstances regulatory and economical failures has obliged to reform the financial dysfunctions in the US and global economic systems (Catte et al. 2011). The improvement of information systems and the progression of financial globalization have enhanced the risk of economic crisis that can expand from one country to another and leads to turmoil all around the world (Chittedi 2014). The turmoil of 2008 brought about a serious global financial collapse. Several economic policies such as restriction of governmental expenditure and lowering interest rates were implemented as a response to the economic situation (Choi et al. 2010). During this turmoil which may be defined as a perfect storm, the countries made an endeavor to preserve their own financial situations. As a matter of the fact all the precautions that could not stop the progressing of the crisis' effects all around the world.

Even though the reflections of the 2008 turmoil has not been passed off yet, the analysts of economic field announce that today the market indicators have been returning to the levels of 2008. The present threat of turmoil signal has shifted organizations' attentions to the cautiousness for preventing the influences of a prospective economic crisis. That's why this paper investigates the historical background of crisis and global economic activities in order to suggest future recommendations. The study consists of two parts. The literature review defines the terms of crisis and economic crisis together with 2008–2009 global financial crisis and global economy. The last part of this paper discusses global economy at turmoil, its implications on the global economic activities by investigating crisis history and its economic effects on some sectors and countries by evaluating some statistics.

2 Literature Review

2.1 Definition of Crisis and Economic Crisis

Crisis is an ordinary fact of the modern society. Crisis has drown interest of not only economic experts, but also households with mass communication effect of internet, newspaper, TV, etc. People has started to learn what was crisis when it became hot matter in the modern society (Zheng 2010).

Economists analyzes the definition of crisis related with negative process in macroeconomic field inclined by defects of governmental policies; sociologists explain crisis with social inequalities; psychologists define crisis an impairment of a person's identity of his/her subjective sense of self; management science consider crisis as limited number of influences and require of security management and control (Pauchant and Mitroff 1992).

According to Johnston and Taylor (1989), the definition of crisis is more severe than a matter or set of problems that expresses the shock triggered by the severity of changes. Pearson and Clair (1998), define crisis as "a low possibility, high influence case that is discerned by critical stakeholders to threaten the organizational viability".

Economic crises are insensately connected with the cycles of business which have continued to distract scientists since the beginning of the nineteenth century. It is not easy to guess and measure the impact of economic crises due to the fact that they attribute to reductions in which real output diminishes, not to periods of slow growth (Grewal and Tansuhaj 2001).

On the other hand economic crises are qualified by the movement of many macroeconomic pointers as diminishing of real output, high ratings of unemployment and inflation, and inconsistent levels of currency. Despite of the fact that economic crisis take place rarely, their depth and schedule may cause expansive capital losses (Leung and Horwitz 2010).

2.2 2008–2009 Global Financial Crisis and Global Economy

Although the 2008 crisis has started at US, the impacts of the crisis have expanded all over the world. The global financial crisis determined turmoil in terms of international trade movements and foreign exchange markets (Choi et al. 2010).

Global economic environment was surrounded by sustained economic growth, low inflation levels, and low interest rates in the pre-crisis period. Actually the growth model that revealed from the 2000s was bringing high risks with it. The economic growth in the USA was supported by intense consumer demand, induced by easy credit and well-supported by oncoming house prices and by high investment rates. In this period, deficits in the USA were financed by accelerating trade excess in China, Japan and other countries. As financial institutions paid attention to short-term profit maximization, long-standing banking executions were ruined. When the difficulties of USA mortgage market were expanded to the all financial sectors, the turmoil spread all around the world (Bhalla 2009).

The 2008 subprime crisis in USA has underlined the financial structures' risks in terms of financially integrated world. Actually the sequence of cases pursued the same logic as previous crises. As the securities portfolio tended towards safer assets, banking balances were rearranged. Then the prices started to fall in the stock markets and this continuum caused pressure on the exchange rates which started to depreciate against dollar (Ferreiro et al. 2011).

In 2008, the global financial crisis had significant effect on developing countries' net capital flows and portfolio equity inflows rotated to negative sharply. China that receiving a sizeable net inflow of portfolio equity in 2008 was the only developing country. However, with $8.7 billion in 2008 it was well below half the $18.5 billion recorded in 2007. In other respects India and Russia experimented outflows of $15 billion in 2008 compared to net inflows of $35 billion (India) and $19 billion (Russia) in 2007 (Chittedi 2014).

With the end of the financial turmoil in the USA housing market and increasing interest rates on sub-prime mortgages, delinquency rates on mortgage loans rose. The value of mortgage-backed securities' value have fallen seriously. Then the crisis in sub-prime market spilled over to other asset markets, especially the corporate bond and equity markets, money markets and credit derivatives markets in the USA, Euro area and all around the world (Bhalla 2009).

154 year old financial power named Lehman Brothers, went bankrupt with USD613 billion in debt on September 15 in 2008. This bankruptcy was the largest one in the economic history of the world. Lehman Brothers had survived the two World Wars, the Civil War, and the Great Depression. After hours Merrill Lynch, other unhappy investment giant, was acquired by Bank of America (BOA) for USD50 billion. Its value was USD100 billion 1 year ago. Merrill Lynch was also exposed to mortgage-backed securities and mortgages. In order to avoid the fate of another investment bank, Goldman Sachs and Morgan Stanley became commercial banks. After 2 days on September 17, the federal government seized control of American International Group (AIG) that was the largest insurer of the world. After 1 week, the control of Washington Mutual which was another illiquid financial institution was taken by federal government. Then the parts of its assets were sold to JP Morgan Chase & Co. (Lee 2009). Those were very tragic days caused to economic turmoil not in USA, but also in Europe and all around the world. Lastly, Table 1 summarizes the literature review of this study.

3 Global Economy at Turmoil

Economic crises and their detrimental effects have drawn attentions of practitioners and academicians in the last decade of the twentieth century. The five main crises of this decade are: Mexican currency crisis in 1994–1995, Asian crisis in 1997, Russian default in 1998, Argentine crisis in 1999–2001, Brazilian stock market crash in 1997–1998 and the United States of America (USA) Subprime crisis 2008. All of these cases can be defined as turmoil that had started in one market, then expanded to a wide range of markets and to other countries of the world (Chittedi 2014).

By the first quarter of 2008, after decades of severe indebtedness, various developing countries had collected a huge volume of foreign reserves, completed repayments to the International Monetary Fund and bought back foreign-currency debts. The booming of commodity prices and oil prices caused the trade surpluses

Table 1 Literature review

Title of study	Author	Key subjects	Method of study
Managing project uncertainty	Cleden, 2009	Risk, risk management	Literature review with quantitive and quality methods
Competitive advantage: creating and sustaining superior performance	Porter, 1985	Competitive advantage, strategy, risk	Literature review with quantitive and quality methods
Strategic risk, risk perception and risk behavior: Meta analysis	Cooper, Faseruk, 2011	Strategic risk, meta-analysis, risk perception, risk behavior	Meta-analysis with literature review
Strategic risk management: A primer for directors and management teams	Frigo, Anderson, 2011	Risk management, strategic risk management	Literature review
Risk management: An integrated approach to risk management and assessments	Alina, 2012	Risk management, risk assessment, audit universe	Integrated approach and score method with literature review
Thirteenth edition strategic management concepts and cases	David, 2011	Strategic management and theory	Case studies with literature review
Strategic management theory and practice	Parnell, 2014	Strategic management and theory	Case studies with literature review
Strategic management for senior leaders: A handbook for implementation	Wells, 1998	Strategic management and implementation	Case studies with literature review

Source: Author

in developing countries "unequalled as a percentage of the global economy since the beginning of the twentieth century". Honestly, the positions of various developing countries were consolidated as capital exporters. Due to this critical change, publicly owned funds started to move from developing countries to developed countries. That's why, governments of the developing world are going to under control of "the new international wealth" (Datz and Tech 2009).

On the other hand, the collapse of banking system turned into deep crisis in three ways. Firstly, the solvency of banks was threatened by advancing tide of bad dept. Secondly, the definite change in policy of Federal Reserve caused a panic in the inter-bank lending market. Thirdly, stock market investors also panicked sending bank shares into freefall. In spite of the fact that these matters firstly happened in the USA, the banking crisis influenced the major industrialized countries that made loans in these markets. Consequently the turmoil was deeply influenced the economic growth of the world. Therefore present perspective is uncertain because of the risks (Bran et al. 2011).

While investigating the effects of turmoil on global economy, some parameters should be evaluated as exchange rates, oil prices, energy and food commodity prices, houses prices, and employment levels, etc.

By virtue of the financial turmoil fluctuations in exchange rates have risen significantly. Volatilization between the major currencies was recorded in high

levels. The US dollar was appreciated exchange rate. At the same time economic growth of other countries got worse and sharp drop of oil prices has great influence on other countries. Because of the tentativeness of future exchange rates, the attention of investors to the foreign exchange market has decreased. Moreover, food and energy commodity prices have diminished sharply. The effect of tax rebates on personal consumption has almost been drawn. On the other hand, reduction of employment level, slacking of wage growth, falling of equity and house prices have depressed the consumption of household. US business investment and US exports have been depressed by the other countries by virtue of slower growth, stronger dollar and finally financial turmoil. This turmoil had also great influence of economic growth in Europe. Demand of the household has diminished with sharp decrease of financial assets and high levels of consumer price inflation (Monetary Policy Report 2008).

When compared with today, it can be said that the great effects of turmoil traces still have not been removed completely. According to Fig. 1 which shows financial conditions index of USA, Japan and Euro area, financial conditions of advanced economies have become less supportive than expected. It took 4 years to reach to the pre-crisis levels of financial conditions. The growth of world trade volumes had been influenced from the recession and the impact in the developing countries took longer time than anticipated.

The OECD Financial Conditions Index is a weighted average of long-term and real short interest rates, bank credit conditions, real exchange rate, household wealth and the yield spread between corporate and government long-term bonds. A unit increase (decline) in the index implies an easing (tightening) in financial conditions sufficient to produce an average increase (reduction) in the level of GDP of ½ to 1 % after four to six quarters.

When evaluating present economic conjuncture, the point of view of IMF chief economist Maury Obstfeld is remarkable. According to Obstfeld, the year of 2016 will be an abundance of challenge and emerging markets will be at the center. Flows of capital have been down, sovereignty areas have widened, some of the reserves have been spent and the economic growth of some countries became slow sharply. Further sharply falls in energy and commodity prices would cause new problems for exporters (Obstfeld 2016). All of these events may be a signal of an incoming crisis that has a potential to affect most of the countries.

The capitalist economy of the world has been based upon rapid growth in China and several emerging markets that depends on huge growth of debt. On the other hand, there is a sharp decrease in business investment of USA and the other industrialized countries. In these circumstances a strategist Albert Edwards who is working for Societe Generale, told in an investment conference at London. According to Edwards current economic developments may cause a recession in the USA and there will be a new financial crisis. Also he stated that the credit expansion in the USA was not for real activity. Moreover, China is getting slower rapidly, Russia and Brazil are in deep recessions, and the influence of rising debt and falling commodity prices brings about sinking of other emerging market economies (Grey 2016).

Fig. 1 OECD financial conditions index. Source: OECD Economic Outlook, Volume 2015, Issue 2, OECD 2015—Preliminary Version

4 Conclusion

Investigating the history of turmoil shows that crisis is inevitable. However efficient crisis management has become more and more important under present economic conditions and competitive landscape.

As it was in the past every crisis occurs unexpectedly and its timing determines commercial reactions of the firms and the countries. While some companies turn the crisis into an opportunity, other ones are collapsed. The question is how to react to the unforeseen issues immediately in the economic environment of the globalizing world. That's why the financial crisis attracted the attention of the researchers for developing survival skills not only for companies, but also for countries. Maybe none of the companies and the countries know when the crisis would come, but every company and country can take measures for prevention of destructive effects of crisis according to their global competitive power.

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International Financial Centers After the 2008–2009 Global Financial Crisis

Mehmet Fatih Bayramoglu and Sinan Yilmaz

Abstract Although the financial crisis of 2008–2009 originated in the USA, its effects reverberated throughout the globe. The crises have also had effects on the balance of power among the competing global financial centers. Although developed nations have been able to maintain their general competitive positions for investors, new financial centers began attracting attention. This chapter the post financial crises competitive positions of international financial centers are evaluated on dimensions of "financial development", "doing business" and "quality of life and cost of living" through cost-benefit analysis using TOPSIS (Technique for Order Preference by Similarity to an Ideal Solution) method. The findings of the study where financial centers of 15 countries were evaluated show that; (1) in regards to financial development the financial centers of developed nations maintain their importance for investors, (2) in regards to doing business the financial centers of Asian nations appear more advantageous, (3) developing nations can compete with developed nations when it comes to "quality of life and cost of living", (4) Generally, although the financial centers of developed nations can protect their competitive positions the developing nations of Asia are increasing their competitiveness. Financial centers in Europe seem to have lost some of their competitiveness as a result of the global financial crises.

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1 Introduction

Investors prefer to undertake their activities in different centers instead of a single location for investing in novel financial instruments and services or keeping costs under control when managing existing markets. Therefore, they require liberal environments enhanced by various legislations and incentives, offering strong infrastructure, qualified human resources, and life and business security to ensure effective and efficient business operations. Sovereign states require direct and indirect foreign investments in addition to domestic capital stock and investment to ensure sustainability of economic development. Therefore, states need to offer these facilities and resources to domestic and foreign investors alike.

Throughout the World, countries encouraging clustering of domestic and foreign investors tend to establish one or two financial centers with appealing features and intend to establish clusters at these locations. The purpose of these centers is to cluster local networks and foreign investments in these financial centers and establish a sustainable structure to support economic growth in the country.

Highly capitalist financial centers like New York and London have been prominent throughout history. However, the spread of capitalism through globalization has established important financial centers offering new opportunities to investors in the Far East, the Middle East, and Western Asia. By increasing the alternatives available for investors, who are able to act globally, this has resulted in greater competition among global financial centers.

Competitiveness of financial centers can be evaluated in parallel to the development level of national economies that host these centers. The most important determinant of competition among financial centers in recent times has been the financial crisis of 2008–2009, which initially began in the US but resulted in effects of systemic risk reaching global proportion due to the globalization of finance. The effects of this crisis, which can still be felt in certain economic regions raised a various questions for researchers of competition between financial centers: "How has the global financial crisis affected the financial centers league?" and "How has the competition between transnational and local financial centers been shaped in light of the financial crisis". Also, investors undertake a decision process to select financial centers to base their operations based on their interests. Therefore, investors ask the question "what are the competitive outlooks of financial centers following the global crisis?" The search for answers to these questions forms the principle motivation of the present study. To answer these questions, we analyze the post-crisis condition of 15 financial centers by developing four different models using a multi-criteria decision model called TOPSIS (technique for order preference by similarity to an ideal solution). Of the 15 financial centers being evaluated; 8 are classified as global, 4 transitional and 3 local financial centers. The post-global financial crisis conditions of these financial centers are assessed through three scales; "financial development," "doing business," and "quality of life and cost of living." The study also develops a general ranking model that takes into consideration these three scales.

The organization of the rest of the study is as follows. Section 2 provides a general, albeit, a brief review of the global financial crisis of 2008–2009 and its effects on financial centers. Section 3 provides definition and description of the concept of financial centers and economic clusters. Section 4 provides explanations on the TOPSIS model and its calculations. Section 5 consists of the application and analysis of the model. Section 6 presents the findings and evaluations. Lastly, Sect. 7 provides conclusions.

2 Development and Contagion of the Global Financial Crisis and Its Effects on Financial Centers

Financial problems emerging in the housing and mortgage markets in the USA in mid-2007 began to spread to other financial instruments and by September 2008, many of the substantial financial institutions faced the danger of insolvency. The crisis shook financial and real sectors of all countries from Europe to Asia; unemployment increased exports and stock indices fell, and many businesses became bankrupt.

Although the crisis emerged as a mortgage crisis, it morphed into a liquidity crisis. Since then many factors cited as causing the crisis include; excessive liquidity and resultant careless lending, excessive securitization, lack of transparency in the financial sector or opaqueness, deficiencies in the effectiveness of rating organizations and delay in intervention by regulatory and oversight organizations (Arner and Schou-Zibell 2010).

During this crisis when homeowners began having difficulty making mortgage payments, derivatives whose value are based on these loans, SWAPS, and other mortgage-based securities began to lose much of their values. Financial institutions like Bear Stearns, AIG, Lehman Brothers and Citibank who profited greatly from selling "warranties" on mortgage-based securities did not foresee the possibility that they could lose value. When homeowners began to default on their mortgage payment financial institutions in turn, had difficulty servicing principle and interest payments on mortgage-based securities. Defaults on mortgage payments and its follow-on effects caused imbalances in the cash flows of these financial institutions and caused a dramatic meltdown of their equity and increase in debt. With rapid contagion, large financial institutions in the USA and Europe pushed the global financial system to the brink of a systemic meltdown. Factors such as global transaction networks of financial institutions and interbank borrowing caused the crisis to spread initially to Europe and eventually to developing countries and the rest of the world. Hence, the crisis that began in global markets transformed into a global recession (Chambers 2008).

Worldwide effects of the 2008 global financial crisis quickened through spreading volatility. The effects of the crisis spread across financial markets through three types of effects. These were direct effects, indirect effects, and second-round

effects. Direct effects exhibited themselves as a rapid decrease in the prices of toxic US mortgage-based financial assets owned by many international financial institutions, particularly in Europe (Gardo and Martin 2010). In this context, liquidation of a large global organization like Lehman Brothers created a spillover effect among other financial institutions and banks that form links of the international credit chain and had dealings with it (Fernando et al. 2012).

Indirect effects resulted from foreign investors withdrawing investments from developing markets because of falling asset prices. While direct and indirect effects explain price implications in the markets, another type of effect explains the impact of the crisis on investment volume. This effect is also called the second-round effect and refers to adverse effects on countries' foreign exchange markets and securities markets due to decreasing investor confidence. This tends to affect the real economy by reducing both consumption and investment (Gardo and Martin 2010).

While European countries were hit the hardest by the crisis, Turkey, Brazil and China were affected less by the global crisis than European and other emerging economies and recovered quicker (BRSA 2010). Therefore, it can be claimed that developments in these economies caused by the financial crisis also had effects on the competitive balance among global financial centers. While the financial centers in countries that recovered from the crisis more quickly rose in the rankings of financial centers, those experiencing longer lasting effects, especially those in some European countries experienced a relative loss of their competitiveness. In their report titled "Global Financial Centers Index-18, The Qatar Financial Center" (QFC 2015) indicate that prominent global financial centers like London, New York, Hong Kong, and Singapore maintain their importance, albeit, the decade-long rise of Asian financial centers like Shanghai, Beijing, and Shenzhen. The QFC report underlines the increasing competitive power of these three financial centers and impact on economic growth in China. In other words, although deep-rooted financial centers maintain their importance in the post-crisis global arena the gap between them and their competition in emerging financial centers is closing.

3 Financial Centers, Economic Clusters, and the Global Financial Centers

Clustering model, which has a proven track record in increasing regional, industrial and local competitiveness, is a type of organizing model that finds wide use in developed and developing economies. One early proponent of the organization concepts, Micheal E. Porter, defines clusters as "geographic concentrations of interconnected companies and institutions in a particular field." Clusters composed of an array of linked industries and other entities that provide significant contributions to competitiveness. Clusters include, for example, suppliers of specialized inputs like components, machinery, and services, and providers of specialized

infrastructure. Interlinkages that characterize clusters may extend downstream to channels and customers and laterally to providers of complementary products and services and businesses related to skills, technologies, or common inputs. Lastly, "many clusters include institutions such as government bodies, universities, standard-setting agencies, think tanks, vocational training providers, and trade associations that provide specialized training, education, information, research, and technical support (Porter 1998)."

Contemporary financial centers could be classified as highly clustered organizations. Financial center clusters emerge as structures composed of clusters of financial intermediaries and products concentrated around a particular location (Yee 2006). A global financial center then, is a concentration of a wide variety of international financial businesses and transactions in one location (Yeandle et al. 2005). In other words, an international financial center is a financial center that has expanded to include offices of international financial intermediaries or that has expanded to include a large proportion of international investors in addition to domestic intermediaries and investors. Furthermore, the origins of financial instruments and other services offered in these centers exhibit a variety on a global scale.

Financial centers are not structures that merely bring together financial instruments. Finance by nature is a service industry. Therefore, financial centers are clusters of services and service providers that include consulting, education, accounting and auditing, hospitality, travel, transportation, customs, advertisement, communications, technology and other infrastructure, human resources management, real estate, health, security, catering, facilities management among many others (Yee 2006). Also, there are many examples of special legislation and incentives being used for establishment and support of financial centers. As such, although financial services and instruments are a central feature, financial centers are comprehensive clusters made up of clusters of several types of businesses. Within this context financial centers are classified as "global", "transitional", and "local" according to the degree to which the cluster is globalized (QFC 2015). Globalization of financial centers is made possible by providing the key factors which are identified by Security Industries Association (SIA 2007) as follows:

- Open and Fair Financial Markets
- Free Flow of Capital and a Convertible Currency
- Skilled Workforce/Flexible Labor Laws
- Prevalent Use of a Globally Familiar Language
- Fair, Transparent, Efficient Legal, and Regulatory Regime
- Sound and Fair Tax Regime
- International Standards
- Low Cost of Doing Business
- High Quality, Reliable and Appropriate Physical Infrastructure
- Stable Political and Economic Environment (SIA 2007).

As can be seen from these key factors becoming a financial center that can be characterized as a globalized cluster requires successful management process on many dimensions. The fact that success of such a process depends on many factors

makes it possible for these centers increase their competitiveness through improvements while the reverse also holds true.

Naturally, financial crises are one of the most major disruptors of stability. For example, the emotional burden of a financial crisis on an economy, a government's inability to manage such a crisis or prolonged recovery can have adverse effects on the key factors identified by SIA, and this can, in turn, reduce a financial center's competitiveness.

Nevertheless, crisis, like the 2008–2009 global financial crisis whose systemic effects play out on not only the financial system but also the real economy ends up having detrimental effects on other members of the cluster. In other words, the latest global financial crisis has affected the whole of the cluster.

4 TOPSIS Method

TOPSIS (technique for order preference by similarity to an ideal solution) is a multi-criteria decision-making technique that identifies the best solution from a finite set of alternatives. The principle idea of the method is that the chosen alternative should have the shortest distance from the positive ideal solution and the longest distance from the negative ideal solution. The TOPSIS method takes into consideration two "reference" points, but it does not consider the relative importance of the distances to these points (Hwang and Yoon 1981).

The mechanism of TOPSIS can be expressed in a series of steps (Jahanshahloo et al. 2006):

1. Calculate the normalized decision matrix. The normalized value n_{ij} is calculated as;

$$n_{ij} = \frac{x_{ij}}{\sqrt{\sum_{i=1}^{m} x_{ij}^2}}, \; i = 1, \ldots, m, \; j = 1, \ldots, n \tag{1}$$

2. Calculate the weighted normalized decision matrix. The weighted normalized value v_{ij} is calculated as;

$$v_{ij} = w_j n_{ij}, \; i = 1, \ldots, m, \; j = 1, \ldots, n \tag{2}$$

Where w_j is the weight of the ith attribute or criterion, and $\sum_{i=1}^{n} w_j = 1$

3. Determine the positive ideal and negative ideal solution

$$A^+ = \left\{v_1^+, \ldots, v_n^+\right\} = \left\{\left(\max_j v_{ij} \middle| i \in I\right), \left(\min_j v_{ij} \middle| i \in J\right)\right\} \tag{3}$$

$$A^- = \left\{v_1^-, \ldots, v_n^-\right\} = \left\{\left(\min_j v_{ij} \middle| i \in J\right), \left(\max_j v_{ij} \middle| i \in I\right)\right\} \tag{4}$$

where I is associated with benefit criteria, and J is associated with cost criteria.

$$d_i^+ = \left\{\sum_{j=1}^{n}\left(v_{ij} - v_j^+\right)^2\right\}^{\frac{1}{2}},\ i = 1, \ldots, m \tag{5}$$

$$d_i^- = \left\{\sum_{j=1}^{n}\left(v_{ij} - v_j^-\right)^2\right\}^{\frac{1}{2}},\ i = 1, \ldots, m \tag{6}$$

4. Calculate the relative distance to the ideal solution. The relative distance of the alternative A_i in respect to A^+ is defined as;

$$R_i = d_i^- / \left(d_i^+ + d_i^-\right),\ i = 1, \ldots, m \tag{7}$$

Since $d_i^- \geq 0$ and $d_i^+ \geq 0$, then, clearly, $R_i \in [0, 1]$

5. Rank the preference order. For ranking alternatives using this index, we can rank alternatives in decreasing order.

5 Application

As indicated in the preceding sections of this chapter the 2008–2009 global financial crisis affected both the financial and the real sectors throughout the world to differing degrees. Some countries were able to recover from this crisis compared to the US and European countries, partly due to measures implemented and partly due to a lower level of globalization. Also, countries that had experienced a previous crisis in the last 15 period, like Russia, Turkey, some South American and Asian countries were able to use this experience for a quicker recovery from the 2008–2009 global financial crisis.

Financial centers compete among themselves for retaining both operations and funds of foreign investors. In this manner, the aforementioned operations or funds can be used to contribute to various activities in other sectors that are a part of the cluster that makes up the financial center to create a leverage effect. However, the decision by an operation or fund to select a given financial center as a base is the result of a decision process that takes into consideration both internal and external factors. While the external factors can be explained from a financial perspective through systemic risk, a more general perspective also takes the location of the

financial center into consideration. Internal factors cover a wider range of topics including the level of development of human capital, legislation, and incentives, transportation, accommodations, consultancy services, the existence of foreign language schools among others.

The present study employs the TOPSIS method to compare the post 2008–2009 Global Financial Crisis state of 15 international financial centers on various internal and external factors derived from the literature. The continental distribution of these financial centers is; 6 Asia, 2 North America, 2 South America, 2 Europe, 2 Asia/Europe and 1 Middle East. The financial centers evaluated are; Dubai, Hong Kong, Kuala Lumpur, Istanbul, London, Mexico City, Moscow, Mumbai, New York, Paris, Sao Paulo, Shanghai, Singapore, Tokyo, and Toronto. Although some of the chosen countries host more than one financial center, only one financial center per country was included in the study. When more than one financial center was present, the best-known center was selected. Table 1 shows the financial centers included in the study.

As can be seen in Table 1 the study examines 8 global, 4 transitional and 3 local financial centers. To be able to analyze the competitiveness of these centers four models were built using the TOPSIS method. The objective of these models, also generating a general ranking of the financial centers, is to evaluate these financial centers on three categories of factors; "financial development", "doing business" and, "quality of life and cost of living". For each category, a number of criteria were selected by the literature on the topic. The following tables indicate the name, data source and short explanation for each criterion. It should be noted that the years for the given criteria can vary, but the data represents the most up to date data that could be accessed for all financial centers.

Table 2 includes ten criteria that are classified under "Financial Development". The analysis performed on Sect. 6 of this chapter; Analysis-1: Results of Financial Development Category is shown using criteria presented here, and each criterion is given equal, 10 %, weight.

Table 3 includes eight criteria that are classified under "Doing Business". The analysis performed on Sect. 6 of this chapter; Analysis-2: Results of Financial

Table 1 Financial centers included in the analysis

Asia	Europe	Asia/Europe	Middle East	North America	South America
Hong Kong (G*)	London (G)	Istanbul (T)	Dubai (G)	New York (G)	Mexico City (L)
Kuala Lumpur (T**)	Paris (G)	Moscow (T)		Toronto (G)	Sao Paulo (L)
Mumbai (L***)					
Shanghai (T)					
Singapore (G)					
Tokyo (G)					

**G* Global, ***T* Transitional, ****L* Local

Table 2 Performance criteria for financial development category

Criteria code	Financial development	Data source and explanation
A1	GDP per capita of the city (PPP, $)	**Data Source:** Brookings. **Explanation:** To generate GDP by metropolitan area, this study sums county-level GDP estimates from Moody's Analytics using county-based metropolitan area definitions. Oxford Economics collects data from national statistics bureaus in each country or providers such as Haver, ISI Emerging Markets, and Eurostat. It then calculates forecasted metropolitan GDP as the sum of forecasted industry GVA at the metropolitan level
A2	Private domestic bond market capitalization to GDP (%)	**Data Source:** World Bank. **Explanation:** This variable is the domestic debt securities issued by financial institutions and corporations as a share of GDP
A3	Trade openness	**Data Source:** World Economic Forum**. Explanation:** Trade Openness is the sum of exports and imports of goods and services measured as a share of the gross domestic product
A4	Value of share trading ($)	**Data Source:** World Federation of Exchange**. Explanation:** Market capitalization is the share price times the number of shares outstanding for listed domestic companies
A5	Market capitalization Ratio (%)	**Data Source:** World Federation of Exchange. **Explanation:** Market capitalization is the share price times the number of shares outstanding for listed domestic companies as a share of GDP
A6	Number of share trading (per share)	**Data Source:** World Federation of Exchange. **Explanation:** The number of shares traded in a security or an entire market
A7	Bank deposits to GDP (%)	**Data Source:** World Bank**. Explanation:** This variable shows the demand, time, and savings deposits in deposit money banks as a share of GDP
A8	Aggregate profitability indicator	**Data Source:** World Economic Forum. **Explanation:** This variable is based on a 3-year average of three measures of profitability: net interest margin, bank return on assets, and bank return on equity
A9	Tier 1 capital ratio	**Data Source:** World Economic Forum. **Explanation:** This is the weighted average Tier 1 regulatory capital ratio at the ten largest banks
A10	International Debt Issues to GDP (%)	**Data Source:** World Bank. **Explanation:** International debt issues to GDP represent the total value of outstanding public and private debt securities placed on international markets as a share of GDP

Development Category is carried out using the criteria presented here, and each criterion is given equal, 12.5 %, weight.

Table 4 includes five criteria that are classified under "Quality of Life and Cost of Living". The analysis performed on Sect. 6 of this chapter; Analysis-3: Results of

Table 3 Performance criteria for doing business category

Criteria code	Doing business	Data source and explanation
B1	Occupancy cost	**Data Source**: Cushman & Wakefield. **Explanation:** Occupancy Cost per Sq. M. per Year (Rent and Additional Costs). Euro
B2	Cost of enforcing contracts	**Data Source:** World Economic Forum. **Explanation:** This variable is the cost of enforcing contracts as a percent of the legal claim
B3	Corporate income tax	**Data Source:** World Bank Group & PwC. **Explanation:** Corporate income tax is a tax based on the income made by the corporation
B4	Time required for enforcing a contract	**Data Source:** World Economic Forum. **Explanation:** Number of days to resolve a dispute counted from the moment the plaintiff decides to file the lawsuit in court until payment
B5	The networked readiness index 2014	**Data Source:** World Economic Forum. **Explanation:** The World Economic Forum's Networked Readiness Index (NRI), also referred to as Technology Readiness, measures the propensity for countries to exploit the opportunities offered by information and communications technology (ICT)
B6	Hotel prices ($)	**Data Source:** Numbeo. **Explanation:** A Relative indicator of prices of 3 star and 4-star hotels in the given city. The mean value of value prices for 3-star and 4-star hotels is used to calculate this index
B7	Tertiary education enrollment rate (%)	**Data Source:** World Economic Forum **Explanation:** The reported value corresponds to the ratio of total tertiary enrollment, regardless of age, to the population of the age group that officially corresponds to the tertiary education level
B8	Intellectual capital and innovation index	**Data Source:** PwC, **Explanation:** IPI index are composed by sub-indexes of Libraries with public Access, Math/Science Skills Attainment, Literacy and Enrollment, Percent of Population with Higher Education, World University Rankings, Innovation Cities Index, Intellectual Property Protection, and Entrepreneurial Environment

Quality of Life and Cost of Living Category is performed using the criteria presented here, and each criterion is given equal, 20 %, weight.

The analysis performed on Sect. 6 of this chapter; Analysis-4: Results Overall is performed using all the criteria presented in Table 2, Table 3 and, Table 4 together. However, in the weight matrix generated for the TOPSIS model the criteria for "Financial Development" was given 50 % weight while the criteria for "Doing Business" and "Quality of Life and Cost of Living" were given 25 % weights. The underlying cause for such weighting is the assumption that "Financial Development" is more important than the other categories.

Table 4 Performance criteria for quality of life and cost of living category

Criteria code	Quality of life and cost of living	Data source and explanation
C1	Apartment rent per month ($)	**Data Source**: Numbeo. **Explanation:** Apartment (3 bedrooms) in City Centre rental price
C2	Crime rates index	**Data Source:** Numbeo**. Explanation:** Is an estimation of the overall level of crime in a given city
C3	Air pollution index	**Data Source:** Numbeo. **Explanation:** Pollution Index is an estimation of the overall pollution in the city
C4	Traffic index	**Data Source:** Numbeo. **Explanation:** Is an estimation of dissatisfaction due to long commute times
C5	Health index	**Data Source:** Numbeo. **Explanation:** Is an estimation of the overall quality of the health care system, health care professionals, equipment, staff, doctors, cost, etc

Table 5 Analysis-1: Results of financial development category

Rank	Profile	Financial center	Values of the relative closeness of ideal solution (R_i)
1	Global	New York	0.5621
2	Global	Hong Kong	0.4910
3	Global	London	0.3784
4	Global	Singapore	0.3309
5	Global	Paris	0.3075
6	Global	Tokyo	0.2839
7	Transitional	Kuala Lumpur	0.2640
8	Global	Toronto	0.2282
9	Global	Dubai	0.1699
10	Transitional	Shanghai	0.1632
11	Transitional	Moscow	0.1223
12	Local	Sao Paulo	0.1049
13	Transitional	Istanbul	0.0932
14	Local	Mexico City	0.0920
15	Local	Mumbai	0.0816

6 Findings and Discussions

As stated in the previous sections of this chapter four TOPSIS models were developed for the evaluation of financial centers. In this section, the findings of these models are presented (Table 5).

1. From the Financial Development perspective, financial centers of highly developed countries maintain their prominence. Although the global financial crisis centered in the USA, New York continued to preserve its first rank as the

primary financial center in the world. What is interesting is that Hong Kong has a R_i score close to that of the USA. This is a sign that there is likely to be an intense competition between New York and Hong Kong. Although London ranks third in financial development in terms or R_i score it is rather distant from the first two centers. When the fact that Paris ranks fifth, behind Singapore, is taken into consideration, it can be deduced that financial centers of Europe, which still has to recover from the effects of the crisis, will face intense competition not only from the USA but also Asian countries. Analysis results indicate that transitional financial centers are able to compete with global financial centers regarding financial development, with Kuala Lumpur being able to surpass both Toronto and Dubai. Also, the fact that Kuala Lumpur is able to attain a R_i score close to those of global centers (i.e., Paris and Tokyo) shows that financial centers in Asia are able to increase competitive pressure regarding financial development. Two transitional financial centers that usually compete against each other due to geographic location, Moscow and Istanbul can be observed to achieve lower ranks, even though Moscow has a slightly higher R_i score compared to Istanbul (Table 6).

2. From the "Doing Business" perspective, three Asian financial centers take place in the top six ranks, and the R_i scores are very close. This indicates that Asian financial centers are very attractive for investors. Another important finding here is that Moscow and Shanghai, although transitional financial centers have such high placement in the ranks. The factors in this category represent infrastructure investment in the financial centers and suggest that shortly transitional financial centers will be very competitive to global financial centers in terms of doing business. Another finding that supports this observation are the R_i scores of the

Table 6 Analysis-2: Results of doing business category

Rank	Profile	Financial center	Values of the relative closeness of ideal solution (R_i)
1	Global	Singapore	0.7353
2	Transitional	Moscow	0.7159
3	Global	Toronto	0.6924
4	Global	Paris	0.6545
5	Transitional	Shanghai	0.6382
6	Global	Hong Kong	0.6280
7	Global	Dubai	0.6186
8	Transitional	Istanbul	0.6079
9	Transitional	Kuala Lumpur	0.6021
10	Global	Tokyo	0.5689
11	Local	Mexico City	0.5601
12	Global	New York	0.5581
13	Local	Sao Paulo	0.4986
14	Global	London	0.4820
15	Local	Mumbai	0.3595

other two transitional financial centers; Istanbul and Kuala Lumpur, which rank eighth and ninth. Also, the fact that three global financial centers; Tokyo, New York and London, lag behind the transitional financial centers support this suggestion. Nonetheless, the doing business findings should not be surprising given that the infrastructures of global financial centers were completed a long time ago and had been consumed for a longer time. The infrastructure investments in the developing financial centers are still ongoing, and they are expected to show quicker improvements in the category of performance criteria. Also, it should not be forgotten that the global financial crisis has had a more detrimental effect on the infrastructure investments of the USA and Europe, with the resultant reflection of this effect on the rankings.

The progress made by transitional financial centers in the Doing Business dimension can be explained by the increasing intellectual capital and relatively attractive office costs. Since global financial centers are, by design, more attractive for investors, concentrations in these centers are higher than transitional and local financial centers. This results in an increased concentration of intellectual capital factors like skilled human resources in global financial centers. Transfer of human capital of other countries to these centers through "brain drain" is also a widespread phenomenon (Lang 2012). However, recent studies show positive developments in the intellectual capital of transitional financial centers (PWC 2014). Therefore, both lower rental and purchase costs associated with office space, and improvement in intellectual capital signals an improvement in the future global competitiveness of transitional financial centers (Table 7).

3. "Quality of Life and Cost of Living" is crucial for increased availability of skilled human capital in financial centers and developing countries can compete with developed ones in this category. The most important indicator of this is the fact that two of the top four financial centers on this category are in developing countries. Two transitional financial centers located in developing countries, Istanbul and Shanghai, are observed to have higher competitiveness on this category than other developing financial centers. Costs are an important factor considered by investors when locating their operations abroad. The high costs of living in the advanced economies and financial centers greatly help the competitive advantages of transitional centers in this domain. Particularly in the US and Europe, problems related to healthcare, rising healthcare costs, increasing crime due to unemployment and immigration are having adverse effects on financial centers. Increased investments in transitional centers towards increasing quality of life and relatively lower cost of living in these economies translate into competitive advantages for these countries. We find that lower costs enable even some of the local financial centers to surpass global financial centers on this domain (Table 8).
4. Lastly, according to general results while financial centers in developed nations can maintain their competitiveness, developing Asian countries are also increasing their competitiveness. While New York maintains its top rank in a general evaluation, the following four ranks are occupied by financial centers from Asia. The relatively strong performance of transitional financial centers like Kuala

Table 7 Analysis-3: Results of quality of life and cost of living category

Rank	Profile	Financial center	Values of the relative closeness of ideal solution (R_i)
1	Global	Toronto	0.765
2	Transitional	Istanbul	0.676
3	Global	Tokyo	0.656
4	Transitional	Shanghai	0.641
5	Global	Singapore	0.634
6	Global	Dubai	0.595
7	Global	Paris	0.573
8	Local	Mexico City	0.555
9	Local	Mumbai	0.547
10	Transitional	Kuala Lumpur	0.541
11	Global	Hong Kong	0.537
12	Transitional	Moscow	0.526
13	Local	Sao Paulo	0.505
14	Global	London	0.406
15	Global	New York	0.352

Table 8 Analysis-4: Results overall

Rank	Profile	Financial center	Values of the relative closeness of ideal solution (R_i)
1	Global	New York	0.5469
2	Global	Hong Kong	0.5040
3	Global	Singapore	0.3947
4	Global	London	0.3908
5	Global	Paris	0.3662
6	Global	Tokyo	0.3523
7	Transitional	Kuala Lumpur	0.3384
8	Global	Toronto	0.3374
9	Transitional	Shanghai	0.2966
10	Global	Dubai	0.2861
11	Transitional	Istanbul	0.2637
12	Transitional	Moscow	0.2622
13	Local	Mexico City	0.2571
14	Local	Sao Paulo	0.2416
15	Local	Mumbai	0.2144

Lumpur and Shanghai supports these findings. In Europe, which is dependent on US funds and has not been able to recover from the effects of the crisis an apparent decrease in competitiveness is visible. The effects of the global crisis have also failed to move the local financial centers into higher positions in the rankings. As a result, the competition is clearly between global and transitional players.

7 Conclusion

The greatest economic problems faced by the US since the Great Depression of 1929 has been the 2008–2009 Global Financial Crisis (Bulkot 2015). This crisis has also had adverse worldwide effects to various degrees because of contagion of systemic risk. Also affected were the on financial center clusters. In this chapter, the post financial crises competitive positions of international financial centers are evaluated on dimensions of "financial development", "doing business" and "quality of life and cost of living" through cost-benefit analysis using TOPSIS (Technique for Order Preference by Similarity to an Ideal Solution) method. The findings of the study where financial centers of 15 countries were evaluated show that; (1) in regards to financial development the financial centers of developed nations maintain their importance for investors, (2) in regards to doing business the financial centers of Asian nations appear more advantageous, (3) developing nations can compete with developed nations when it comes to "quality of life and cost of living", (4) Generally, although the financial centers of developed nations can protect their competitive positions the developing nations of Asia are increasing their competitiveness. Also, the competitiveness of financial centers of Europe has decreased visa vis the financial centers in other regions. (5) The findings of the study, which are compatible with publications like the "Global Financial Center Index" and "Doing Business Report" covering the same period show that the TOPSIS method is effective in evaluating the performance of financial centers. (6) The compatibility with the literature indicates the soundness of the performance measures used in the study. (7) Lastly, in the overall analysis of the performance criteria related to "financial development" was assumed to be more important than the criteria for "doing business" and "quality of life and cost of living" regarding contribution to competitiveness. The compatibility of the obtained results with the literature supports this assumption. Therefore, the principle factor forming the backbone of financial center clusters is clearly observed to be financial concentration.

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Economic Crisis and the Changes in Functioning of International Financial Institutions: The Case of European Developing Countries

Ljiljana Kontić

Abstract The aim of the paper is to assess the international financial institutions (IFIs) response to the global economic crisis in the European developing countries. In their response to the global crisis, the international financial institutions have increased funds for shock financing as well as significantly reformed their instruments. The Euro area is faced with a new attitude towards the international financial institutions, particularly the International Monetary Fund. With regard to the European developing countries, the research reveals that IFIs expanded its policy lending. The economic outlook includes the rate of economic growth, inflation rate and fiscal deficit. The results of analysis showed that the European developing countries, regarding the economic growth have shown a different rates—from a sharp decline to positive growth. All countries had inflation rate above the average of EU members and fiscal deficits. To prevent future financial crisis in the European developing countries it is necessary to create safety net by EU member countries, then to reform IMF.

1 Introduction

The economic crisis has caused the evolutionary changes in the functioning of the international financial institutions (IFIs). In the last 60 years, the international financial institutions have moved from a guarantor of stability of the global economic system, through rescue creditors to the advisers of transition in post socialist countries.

The financial crises are more frequent than economic crisis, especially in the twentieth and twenty-first centuries. The question that economists expose is why there is not a lesson related the economic policy? The neoclassical theory did not recognize the crisis, but when it became obvious, it was only noted that it is inevitable and even useful. The rational behavior, perfect competition, and the

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perfect markets, leading to the general equilibrium that does not require absolutely no intervention of the economic policy. In real terms there is, however, imperfect competition, monopolies and oligopolies, a structure of international trade can no longer be analyzed at the level of national economies.

Since the beginning of the financial crisis, its effects on the real sector have not be visible, but this situation had changed very quickly. The lower housing prices, lower stock prices (initially launched by financial institutions because of the fall in the market value of securities), higher risk premiums and more rational lending, began to take its toll in the second half of 2007. And when all wished for the end of the newly emerging crises disorders, in the fall of 2008. The impact of the crisis suddenly becomes more evident. Concerns that the financial crisis has worsened and that can lead to new Great Depression, led to a sharp decline in stock prices, but also the fall in consumer and corporate confidence worldwide.

This happened as a result of the aggregation of several basic causes during the previous period in which the crisis is invisible. These causes are shaped by the crisis, but we must point out some additional mechanisms which is reinforced and accelerated. Blanchard (2009) identified two related but, at the same time, different mechanisms: first, the sale of assets to meet liquidity, and other investors, selling assets in order to re-establish adequate capital koeficijenti. Together with the initial conditions that provoked the crisis, these mechanisms have been further helped the emergence of the worst global recession since the '30s of the XX century.

Since the onset of the financial and then global economic crisis in 2008, the international financial institutions (IFIs) have struggled to stay relevant. The principal IFIs are (Truman 2011: 2): the International Monetary Fund, the World Bank group and the various regional development banks, the World Trade Organization, which evolved out of the General Agreement on Tariffs and Trade, and the Bank for International Settlements (BIS) and the cluster of groups that generally meet at the BIS in Basel, Switzerland, in particular the Financial Stability Board (FSB), formerly the Financial Stability Forum.

The European developing countries are: Albania, Belarus, Croatia, Moldova, Montenegro, Serbia, Bosnia and Herzegovina, Macedonia, Russia, Turkey, and Ukraine.

Besides introduction and conclusion sections, the paper is structured into five sections. The first section is devoted to the literature review; the second one is devoted to conception of analysis. Third section presents empirical data and analysis, followed by results and discussion part.

2 Literature Review

The literature on the effectiveness of aid focuses almost exclusively on the macroeconomic impact of aid, measuring the effects of aid on economic growth, savings, and investment. Aid flows are meant to fill the gap between investment needs and

domestics savings. In this paradigm, the expectation was that rapid growth initialed by the injection of foreign aid would lead to alleviate poverty.

The effects of foreign aid on recipient countries' growth were, at best, ambiguous. However, the results of many studies on the effectiveness of foreign aid found very little evidence that aid has any effect on development (Boone 1996; Burnside and Dollar 2004; Easterly 2006; Clemens et al. 2004).

Foreign aid does not promote economic development for two main reasons (Boone 1996: 327). First, capital shortage does not cause the poverty. Second, aid is not optimal for politicians to make necessary adjustments. In addition, foreign aid does not significantly increase investment, nor benefit the poor, but aid does increase the size of government. Easterly (2006) led a larger research using the data for 88 developing countries and found that in just six cases, aid had some positive influence on growth. Foreign aid could be effective when policies are good (Burnside and Dollar 2004). This suggests that multilateral aid favors countries with good economic policies. Who decides which policy is good? Free private capital markets, not the World Bank or the International Monetary Fund (IMF), can judge whether policies are good. The thrust of their strategy lies in the obligation upon the aid-receiving countries to align their own economic policies with the requirements of the IMF and World Bank. They have to develop themselves in a manner they want these countries to develop. Dependence on the aid-giving agencies has created a new type of poverties, and the massive foreign aid financing by IMF or World Bank cannot lead to poverty reduction. In many cases, dependence has result in an erosion of sovereignty and destabilization of societies. Foreign aid causes a "vicious circle of poverty." Sustainable social development is only possible through local resources, which can always be found if the programs are participatory in nature and low in cost.

Clemens et al. (2004) find positive, causal relationship between this type of aid and growth over a 4-year period. They also found a significant negative relationship between debt repayments and growth.

Moreover, the results of two studies revealed positive relationship between aid and growth (Hansen and Tarp 2001; Rajan and Subramanian 2008).

The volume of IFIs support has grown fast in recent years (Dellacha and te Velde 2007; Perry 2011) and became increasingly visible in developing economies (te Velde 2011).

There is a little empirical evidence of the effects of aid on growth in developing countries (see Table 1).

Many authors highlighted the import role for IFIs in managing shocks in developing countries (Griffith-Jones and Gottschalk 2012; Lee et al. 2008). During the global financial crisis, the IFIs external financing reduced developing countries' need for restrictive fiscal policies (Berensmann and Wolff 2014).

Table 1 Empirical evidence of the effects of aid on growth in developing countries

Author (year)	Subject	Variables	Methods	Findings
te Velde et al. (2010)	10 developing countries	Private capital flows, trade, growth, poverty	Synthesis of a case study	Only two countries reported a decline in aid in 2008
Institute of Development Studies (2008)	21 developing countries	Export, foreign investment, exchange rate, interest rates, remittances, foreign aid	Delphi method (21 experts)	Some private foundations scaled down their budget allocations especially in African countries
te Velde and Massa (2009)	15 donors of aid	Aid volumes, new aid instruments and reprogramming of aid programmes	Analysis of statistical data	The aid is pro-cyclical with both donor and recipient incomes
Massa (2011)	101 countries over 1986–2009	Foreign direct investment, trade, government expenditure and the inflation rate	Sectoral analysis	IFIs have a stronger growth impact in lower-income than in higher-income economies
te Velde (2011)	150+ developing and emerging economies	The share of investment, country-specific effects, time dummies, IFI investment	Regressions	All regressions show that investment rates are persistent over
Fic (2014)	Developing and developed countries	Government bond yields, the new regulatory capital, liquidity requirements, export prices	Scenario	The global economic policies may have a significant impact on the prospects of developing countries

3 The Conception of Analysis

The sample consisted of eleven European developing countries e.g. Albania, Belarus, Croatia, Moldova, Montenegro, Serbia, Bosnia and Herzegovina, Macedonia, Russia, Turkey, and Ukraine. To assess IFIs response to economic crisis in those countries, statistical data from various sources have been used.

The first part of analysis consisted of three main indicators (in percent): real GDP, inflation rate and fiscal balance, which have been compared in period 2006–2011. The second part presented amount of IFIs financial inflows in observed countries.

4 Empirical Data and Analysis

The results of analysis shows that the European developing countries, regarding the economic growth have shown a different rates—from a sharp decline in Ukraine (−14.8 %) and Russia (−7.8 %) to positive growth in Albania (3.3 %) and Belarus (0.2 %).

Table 2 Indicators of economic growth in European developing countries (2006–2011)

Country/indicators: real GDP (%) Inflation rate (%), Fiscal balance (% of GDP)	Year					
	2006	2007	2008	2009	2010	2011
Albania	5.5	6.3	6.8	3.3	3.5	2.5
	2.4	2.9	3.4	2.2	3.6	3.9
	−3.2	−3.8	−5.5	−7.4	−4.2	−3.7
Belarus	10	8.6	10	0.2	7.6	5
	7.0	8.4	14.8	13.0	7.7	41
	1.4	0.4	1.4	−0.7	−1.8	−0.9
Bosnia and Herzegovina	6.9	6.8	5.5	−2.9	0.7	2.2
	6.1	1.5	7.4	−0.4	2.1	4.0
	2.2	−0.1	−4.0	−5.5	−4.3	−3.0
Croatia	4.7	5.5	2.4	−6	−1.2	0.8
	3.2	2.9	6.1	2.4	1	3.2
	−1.8	−1.2	−0.9	−4.1	−5.0	−5.7
Macedonia	4	5.9	4.9	−0.9	1.8	3
	3.2	2.3	8.3	−0.8	1.5	4.4
	−0.5	0.6	−1.0	−2.7	−2.5	−2.5
Moldova	4.8	3.0	7.2	−6.0	6.9	7.0
	12.7	12.4	12.7	0.0	7.4	7.9
	0.0	−0.2	−1.0	−6.3	−2.5	−1.9
Montenegro	8.6	10.7	7.5	−5.7	1.1	2
	2.1	3.5	9.0	3.4	0.5	3.1
	2.1	6.4	−0.3	−6.5	−3.8	−3.4
Russia	7.7	8.1	5.6	−7.8	4.0	4.3
	9.7	9.0	14.1	11.7	6.9	8.9
	8.3	6.8	4.3	−6.3	−3.5	−1.1
Serbia	5.2	6.9	5.4	−3.5	1	2
	12.7	6.5	11.7	8.1	6.2	11.3
	−1.6	−1.9	−2.5	−4.5	−4.6	−4.6
Turkey	6.9	4.7	0.9	−4.8	8.9	6.6
	9.6	8.8	10.4	6.3	8.6	6.0
	−0.7	−2.1	−2.8	−6.2	−3.7	−1.4
Ukraine	7.3	7.9	2.1	−14.8	4.2	4.7
	9.1	12.8	25.2	15.9	9.4	9.3
	−1.4	−2.0	−3.2	−6.3	−5.7	−2.8

Source: Recovery (2009) and Recovery (2011)

If we look at the average inflation (measured by the consumer price index), we will notice that in the biggest crisis of 2009, inflation is generally measured in European countries development (8.5) dominated Ukraine (15.9), Belarus (13) and Russia (11.7) (see Table 2).

The largest fiscal deficits recorded in Albania and Montenegro.

The various impact of economic crisis on the observed countries can be explained by different institutional frameworks and different integration into the world economy (Barlett and Prica 2012). The countries that more integrated into the world economy were more affected than countries in which transition process slow down before crisis.

5 Results and Discussion

According to study results, in response to the global financial crisis, the IFIs significantly scaled up their financial flows to developing countries (Berensmann and Wolff 2014), thereby complying with the G-20 recommendation to provide substantial countercyclical support (G-20 2009).

Regarding the European developing countries, IFIs raised financial support in 2008, and partially in 2009. In 2010, IFIs were supported Croatia, Moldova, Russia and Ukraine. Financial influx by IFIs were significantly decrease in 2010 (see Table 3).

The question is the following: What is the role of IFIs in addressing the financial crises of the twenty-first century? In order to answer aforementioned question, Truman (2011) discusses three interrelated topics: (1) reform of the International Monetary Fund (2) supervision and regulation of the global financial system, and (3) the European sovereign debt crises.

The globalization requires the fundamental change in the management of the IMF (Stiglitz 2003). At the spring 2010 session of the IMF and World Bank is considering the reallocation of voting rights in favor of developing countries. BRIC countries (Brasilia, Russia, India, China) promote this change in voting rights.

Table 3 IFIs support to the European developing countries (2005–2010) in US$ millions

	Year			
Country	2005–2007	2008	2009	2010
Albania	233	307	378	168
Belarus	98	142	3942	376
Bosnia and Herzegovina	592	890	2241	468
Croatia	1062	954	1314	2125
Macedonia	194	387	485	172
Moldova	206	335	243	1023
Montenegro	52	182	282	249
Russia	3584	3731	4089	4341
Serbia	939	1402	7177	1872
Turkey	7878	7881	6554	6599
Ukraine	1824	20,490	3152	17,489

Source: Independent Evaluation Group World Bank, IFC, MIGA (2011, 180–181 Table B.1)

Lessons after the global economic crisis can be summarized as following:

- The change of creditor role of the IMF,
- Poverty reduction and growth facilities,
- Emphasizes the social security of the people.

The change of creditor role of IMF reflects in terms of improvements and expansions of creditor arrangements, namely:

- Now IMF is able to quickly mobilize large credit packages
- Newer programs have fewer structural conditions than previous ones,
- The objective of the program is to protect vulnerable groups of people,
- Programs are tailored to the needs of a specific country, and
- In most cases fiscal policy is adjusted to the changing circumstances in the particular country.

The following examples state in favor that IMF emphasizes the social security of the people. According to IMFs experts, Serbia has developed social security system therefore social consumption have not been object of the fiscal cuts. In Bosnia and Herzegovina, the aim of the Program was to decrease the impact of the global crisis on vulnerable groups of people. In Ukraine IMFs Program includes the rise of social consumption during the recession. Especially, the following measures: protecting the poor from rising gas prices, protect the unemployed through the unemployment insurance system and the expansion of two targeted program of the World Bank. In 2009 the Government of Belarus has increased support for families with three or more children, no financial housing benefits and assistance for the unemployed. In 2010 same Government doubled the funds in the budget for social assistance.

Truman (2011: 9) concludes that "*progress has been substantial in the area of financial supervision and regulation. The emerging regime lacks an overarching legal framework. This forces reliance on cooperation and, in some respects, avoids some issues of sovereignty because each country, or jurisdiction, in the end makes its own decision on implementing non-binding international agreements. However, countries are choosing to share their sovereignty in this area.*"

Bergsten (2005) states that euro can be the global currency in the case of long term fiscal deficit in the USA. It is need to highlight the fact that BRICs and developing countries have reserves in US dollar or use dollars in the international trade. Any fluctuation of this currency will have strong effects on their economies.

The challenge for the international financial community and the IMF is "to promote the use of precautionary facilities by countries facing contagious pressures, to build firewalls early on when such pressures arise to effectively prevent financial contagion" (Marino and Volz 2012: 33).

Starting in May, 2010 the European Union endeavored to create a firewall to prevent the spread of the Greek crisis to the other countries. The European Union fails either to share sovereignty before or to cooperate after the crisis. Therefore, a safety net for countries is the first condition to locate crisis. Either way, the economic consequences of their failures are substantial and inexcusable (Truman 2011).

6 Conclusions

The economic crisis has caused the evolutionary changes in the functioning of the international financial institutions (IFIs). In the last 60 years, the international financial institutions have moved from a guarantor of stability of the global economic system, through rescue creditors to the advisers of transition in post socialist countries.

The aim of the paper was to assess the IFIs response to the global economic crisis in the 11 European developing countries.

The economic outlook includes the rate of economic growth, inflation rate and fiscal deficit. The results of analysis showed that the European developing countries, regarding the economic growth have shown a different rates—from a sharp decline in Ukraine (−14.8 %) and Russia (−7.8 %) to positive growth in Albania (3.3 %) and Belarus (0.2 %). All countries had inflation rate above the average of EU members and fiscal deficits.

The various impact of economic crisis on the observed countries can be explained by different institutional frameworks and different integration into the world economy, before 2008. The countries that were less integrated into world economy had smaller negative impact (e.g. Albania).

Regarding the European developing countries, IFIs raised financial support in 2008, and partially in 2009. In 2010, IFIs were supported Croatia, Moldova, Russia and Ukraine, but overall financial influx by IFIs were significantly decrease.

The economic recovery of the observed countries are slower than expected. The various policy response have been implemented, too. The heterogeneity of the sample during the economic crisis can be illustrated by Forecast (2009: iv): *"Croatia: A declining economy creates important fiscal challenges; The former Yugoslav Republic of Macedonia: Joining the general trend . . . albeit with a delay; Turkey: Manufacturing faltering as exports decline; Russian Federation: The first recession in a decade"*.

To prevent future financial crisis in the European developing countries it is necessary to create safety net by EU member countries, then to reform IMF. The main policy recommendation for all observed countries is to reconsider of the growth model. This can be direction for future research.

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Deindustrialization, Public Debts and Euro Crisis

Engin Sorhun

Abstract The 2008 Global Crisis and the Euro Crisis sparked a long standing debate: the impacts of the relocation of western companies (*expat-firms*), together with deindustrialization process, towards developing countries on the western economies. However the mentioned trend is recently discussed on the ground of the EU public debt burden and the Euro. The specific problematic is whether the relocation of firms is one of the main reasons for the deteriorated public finance and fiscal discipline of the EU countries. This is analytically evaluated under four eventual scenarios in the framework of the Euro Crisis.

1 Introduction

There is a longstanding literature about the interrelated concerns such the deindustrialization, the relocation of western companies towards developing countries (Brainard and Riker 1997; Egger and Egger 2003; Mucchielli and Saucier 1997). The concerned literature can be handled under two categories: one set of studies approach the issue at microeconomic level and focus on the cost saving behavior of firms and the determinants of international relocations of firms (Pennings and Sleaweagen 2000) another set of studies investigates the issue on a macroeconomic level and give the attention to the eventual economic impacts of the *expat*-firms on the countries of origin (Bremer 2010; Casals et al. 2006; Hays 2006; Iversen 2001).

Two recent crises, one at global scale in 2008; other at regional scale (Eurocrisis) sparked a long standing debate about the concerns on deindustrialization and relocation of firms. However, for this time the discussions are mostly on the ground of the EU public debt burden and the Euro. The specific problematic is whether the relocation of firms can be regarded as responsible for the deteriorated public finance and fiscal discipline of the EU countries.

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The next section will briefly discuss deindustrialization process as from 1960s as well as globalism as an accelerator of firm relocations as from 1980s and its outcomes for the developed and developing countries. And then the meaning of these developments to the EU and Eurozone will be investigated together with the 2008 global crisis.

2 Evolution of the Deindustrialization

Two world wars, following industrial revolution, had left a legacy of a bipolar world: the Eastern bloc and the Western bloc. Moreover, another dual structure was also formed in the western bloc: industrialized and non-industrial countries. In this duality, almost 90 % of manufactured goods were produced by USA, Western Europe and Japan. And the rest of the "free world" (western bloc) was formed by "non-industrial" countries.

During those black-white days when the society of consumption had not yet manifest itself at the global extent, consumption in the industrial countries was generally domestic market-oriented. They were exchanging their excess supply each other. The exchange among industrialized countries was not limited only to circulation of goods. Brilliant ideas were circulating, too. Even on those days a creative idea that a man from Detroite applied into his factory had begun to be widely accepted by leading industrial companies of the both sides of the Atlantic. That new understanding could be summarized as "pay workers higher wages so they can afford to purchase the products they make". The father of the idea, afterwards called "Fordism", was none other than Henry Ford. This young man was offering workers higher wages, installment shopping and low-cost credits to flourish automobile sales (Fig. 1).

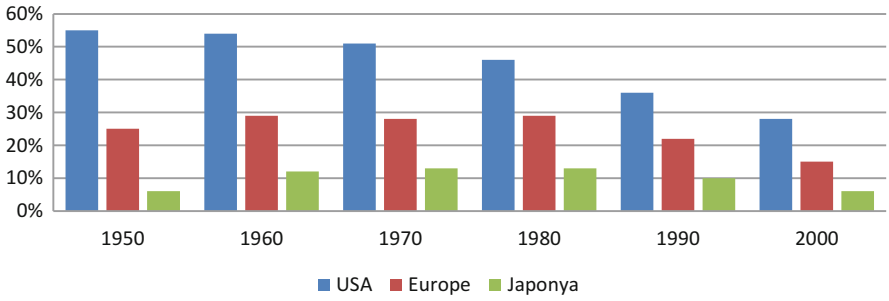

Fig. 1 Industrial production share (%)

2.1 The 1960s and the 1970s

In the 1960s, some developments such as expansion of the Fordism, prevalence of social state and welfare state understanding, baby-boom, etc. have extremely increased welfare, consumption, of course real wages. For the first time in the history income gap between rich and poor nations was growing so fast. Such that this gap stimulated immigration flows from poor countries to rich countries. Even in the end of 1970s the western world was sure to keep their relative position abidingly. For this reason, industrialized rich western countries were continuing to keep the door open to new worker-consumers immigrating from different corners of the planet. For example, the economic growth of France continued uninterrupted for 30 years. In this period, called "*les trente gloriousness*", the number of immigrants coming from mostly Africa corresponded to 5 % of its population.

Economic expansion was reassuring industrialized countries. In 1970s, European integration had accelerated well enough. Trade flows were increasing at regional level due to the Customs Union as well as at international level between the both sides of the Ocean due to GATT-backed liberalization.

After a period of long spring, the scorching sun rising in the Persian Gulf brought about first shocks in the Western world. The oil crisis in 1973 and 1979 raised the oil price and later on caused fluctuation in raw material prices. The increase in costs of production, triggered by especially energy commodities caused difficulties in manufacturing in developed nations.

The only reason for increasing costs of production is not the climbing oil prices, not of course.

For a long time, an extra purchasing power had been pumped to employees and workers so that "they can afford to purchase the products they make". This also increases the cost of labor. The new competitive pressure created by trade liberalization could no longer cover the increases in costs of inputs. The situation could worsen further in the future!

2.2 The 1980s and the 1990s. . .

It was the beginning of the 1980s when the Americans found a way-out (even if it was not perfect). It was globalization! When looked from those days, being in debt by one trillion dollar to a communist country was, for the capitalist America, less likely than the invasion of our planet by extra-terrestrials. Two processes, liberalization of international trade and globalization, were going to make China an important creditor and a trade-surplus economy versus the USA. What globalization actually presented in terms of international business division were roughly:

1. Industrialized countries would gradually move production facilities to countries with cheaper raw materials and labor.
2. Product development, design, and R&D would still remain in rich countries.

3. Western companies would sell in the West what they cheaply produced in the East (Asia).
4. The developed countries have been facing a set of cost elements such as high product standards, supervision on production process, health and environment regulations. But it could be easier to pollute the environment in the poor Asian countries.
5. Because of the trade union rights in the developed world, workers were working fewer hours and gaining higher wages. But it was possible to employ child labor for $1/18 h in Taiwan. It could not be done in the West.
6. Energy commodity importation was increasing external dependency and current account deficit of industrial countries. As the rich nations move manufacturing activities to developing countries, particularly East Asia, they were indeed exporting current account trouble and headache caused by oil prices to developing countries.

Following the visit of the President Regan to China, and concluded agreements with the Deng Xhoping, first American companies in 1980s and later on European companies in 1990s were rushing to abundant and cheap labor. Gold rush had begun and it was China the new Eldorado!

China was practicing a kind of state capitalism. "State capitalism is a match in which government controls most of the referees and enough of the players to improve its chances of determining the game's outcome".[1] China was not single while practicing state capitalism. Russia joined the club just following the collapse of the Soviet bloc. But it could not be as successful as China. Many smaller countries that had freedom but no idea what to do with it had taken places in the reshaped world. Some of them were lucky, especially those geographically found in the Eastern Europe. Because there were European cousins embracing them.

[1]Bremer, Ian, 2010, The End of the Free Market: Who Wins the War between States and Corporations?, Penguin, London.

In this system, ruling elites are, for political survival, focused on completing in a short time the kind of transformations that indeed takes a long time in any democratic country using government rigorous authority.

State capitalism is not the reemergence of socialist central planning in a twenty-first-century package. It is a form of bureaucratically engineered capitalism particular to each government that practices it. It is a system in which the state dominates market primarily for political gain.

Decision is a process subject to multilateral consultation (legislation, civil society, lobbying, etc.) and supervision (judiciary) in liberal democracies; but it is between the two lips of just one man in authoritarian countries. For example, urban transformation of a city as large as Shanghai take longer time in a democratic country than in an authoritarian country. Because, many old inhabitants can be relocated and some districts can be razed while rebuilding the city. Nevertheless a long negotiation and consultation mechanism is need to do this in the countries where the principles of democracy and state of law prevail.

Although state capitalism accelerates some transformations, in the last analysis it helps ruling elites to strengthen their position. Even if state capitalism seems in some cases to generate national wealth, it often allows ruling elites to make furtune. In this respect, state capitalism, as a result, is a useful anti-democratic system as long as it is not investigated who get the big share of the generated wealth!

The EU behaved tenderhearted while welcoming with open arms ex-socialist eastern European countries. The integration of them to the Union costed 70 billion € to European taxpayers.[2] Is it excessive? No, because ex-socialist cousins were admitted to membership without perfectly meeting all the criteria. If they did, it would be more costly to the EU due to the increased bargaining power. After all, the EU had found a way to do the integration of ex-socialist cousins cheaply. The EU was establishing its own China, maybe! New eastern members could be a low (labor) cost manufacturing zone? But it was not a businesslike investment for two reasons:

1. There are yet already countries in the Mediterranean Basin where the EU firms produce less costly.
2. Eastern members have fewer and also aged population.

The 1980s was the "good old days" of the globalism. In the 1990s everything developed so fast that nobody could see the bridles began to slowly change hands in Asia when we were focused on the Berlin Wall, EU integration.

2.3 The 2000s...

When we came to the Millennium, Globalism had created a world where everybody could produce everything. Now, competition was not between the two sides of the Atlantic Ocean but at global scale. Now, rich countries were no longer competing with each other but developing countries were competing with rich countries. Now, 90 % of the world production was no longer in the hand of USA, Western Europe and Japan only.[3] A lot of water had flowed under the bridge. West was aging population. Prosperity had a side effect such as languor for western societies. Conversely, Asia was now refusing to play the "poor but proud man" of the global village.

In the millennium world, an Indian village man, called Rageev could produce t-shirt for Nike with the Brother sewing machines that he imported from Germany. He could also occasionally produce the fakes for the domestic market. Who knows! The fake products could find costumer in the western market benefiting from the flexibility of the globalism.

In the 2000s, the conventional economic powers begin to feel losing the thread. Supposedly Asia was going to be only a manufacturing base. Western companies were going to sell with high profit margin the products that they produced less costly there. It was the expected scenario at the beginning of the 1980s. But 20 years later, emerging countries with their own trade mark and competitive prices was

[2] http://ec.europa.eu/enlargement/archives/questions_and_answers/11-22_en.htm

[3] It is in 2011 that the total manufacture production of the developing countries exceeded that of the developed countries.

causing a pressure on the western markets. And thanks to the agreements such as GATT/WTO and the technical developments such as internet, making international trade was irrevocably freer and easier. In the developed world:

1. Fordism like approach increased wage level.
2. "Social state" and "welfare state" increased income level and so consumption level.
3. Acquirements of union rights decreased working hours.

3 Deindustrialization and Expat-Companies

All of them have raised cost of production. It was easy to turn the wheel in the old good days of the developed world. But nowadays it is so difficult to sustain the former international division of labor while competing with the countries whose the rankings in democracy, human right, intellectual property right, transparency remaining behind the economic indicators.

In the EU, the social rights, right-to works-law, fair wages, union rights, social security rights are constitutionally guaranteed and irreversible. For example, when a bill predicting to raise the retirement age by 2 years was presented to the French Parliament it provoked streets and caused 6 month long public demonstrations. It is not too easy to make this kind of reforms in the western world, especially in the EU. But if Chinese government rises retirement age even by 5 years nobody dares to demonstrate against it. In other words, developing countries are hitting below the belt!

Wester rich countries presumed that they could continue on their way replacing industry by services when outsourcing manufacturing to developing countries. But fiber-optic cables, satellites and internet have derailed that presumption: it is Indians that do the accounting services of many American firms. When you order a pizza form Pizza-Hut in London, it is a call center employee in New-Delhi that sends it to your address. If the internet speed makes a Frenchman unhappy it is a Marrakech operator that deals with it. To sum up, as a result of all these three things happened:

1. Due to the increased cost of production western company gradually moved facilities and operations to eastern developing countries. Western companies were continued to generate as much surplus as before but no longer in western world.
2. Each relocated company marginally causes decrease in tax revenue and increase in unemployment. Western governments that slightly lost tax revenues have continued to pay social welfare payments such as unemployment pay, social security, retirement pension.
   Actually, at the beginning western companies that moved to developing countries were making income transfers and were paying the most of the tax liabilities to their homeland. But the ties of the western global companies with their

own countries have increasingly loosened. A GP Morgan analysis reports that global western companies paid $45 of every $100 tax liabilities to their countries of origin in 2008 where as it was $75 of every $100 in 1995.

3. In the Western world, especially in the EU, the whole social rights and welfare payments determined in law or guaranteed in constitutions begun to burden the state budgets. Companies adapted themselves to the new conditions but the governments were not lucky enough to move to China. They have to pays citizens' rights guaranteed by law.

In a world of the 1970s where almost no country except for USA, Western Europe and Japan yields any considerable surplus, it was feasible to distribute an extra income throughout welfare state mechanism among social layers. But for a while now the old economic powers have struggled to maintain production process as before by reason of young competitors producing less costly. Moreover western companies expatriate towards developing countries where as the latter's work force tend to immigrate towards the formers.

All of these put the Europeans rather than the Americans behind the eight ball! Because the USA has a degree of flexibility in respect to labor market, social rights and social welfare payments. Conversely European countries have a degree of difficulty in adapting the understanding of welfare state to today's world. So, you cannot make an omelet without breaking eggs!

4 Path to Euro-Crisis

4.1 Honeymoon with Euro

Decreasing tax revenues and increasing welfare payments have inflated the budget deficits and debt ratios of the EU countries. In a world economy without turmoil, debt-services have not proved any troublesome to the EU. The EU was a symbol of stability. However, it would not be bad to commit something against the potential risks that can be provoked by budget deficits and public depts.

Maastricht Criteria and the Stability and Growth Pact entered into force in 1993 and 1997 respectively brought two major fiscal rules for sustainability of public finance: The budget deficit and the public debt stock were not going to exceed 3 % of GDP and 60 % of GDP, respectively. Besides, according to article 104 of the EC Treaty, the countries exceeding these limits would be penalized.

The objectivity of the thresholds determined as 3 and 60 % can be questionable. Why not 4 and 70 %? Yet, some empirical studies suggest that respecting the fiscal rules contributes to the financial stability of the EU countries (Casals et al. 2006).

However, the problem here was that: the penalty of exceeding the budget deficit or debt limits is not deterred. Besides, with some comments made to the rule, exceeding the limit in certain cases is considered as an exception and countries are exempted from any penalty. For example, despite Germany and France having a

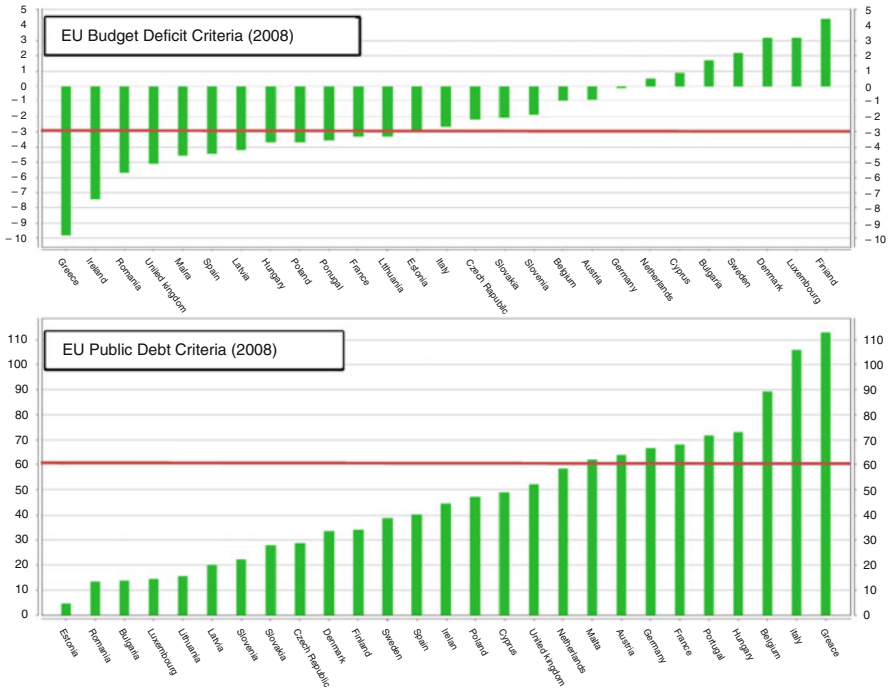

Fig. 2 The EU economies according to the Maastricht public debt and budget deficit criteria

budget deficit above the threshold in 2002, the EU Commission did not practiced any enforcement for them. This has encouraged other countries.

When the crisis begun in 2008 it seemed how member countries could be loose in complying with Maastricht Criteria! Many members' budget deficit was above the 3 % of GDP. And the public debt threshold of 60 % was also exceeded the by most of the member states. Here, when the crisis cropped up, some EU countries were caught naked and unprotected (Fig. 2).

The effects of the mortgage crisis started to spread towards Europe. Something had to be done but the 27 EU countries were either unable or late to get necessary decisions. Delays in the resolution process further increased the cost of the crisis to the EU states, especially Eurozone economies. It was a debt crisis and the decisions to be taken included debt restructuring, remission of some debts or the opening of new loans to the member countries in difficulty. That means a lot of money was going to be pumped into the market. Pumped money seemed only as good as narcosis; it was restraining the pain for a while. It could not be said that the quantitative-easing-based measures helped the recovery of the EU economy as expected. The EU countries using their own currencies were luckier. They were at the very least a little bit more flexible in determining economic and monetary policy. Conversely countries using the euro had to take common decision.

Following the 2008 crisis, it was for the first time expressed from the official sources that the common currency use of non-synchronous economies with different fiscal structures and policy approaches was absurd. The risks recognized by some EU politicians and top officials in 2012 were in fact pointed out by Nobel-prized Milton Friedman just before the first euro coin fell into the pocket of Europeans:

> Never in history, to my knowledge, has there been a similar case in which you have a single central bank controlling politically independent countries [. . .] I think the euro is in its honeymoon phase. I hope it succeeds, but I have very low expectations for it [. . .] The various countries in the euro are not a natural currency trading group. They are not a currency area. There is very little mobility of people among the countries. They have extensive controls and regulations and rules [. . .] It's hard to believe that it's going to be a stable system for a long time.[4]

What pushed the wise old man towards a pessimistic thinking was the fact that the Eurozone was composed of countries with different economic characteristic and policy preferences. Though different, they were going to use a common currency! For example, an appreciated Euro does not have a considerable impact on German economy having trade surplus whereas it could be amassing for the countries having trade deficit such as Portugal, Spain, and Greece.

If only that politicians give ear to scientists! Apparently, Eurozone was waiting for the final straw for the crisis. A global scale straw! It was the American middle class that was not able to repay mortgage credit.

4.2 With or Without Euro: Four Analytic Scenarios

Honeymoon had lasted about 9 years with the euro until the crisis. As of 2016 the difficulties in the global market were not overcome. Four scenarios have been studied in academia and discussed in the concerned institutions of the EU since the beginning of the crisis:

1. Optimistic Scenario: The EU would not be disintegrated. No Eurozone member would be excluded.
2. Less Pessimistic Scenario: Greece would be excluded form Eurozone but stay in the EU.
3. Very Pessimistic Scenario: Six members would be excluded from Eurozone but stay in the EU.
4. Disaster Scenario: The EU would be disintegrated. The euro would fall into disuse.

Let's deal with them in details!

[4] http://www.bankofcanada.ca/wp-content/uploads/2010/08/keynote.pdf

In the Optimistic Scenario despite the whole problems, the member states would act within an action plan to be expressed as "don't let it out of this room" so that it cannot create a domino effect. The European Central Bank (ECB) would continue to support the member countries and banks in trouble. An eventual recovery would take longer, depending on ensuring fiscal discipline and reducing debt stock. Considering the growth rates moving around 0, it seems to take a long time for the members in trouble to increase the incomes, to control the budget deficits and to alleviate the debt stocks.

Less Pessimistic Scenario is based on the excluding of Greece with dead loans from the Eurozone, not the EU, for the survival of the others. However, this is a scenario which Germany and Greece ironically consider with caution on different grounds. Because, if Greece turns back to Drahmi (its former currency), it will have to devaluate it the day after. In such a case it would become more difficult, even impossible, for Greece to repay its debts with a devaluated currency. It would require a cancellation of some part of Greece's debts. This would impose the large part of the burden to Germany, the healthy man of Europe. Moreover, the fact that Greece goes out of play could turn the worried glances to the other countries in trouble. This could create a domino effect increasing risk primes and borrowing costs of the debtor countries.

Very Pessimistic Scenario in fact predicts to alleviate the stress at once (following the expectative Grexit) and to prevent the contamination of the estimated risks to the other risky countries. Briefly, The EU would cut off the gangrened limb without extending the issue. North Eurozone would go on its way more powerfully while Greece, Italy, Spain, Portugal, Ireland, South Cyprus are out of game. According to another version of this scenario, Eurozone would be divided in two blocks as the South-Eurozone (member countries in trouble) and the North-Eurozone but both of them would act under the EU.

Disaster Scenario is the least likely one. Its reason for being is purely and simply analytical. Eurozone economies would turn back to their former currencies. The disintegration process would start and a half century long European convergence would be replaced by a divergence in economic and political dynamics. Each country's own recovery effort would be insufficient. Recovery would take long time for some countries but it will take much longer for some others.

But in any case the Union has headache to undergo: Recovery will take longer; unemployment will increase; investments will stagnate and shift outwards; budget cuts will cause social unrest and resistance; and at the end the EU will have to take very radical decisions.

Here is a vicious cycle caused by a chain reaction: A government being up to its ear in debt has four possible options: retrenchment of public expenditures, maximization of public revenues (primarily tax revenues), borrowing, emission.

The last two do not seem to be reasonable: Because, first the EU regulation does not approve the funding of public debt through "helicopter money". Second, the more a government has a debt overhang the higher its cost of debt servicing

is. Thus, probably no Eurozone-government prefers going into debt spiral or rolling over debts (for some time now).

Let's deal with the most reasonable options: Cuts in public expenditure would not be welcomed by the man in the street. Numerous officers, a small number of workers and plenty of unemployed people would mobilize against the government. It can be true that social welfare payments, social benefits, social transfers are a burden in the budget. But if ruling politicians tempt to diminish them in the name of "reform package", it is guaranteed that they will follow the next election on TV screen. Or, they can hand over the baton to a government of technocrats as it was done in Italy and Greece in 2011 so as to do these "dirty duties".

European economies need high growth rates to raise the government revenues, to balance the budgets and to diminish the debt overhangs. But unfortunately European companies continuously look for low cost countries out of the continent and do not send too much money from where they went. This means that the growth in the public revenues of the euro-governments depends on tertiary sector, declining industrial companies, and wealthy Europeans who acquired the citizenship of the tax-haven island states. Additionally, the uncertainty fed by the global crisis and regional recession reduce the motivation for new investments.

This is a real vicious circle; and for a government the breathing within this circle depends on its credibility and rollover capacity. One smart way for the precarious economies to find new debts is to menacingly screw money out of other European countries that are found in the same boat and relatively good situation. The latter do not want to run the risk of a hole in the hull. And they probably consent to give something to the former.

This is more or less all about what has happened to the EU debt crisis until now. The EU overcame many crises since its foundation. The Union achieved to come out of each crisis stronger and to accomplish radical reforms. What feed the concerns is actually the fact that the EU is not alone in the global race. The EU has taken steps considering the internal dynamics in each wave of reforms until now. However it needs to take more into account the external dynamics in the next wave of reform.

5 Conclusions and Remarks

Of course, the Union has always been conscious of how vital the reforms required by transformation dynamics of the world were. It is particularly remarkable that the Presidency Conclusion Text of the 2000 Lisbon Summit underlined about the economic and social strategy to be done until 2010[5]:

> The European Union is confronted with a quantum shift resulting from globalization and the challenges of a new knowledge-driven economy. These changes are affecting every

[5] http://www.europarl.europa.eu/summits/lis1_en.htm

> aspect of people's lives and require a radical transformation of the European economy. The Union must shape these changes in a manner consistent with its values and concepts of society and also with a view to the forthcoming enlargement.
>
> The rapid and accelerating pace of change means it is urgent for the Union to act now to harness the full benefits of the opportunities presented. Hence the need for the Union to set a clear strategic goal and agree a challenging program for building knowledge infrastructures, enhancing innovation and economic reform, and modernizing social welfare and education systems.

Briefly, Lisbon Strategy is based on the two principles: (1) finalizing the preparation for the EU to become the most competitive and dynamic knowledge-based economy; (2) developing the principle of welfare state in such a way to train the human resources of the Union. This transformation is exactly what the EU needs! Nevertheless, the Lisbon Agenda seems to have progressed more slowly than the great transformation of the world.

The whole recent goings-on actually suggest that the EU should first and foremost reform its resolution process. And then the EU that determined about 90 fiscal rules but no penalty, enforcement or disincentive should imperatively base its financial control and audit mechanisms upon a supra-national structure not on the unanimity. The EU can be expected to make progress on two points: reforming resolution process and fiscal discipline. Both mean that the member state nations should wave a portion more of their sovereignty rights.

Let's go now to our essential question! Is the EU going down? One bad and one good news:

Bad news: Of course, the EU will going down. As indicated by Ibn Khaldun, the founding father of sociology, we are aware of the fact that that political organisms, the same as living organisms, are born, grow and die. And as argued by Hegel we are aware of the fact that the ends of political organisms lead to the birth of new ones, in the historical dialectic. 50, 100 years later . . . We do not know! One day the EU will probably be subject to a disintegration to transform itself into another, higher political entity.

Good News: the EU has not gone down yet. Because it is too big to fail. A rule of physics says that stars, when their energy is depleted, transform into the black holes that catch and swallow everything around them. So no country in the world would get rid of being exposed to the negative effects of the EU's decline. No country!

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Public Debt Management in Developed Economies During the Crisis

Christophe Schalck

Abstract The aim of this chapter is to identify certain shifts in the behaviors of public debt managers in selected developed countries. This study focuses on Canada, France, the United Kingdom, and the United States for the period 1998–2015 in quarterly data. The behaviors are described using a reaction function to cost and risk considerations on the share of short-term debt. We estimated these behaviors using a Kalman Filter-Maximum Likelihood approach. Our results showed that public debt management behaviors in developed countries have changed since 2001 in response to the financial and economic crisis. Nevertheless, the impact of the crisis on the public debt management behavior is heterogeneous across countries. For example, public debt management behavior in France is characterized by cost optimization while public debt management behavior in Canada is less sensitive to interest rates. This study also highlighted that short-term debt is a backup plan when there are problems within the bond market.

1 Introduction

The onset of the financial crisis resulted in a sharp deterioration of fiscal positions in developed countries. For example, the public deficit in the European area increased from 0.6 % in 2007 to 6.1 % in 2010, and public debt in the European area increased from 65 % in 2007 to 94.2 % in 2014. This sharp deterioration is the result of automatic stabilizers and the implementation of fiscal recovery plans to support the economy. At the time, central banks had implemented unconventional monetary policies through an anchor policy rate close to zero and unique measures of quantitative easing. This resulted in a change in the yield curve, mainly through a sharp decline in short-term interest rates from 2008.

In this context, public debt management has had to evolve. Indeed, most of the debt management offices worldwide follow the revised guidelines for public debt

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management published by the IMF and the World Bank in 2014: "Public debt management is the process of establishing and executing a strategy for managing the government's debt to raise the required amount of funding at the lowest possible cost over the medium to long run, consistent with a prudent degree of risk." Therefore, the significant change in the yield curve associated with growing financing needs had to influence the behavior of public debt managers. Nevertheless, several studies have showed interactions between public debt management and fiscal policy, monetary policy and financial stability (Blommestein and Turner 2012; Das et al. 2010; Hoogduin et al. 2011; Togo 2007).

Using descriptive statistics, international institutions described the impact of the financial crisis on the composition of public debt in developed countries (e.g., Rawdanowicz et al. 2011). The stylized facts can be summarized as follows: Until 2010, the share of short-term debt constantly increased. Whenever the share of foreign currency-denominated debt increased, the share of inflation-indexed debt decreased. The share of floating debt rate remained broadly unchanged, so to improve the liquidity of sovereign markets, debt managers increased flexibility in the issuance of calendars and techniques. However, few academic studies have employed econometric methods to assess changes in public debt management during the crisis. Guscina and Broeck (2011) analyzed determinants of total issuance and auction share in a panel of 16 euro zone countries between 2007 and 2009. They found that the crisis and a business sentiment indicator had a significant effect, whereas debt and macroeconomic variables were not statistically significant. Hoogduin et al. (2011) estimated a debt management reaction function on a panel of 11 euro zone countries between 1999 and 2009. They found that their shares of short-term debt responded to the yield curve and have gone up since the onset of the economic crisis. These studies are panel analyses, and the effect of the crisis is only assessed through a dummy variable. Therefore, the studies are limited in their ability to reflect changes in national public debt managers' behaviors.

The aim of this chapter is to fill this gap by providing new insight into public debt management behaviors in developed countries. The behavior is a reaction function of the share of short-term debt. This chapter uses a time-varying parameter model to assess possible changes in public debt management behaviors, especially during the recent crisis. Table 1 presents an overview of the literature on this topic, making it easy to identify the contribution of this chapter. The chapter is structured as follows: Section 2 describes public debt management behavior; Sect. 3 presents the methodology used; Sect. 4 presents and discusses the obtained results, and the final section provides a conclusion.

2 Public Debt Management Behavior

As Hoogduin et al. (2011) described, the behavior of a public debt manager is estimated using a debt management reaction function. According to the definition in the IMF and World Bank guide, public debt management behavior captures

Table 1 Literature table

Author(s)	Subject	Variables	Method	Findings
Das et al. (2010)	Public debt management and financial stability	IMF database	Descriptive statistics	Discussion on the channels through which sound debt management practices can bolster financial stability by complementing improvements to the macroeconomic policy framework
Guscina and Broeck (2011)	Changes in the euro zone and Danish issuance practices	Inflation, crisis dummy, investor sentiment, level of public debt, industrial production, interest rate spread, exchange rate	Panel estimation and censored Tobit estimation	The crisis and a business sentiment indicator had a significant effect, whereas debt and macroeconomic variables were not statistically significant
Hoogduin et al. (2011)	Public debt management behaviours	Yield curve, stock market volatility, debt to GDP ratio, crisis and EMU dummies	Two-stage estimated generalized least squares	The share of short-term debt responded to the yield curve and has gone up since the onset of the economic crisis
Rawdanowicz et al. (2011)	Public debt and assets management	OECD database	Descriptive statistics	Public balance sheet policies differ between countries, reflecting different market conditions and reflecting policy trade-offs
Blommestein and Turner (2012)	Interactions between sovereign debt management and monetary policy	Fed database	OLS estimation	Recent balance sheet policies of central banks have tend tended to blur the separation of their policies from debt management and fiscal policies
Schalck (2014)	Public debt management	Interest rates, short-term debt, net issuance, trading volume of bonds	Time varying regressions	public debt management behaviors in developed countries changed in response to the financial crisis and are heterogeneous across countries

reactions to the proportion of the short-term debt compared with the total debt, costs and risk considerations.

Cost considerations are reflected in the responses to interest rates. Reactions to short and long-term interest rates are distinguished. According to the micro portfolio optimization perspective, debt management behavior should minimize the debt serving cost. Consequently, higher short-term interest rates imply more expensive money market financing and may decrease the share of short-term debt. Similarly, higher long-term interest rates imply more expensive bond market financing and may increase the share of short-term debt.

Risk considerations are reflected by other variables. The first risk is related to the refinancing risk, which reflects changes in debt servicing costs due to changes in interest rates or unexpected changes in market conditions. This risk is captured using the lagged value of the share of short-term debt. In the past, a high share of short-term debt implied high short-term refinancing. Debt management is also dependent on the government's record as a reliable debtor. In other words, debt management behavior includes a reputational risk. This risk could be reflected by the net issuance of public debt. In the case where the government is not considered to be a reliable debtor because the credit risk is significantly higher, net issuance could lead to more difficulties in finding a counterparty. The debt level amplifies this effect: Drudi and Giordano (2000) showed that at high debt levels, the default risk premium becomes too large for governments to issue long-term debt, indicating that higher net issuance may imply an increase in the share of short-term debt. In contrast, a low reputational risk allows the government to reduce the refinancing risk by lengthening maturity, thus reducing the share of short-term debt. The last risk refers to the liquidity risk. The trading volume of long-term debt is a standard measure of market liquidity. A high trading volume reflects a greater ease with exchanging bonds and thus reflects a low liquidity risk. This facilitates the issuance of long-term debt. Higher trading volume may decrease the share of short-term debt.

The public debt management reaction function is described as follows:

$$\rho(L)SD = \gamma + \alpha X + \varepsilon \tag{1}$$

where SD is the share of short-term debt to the total public debt, L is the lag operator, X is the vector of endogenous variables [namely the short interest rates (SR), the long interest rates (LR), the net issuance (NI) and the trading volume of the bond market (VOL)], γ is the vector of constants, α is the matrices of coefficients, and ε is the error term.

3 The Empirical Methodology

We focus on four developed countries: Canada, France, the United Kingdom, and the United States. Our study covers the period from 1998 to 2015 using quarterly data. Thus, we used a panel of 54 observations. Relevant information was extracted

from the quarterly reports and institutional websites on national public debt agencies, including details on short and long-term debt, short and long-term interest rates, net issuance, and trading volume. The seasonality of the series is adjusted using the X-11 ARIMA model.

Models of time-varying parameters are the subject of growing interest. They have been used to study the main macroeconomic variables (Cogley and Sargent 2002; Stock and Watson 1998), monetary policy (Primiceri 2005), and fiscal policy (Schalck 2014). We propose to use this methodology to analyze public debt management behaviors in certain developed countries. We are interested in the sign, size, and time variation of the parameters α and β in Eq. (1). These parameters indicate sensitivities of the share of short-term debt to cost and risk considerations, respectively. The dynamic assessment of these parameters corresponds to a two-stage methodology. First, we estimate (1) by OLS under the assumption of constant parameters. Second, we explicitly allow for time variation in the parameters α and β by relying on a Kalman Filter—Maximum Likelihood (KF-ML) approach.

The dynamic model of public debt management behavior is specified as follows:

$$\rho(L)SD_{i,t} = \gamma_i + \alpha_{j,t}X_{i,t} + \varepsilon_t \tag{2}$$

where $i = \{Canada, France, UK, USA\}; j = \{SR, LR, NI, VOL\}$ and the parameters α may change over time. To identify these parameters, we proceed with the following steps:

- To initialize the filter, we first assumed that all coefficients are constants and used the estimated coefficients from Eq. (1) to obtain the initial conditions for the parameters ρ, and the variance of the error term ${\sigma_\varepsilon}^2$.
- We assumed that α follow a random walk, set $\alpha_{j,t} = \alpha_{j,t-1} + u_{j,t}$ and estimated the median unbiased estimation (MUE) for the variances ${\sigma_u}^2$ using the procedure developed by Stock and Watson (1998).
- We ran the Kalman filter after plugging in these variances. We extracted the disturbance series $u_{j,t}$ and the estimates of $\alpha_{j,t}$. We performed ADF and Phillips Perron (PP) unit root tests on the estimated disturbances $u_{j,t}$ which allows us to evaluate whether $\alpha_{j,t}$ is trending or whether we should add a drift term. If we find that $u_{j,t} \sim I(1)$, it may be advisable to decompose it into $u_{j,t} = \theta_{j,t} + u_{j,t}*$, where η represents random walks. Accordingly, we obtained local linear trends as follows: $\Delta\alpha_{j,t} = \theta_{j,t\text{-}1} + u_{j,t}*$, where $\Delta\theta_{j,t} = w_{j,t}$ and $w_{j,t}$ represents white noise.
- When it was necessary to include drift terms, we evaluated the MUE of ${\sigma_w}^2$ using $\Delta\alpha_{j,t}$ from the previous estimation.
- We ran the Kalman filter for the final extraction of the time-varying parameters $\alpha_{j,t}$.

In summary, the final time-varying system of public debt management behavior to be estimated is as follows:

$$\rho(L)SD_{i,t} = \gamma_i + \alpha_{j,t}X_{i,t} + \varepsilon_t \quad (2)$$

$$\alpha_{j,t} = \alpha_{j,t-1} + \theta_{j,t-1} + \tau_1 u^*_{j,t} \quad (3)$$

$$\theta_{j,t} = \theta_{j,t-1} + \tau_2 w_{j,t} \quad (4)$$

where the first line denotes the observation equation, the last two lines represents the state equations, and the τ*'s* denote signal-to-noise ratios.

4 Results

We examine time variations in the share of short-term debt to cost and risk variables by estimating model (2) using the KF-ML approach. As was illustrated above, to select the appropriate state space model, we performed unit root tests on residuals $u_{j,t}$. Table 2 shows that the use of a stochastic drift term in the state equation helps to reduce residual non-stationarity for the trading volume of the bond market in Canada, the USA and for the UK's long-term interest rate.

Figures 1, 2, 3, 4 depict the results for each country. The left upper graphs present the results for the short-term interest rate, the right upper graphs present the

Table 2 Unit root tests on state equations residuals without and with drift

		ADF		PP	
		u_t	u_t*	u_t	u_t*
Canada	SR	−6.663***	−6.242***	−6.646***	−6.242***
	LR	−6.266***	−5.594***	−6.266***	−5.594***
	NI	−4.178***	−4.598***	−4.224***	−4.605***
	VOL	−2.968**	−5.436***	−2.324	−5.469***
France	SR	−9.937***	−10.007***	−9.660***	−14.713***
	LR	−5.175***	−11.029***	−5.414***	−11.167***
	NI	−5.523***	−5.130***	−5.347***	−5.371***
	VOL	−5.520***	−5.605***	−5.751***	−5.845***
The UK	SR	−6.397***	−6.404***	−6.490***	−6.668***
	LR	−2.478	−5.344***	−2.663*	−5.311***
	NI	−4.414***	−3.593***	−4.496***	−3.589***
	VOL	−3.066**	−7.477***	−3.083**	−11.768***
The USA	SR	−3.194**	−4.040***	−3.296**	−4.228***
	LR	−2.940**	−7.891***	−3.021**	−7.789***
	NI	−3.279**	−6.301***	−2.937**	6.430***
	VOL	−2.390	−7.935***	−2.567	−7.937***

Note: Tests null hypothesis: non-stationarity (unit root in the series), u_t are disturbance series without drift and u_t* are disturbance series with drift. *SR* is the short interest rate, *LR* is the long interest rate, *NI* is the net issuance, and *VOL* is the trading volume of the bond market. The statistical significance of the coefficients is denoted as follows: * significant at 10 %, ** significant at 5 %, *** significant at 1 %

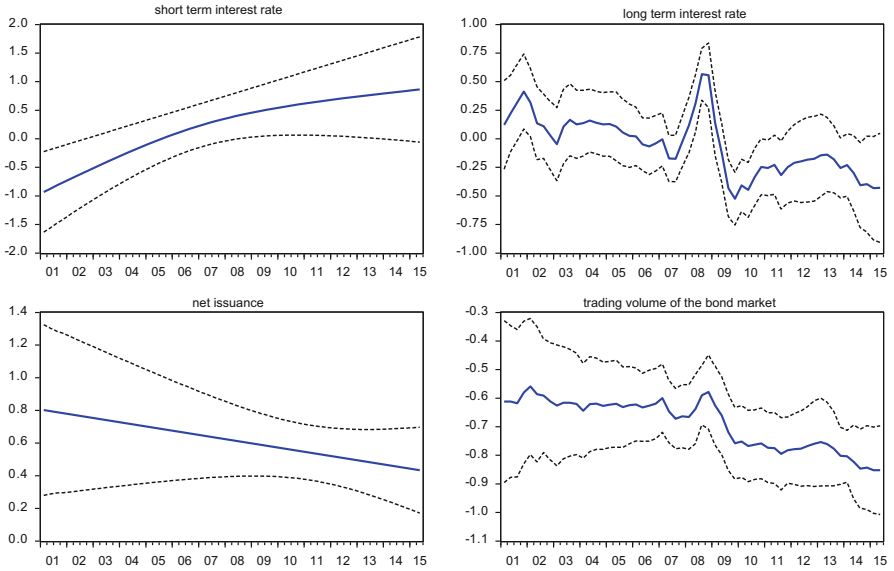

Fig. 1 Time-varying coefficients for Canada. Note: *Solid lines* indicate time varying estimates and *dotted lines* denote the 95 % confidence band

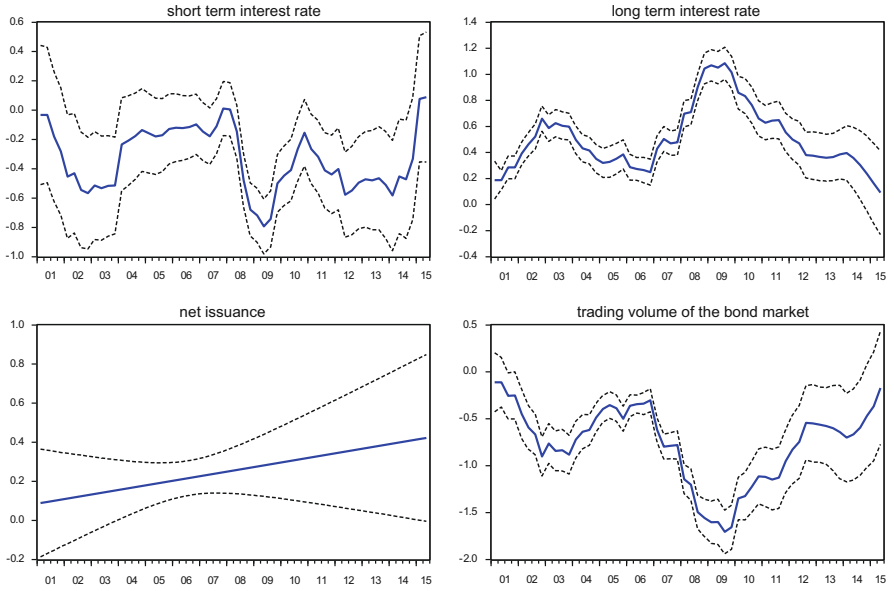

Fig. 2 Time-varying coefficients for France. Note: *Solid lines* indicate time varying estimates and *dotted lines* denote the 95 % confidence band

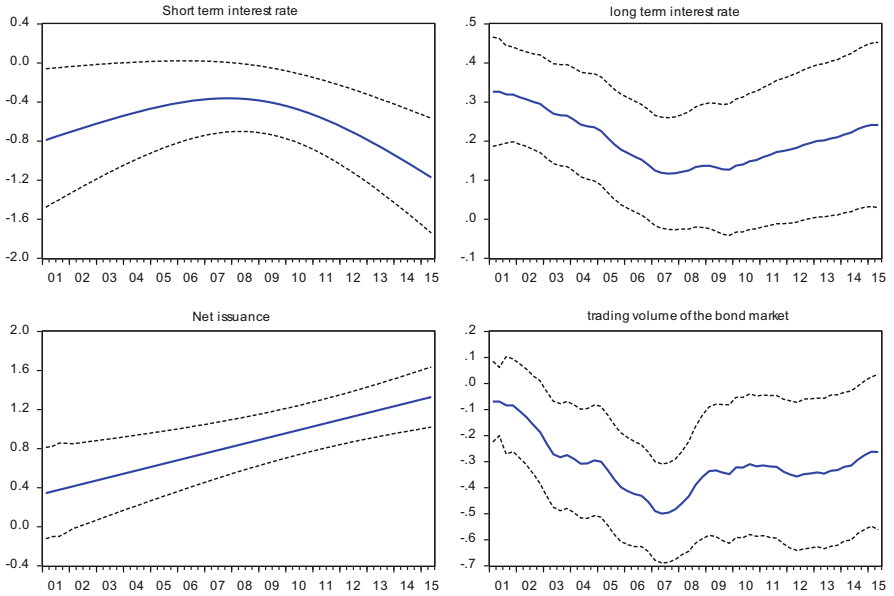

Fig. 3 Time-varying coefficients for the United Kingdom. Note: *Solid lines* indicate time varying estimates and *dotted lines* denote the 95 % confidence band

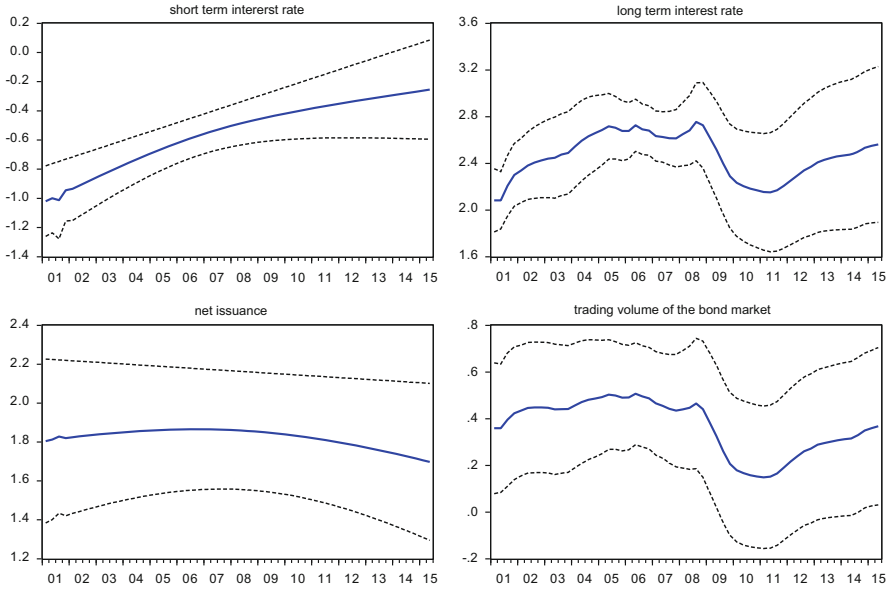

Fig. 4 Time-varying coefficients for the United States. Note: *Solid lines* indicate time varying estimates and *dotted lines* denote the 95 % confidence band

results for the long-term interest rate, the left lower graphs present the results for the net issuance, and the right lower graphs present the results for the trading volume of the bond market. Solid lines indicate time varying estimates for parameters $\alpha j, t$ and dotted lines denote the 95 % confidence band. The main result shows that most of the coefficients in all observed countries have changed over time, indicating that public debt management behaviors have evolved in a non-monotonic manner over the last 15 years.

The reactions of the share of short-term debt to short-term interest rate have changed over time in all countries. As expected, the effect of an increase in the short-term interest rate always leads to a decrease in the share of short-term debt in the UK and in the USA, reflecting a cost optimization behavior. However, this effect has increased over time in the UK (from −0.79 in 2001 to −1.17 in 2015) while it has decreased over time in the USA (from −0.93 in 2001 to −0.25 in 2015). The time varying parameter model allows us to identify changes in the sign of the effect of short-term interest rate in Canada and France. The reaction of the share of short-term debt to the interest rate in Canada has become insignificant since 2003, reflecting that public debt management is not mainly driven by cost optimization. At the opposite end, reaction of the share of short-term debt to the short-term interest rate in France is higher and significant in time of financial stress (from 2002 to 2003 and from 2008 to 2014).

According to cost considerations, an increase in the long-term interest rate leads to an increase in the share of short-term debt in France and the USA over the whole period. It should be noted that the impact of the long-term interest rate strongly increased during the financial crisis in France (0.25 in 2006 compared to 1.07 in 2009). In Canada and the UK, the reaction of the share of short-term debt to the long-term interest rate significantly changed during the financial and economic crisis (2007–2010)—the effect was insignificant in the UK and significant in Canada. These shifts correspond to a trade-off made by fiscal authorities between debt servicing costs and macroeconomic stabilization.

For all countries and over the whole period, an increase in the net issuance leads to an increase in the share of short-term debt, which reflects a reputational risk. The size of this reaction differs across countries (from 0.09 for France in 2001 to 1.70 for the USA in 2015). Moreover, changes in size do not follow the same trend: the effect of the net issuance to the share of short-term debt is increasing in France and in the UK, decreasing in Canada and is stable in the USA.

Reactions of the share of short-term debt to the trading volume of the bond market vary across countries. In Canada, an increase of the trading volume always leads to a decrease in the share of the short-term debt, which reflects that the money market is used as response to the level of liquidity risk on the bond market. This effect has been higher since the occurrence of the crisis (−0.62 in 2006 compared to −0.85 in 2015). The negative relationship between the share of the short-term debt and the trading volume of the bond market is also found in France and the UK, but only during a specific period (2002–2014). At the opposite end in the USA, an increase in the trading volume led to a decrease in the share of the short-term debt before 2009. This result could be explained by a spillover effect since the liquidity

risk of the bond market affects the money market. This spillover effect has disappeared since 2009.

Our results show that the crisis had a significant effect on public debt management behavior in developed countries. They also show that this effect is heterogeneous across countries. Thus, public debt management behavior in France is characterized by cost optimization while public debt management behavior in Canada is less sensitive to interest rates. A common feature is the role of sovereign risk. The share of short-term debt is strongly affected by conditions on the bond market, especially the liquidity of the bond market. The short-term debt is often used when a debt manager has difficulty attracting a large investor base.

5 Conclusion

In this chapter, we sought to identify changes in public debt management behaviors in four developed countries: Canada, France, the UK and the USA. We constructed a time-varying parameter model to analyze public debt management behaviors. These behaviors were analyzed according to a specification in which the share of short-term debt mainly reacted to cost and risk considerations. We estimated these behaviors using a Kalman Filter-Maximum Likelihood approach. Our results showed that public debt management behaviors in developed countries changed since 2001 in response to the financial and economic crisis. Nevertheless, the impact of the crisis on the public debt management behavior is heterogeneous across countries. Thus, the public debt management behavior in France is characterized by cost optimization while public debt management behavior in Canada is less sensitive to interest rates. This study also highlighted that the short-term debt is a backup plan when there are problems within bond market.

The results have implications for monetary policy, in particular for the eurozone. The ECB has a challenge to consider the debt managers' various reactions to a common monetary policy. A strong heterogeneity in public debt management behavior could develop into non-cooperative behavior, free riding or subgroups within the monetary union. The findings presented here could be extended to different international settings to gain new intercultural insights.

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Fiscal Framework Changes in European Monetary Union Before and After Sovereign Debt Crisis

Hale Kırmızıoğlu

Abstract The most important element holding possibility to destroy stability in monetary unions is fiscal policies left under monopoly of countries. There have been debt and public finance policies conducted by member states causing sovereign debt crisis triggered by Global Crunch in Eurozone. Therefore, fiscal framework of European Monetary Union is examined in the study. Fiscal rules adopted by Treaty of Maastricht being the founding charter of European Union and additional measures taken due to hinder experienced are assessed besides theoretical foundations of fiscal policies recommended for Monetary Unions. During analysis of the process, it is remarkable that both such rules and measures taken afterwards have followed each other however, that radical changes have not actually occurred. Only restrictions to national policies have been used instead of common policies in the fiscal field to prevent Eurozone member states to deprive fiscal policies: the only tool, which may be used to handle asymmetrical shocks. However, it is observed that sanctions on the implementation of rules adopted for the fiscal field have always been weak and could, from time to time, easily be broken despite the fact that such rules are qualified as binding.

1 Introduction

Despite the need for reaching at least a certain level of coordination in respect of fiscal policy within monetary unions, it is possible to consider that countries generally form their own policies within this field. It is impossible for monetary policy of member states within a monetary union to be independent. This fact is not valid for fiscal policy. If there is an advanced financial market for a government to go for borrowing then, referring to monetary financing will not be required.

This study is derived from unpublished PhD thesis titled as "Fiscal Policy Debates in the Context of Fiscal Discipline and Economic Growth in the Eurozone Countries that have been suffered from Sovereign Debt Crisis" completed in December 2014, after revising and updating the same.

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Therefore, it may be asserted that independent and different fiscal policy will not damage monetary conditions. However, there is a danger, which will interrupt the process. If governments fail to maintain services for the substantial debts, which they borrowed then, they may impose pressure on the central bank to monetise the debt or finance the deficit by creating money. A central bank under mentioned conditions may not warrant that it will, in a reliable manner, ensure price stability and may include inflation into private sector expectations. It may be possible for a government to encounter with higher interest rates during borrowing from the market while labourers claim higher wages. Consequently, all advantages held by stabile money may be lost (Masson and Taylor 1993). The role of fiscal policy in monetary unions should be assessed within this context.

It is seen that the measures taken by the Irish government to avoid the crisis have deepened problems; Portugal, Spain and Italy have remained late in respect of structural problems which they should have solved until early 2000s, when debt crisis experienced in Eurozone is examined specific to countries. Whatever the particular reasons lay under Eurozone member states to experience problems are, the basic reality, which should be minded is the fact that the trust against such countries have been lost. This caused them to fail in respect of managing or solving current problems by increasing borrowing costs. The market of government bonds processed in Euro has been divided. In other words, sharp differences between the member states' bonds have come out at certain phases of the crisis. The markets staying late to realise public finance problems in countries of crisis have over-reacted (Profumo 2010). In consequence, the concern behind the crisis experienced has arisen from problems in public finance or differences between fiscal policies. Borrowing costs have increased as result of markets pricing bankruptcy risk and strengthened the expectation that debt services could not be conducted.

In this study, theoretical information regarding fiscal framework in monetary unions are given first. Nevertheless, the foundations of fiscal policies recommended for European Monetary Union, fiscal rules adopted with Treaty of Maastricht and additional measures taken due to hinders experienced are examined. Assessments regarding national fiscal policies of member countries and their status within monetary union are submitted under the study.

2 Theoretical Discussions Regarding Fiscal Framework in Monetary Unions

The fiscal policy or framework, which will be formed within monetary unions, should be analysed around three basic macroeconomic problems. These problems, which are expressed as stability, coordination and solvency by Kenen (1995), are treated as to maintain sustainability of public finance, to leave moving space for stability and structural reforms by Coeuré and Pisani-Ferry (2005). Possible damages to monetary stability which may be caused by budget policies and public

finance conducted for macroeconomic stability in each member country, form the focus point of theoretical discussions. How the different fiscal policies to be implemented by member states should be designed to protect stability of economic and monetary union? Is the main reason of the debt crisis experienced in Eurozone the insufficiency of fiscal restrictions or implementation mistakes in European Monetary Union? The examination of the very nature of fiscal policy in respect of its being as an economic stability tool, the necessity to coordinate the same and solvency indicates a single point: Maintaining stability in monetary union. The implementation of fiscal policy being main intervention tool against asymmetrical shocks in countries being member in a monetary union has prepared a basis threating the stability of monetary union.

The stability problem is related with the fact that the sole tool which an economy being member to a monetary union will use for shocks unique to the country. Despite the fact that fiscal policy is a tool used by all countries which deprive monetary and exchange rate policies along with the joining to monetary union, its method of implementation and timing are different in each country.[1] The studies conducted on the stability problem in European Monetary Union (EMU)[2] are correlated with optimum currency area.[3] For, if the currency area is optimum then, the vulnerability of member states to real shocks will decrease and the ability to deal with shocks will increase. If the currency area is not an optimum area then, the nature and extent of shocks will determine the real cost of entering to monetary union. In this case, the restriction of fiscal autonomy with fiscal rules will aggravate the struggle against shocks (Kenen 1995). Coeuré and Pisani-Ferry (2005) have seen this case regarding stability problem as the very source of the problem experienced in Europe. The member states facing economic downturn after 2001 have been forced to choose between maintaining fiscal consolidation and supporting economic activity to ensure fiscal boundaries and the arising difficulty to make a choice has prevented efficient use of the policy.

[1]For instance, some European countries have followed first examples of supply biased economy strategies of Social Democratic Parties in 1990s. Based on this, they have reduced unproductive expenses, increased public investments and relative tax income acquired from direct taxation. Thus, they have implemented fiscal regulations combining different policies: Netherlands (1990–1994), Greece (1994–1999) and Finland after 1999. Some countries have maintained expense based fiscal regulations: Austria (1995–1997), Ireland (1990–1993/1998–2000), Denmark (1990–1993) etc. (Mulas-Granados 2006).

[2]EMU abbreviation is used for both European Monetary Union and economic and monetary union. This is a natural circumstance, for, widest state of economic and monetary union has come to existence at the monetary union of European Union (El-Agraa 2007).

[3]According to Frankel and Rose (1996), trade volume is high, business cycle and shocks are similar, labour mobility is high amongst optimum currency area members. Also, a fiscal transfer system may exist. For, regions in the space called as optimum currency area and conditions expected to remove possible deviations at such area's relations with outer world and solution ways are important. Therefore, mechanisms existing to deal with asymmetric shocks are deemed as integral part of optimum currency area.

It is considered that additional mechanisms are needed in monetary unions due to this dilemma between fiscal restriction and fiscal autonomy. Foundation of a federal fiscal system may partially remedy deviations. Such circumstance first mentioned by Ingram in 1959, has afterwards been concretised with the calculations of Sala-i Martin and Sachs in their study called "Fiscal Federalism and Optimum Currency Areas" in 1991. Sala-i Martin and Sachs (1991) state that such a mechanism already exists due to European Community Taxes however, such taxes are not at a level to substitute the same. Another opinion pertains to Eichengreen (1991). Even though it is not identical with the federal fiscal system, foundation of an interregional fiscal transfer system will prevent many problems to arise. However, the existence of a transfer system should not pay the price of the mistakes arisen from the corporate structure of countries. Profumo (2010) advocates that the fiscal policy in Eurozone may be centralised however, the biggest burden before this, is that the taxation and expenditure power is bound to national sovereignty. This will not be easy for countries, which waive from money printing power based on sovereignty and accordingly from seigniorage revenue by being a member to Monetary Union. Also, existing European Union (EU) budget is small and inflexible to perform this function. The total EU budget is estimated at the rate of 1 % of EU Gross Domestic Product and most of the same is used for planned expenditures such as agricultural incentives and regional harmonisation policies. Accordingly, it will not function towards increasing regional demand. Therefore, the stability problem may only be solved at national level (Avellaneda and Hardiman 2010; Bureau and Champsaur 1992; Dullien and Fritsche 2009; Kenen 1995).

Another issue regarding fiscal policy is the coordination problem. This issue is actually combined with the monetary policy of the European Central Bank (ECB) and fiscal policies formed within the Union. For, despite the fact that there are restrictions imposed by the monetary policy, the fiscal policy implemented will have effect on the interest rates and exchange rate. Interest rate increases arisen from budget deficits will slow down the production of investment and tradable goods by curbing total demand as well as will decrease future output by slowing down capital stock increases. As result of this, the governments are obliged to increase future taxes and the future revenues will decrease (Kenen 1995; Mayes and El-Agraa 2007). The reason behind the need of coordination in monetary unions is the implementation of common monetary policy. A monetary policy appropriate for a single economy may form a problem for another economy. The chance of efficiency of a policy based on average experience in Eurozone is low.[4] The

[4]A common monetary policy implemented for all the countries means ECB to use a single nominal interest rate for Eurozone countries. However, while this circumstance decreases real interest rates in countries holding high inflation such as Greece, Spain and Ireland; it causes real interest to be higher in countries where inflation rates are lower such as Germany. Lower real interest increases domestic inflation by encouraging economic activity. Thus, while Eurozone inflation could be as targeted, the inflation rates of each country will be different (Neck and Sturm 2008; Wickens 2010). Accordingly, money and fiscal policy coordination should be under economic conditions of each country.

problem is more complicated. The correlations comprised in Philips Curve are not linear but asymmetric. In other words, low unemployment or positive output gap creates a strong inflationist pressure. However, an unemployment or negative output gap at the same level creates a lower deflationist pressure. Accordingly, the fiscal policies should be dealt to offset different effects of monetary policy (Mayes 2007).

The third problem regarding fiscal policy is the solvency. When the liabilities of the borrower excess the current value of its future revenue, the borrower may not be able to pay the debt. However, when the borrower is a government, it may increase future taxes to make the debt payment. If the markets may price the risk then, the borrowing by governments for budget deficits will be more costly. The markets may remain slow to realise that the government has encountered insolvency and give sharper reactions when they realise this situation. The makers of Treaty of Maastricht have considered this and actually rules have been adopted to struggle with two possibilities. The first of the aforementioned is possible political pressure by the government under excessive debt that may cause ECB to move away from price stability. The second is possibility of market pressure. ECB wishing to protect the financial system may be obliged to purchase such debts (Kenen 1995). According to Von Hagen and Eichengreen (1996), if excessive deficit causes a debt crisis then, ECB will have compelled to aid the government in danger. Such aid may appear as keeping interest rates low for the monetisation of government debt and decreasing debt service. In both cases, the unfettered fiscal policy may create an inflation pressure, which will compel ECB.

The problem of fiscal laxity or insolvency arises from governments' wish to use budget deficits. However, this holds a possibility to create moral hazard. Primarily, the budget deficits will cause governments to increase expenditures. High expenditure level increases inflation and all the same may cause interest rates to rise. In this case, pressure on ECB to leave strict monetary policy to keep interest rates low. Apart from this, high deficit arising in a country may create overflow towards other countries. High interest rates to be triggered by high deficit may cause upwards pressure through integrated capital markets. In this case, the country in deficit will share costs incurred. Consequently, the pressure to be created by fiscal laxity may compel ECB to purchase government bonds losing reliability of the investors.[5] The circumstance leading ECB to move in that manner will cause bonds held in banking and insurance markets to create systematic threats (Masson and Taylor 1993; Neck and Sturm 2008; Visser 2004). Therefore, a new proposal comes out while mentioning to the need of putting borrowing targets to guarantee the sustainability of debt and of existence of fiscal space to ensure fiscal stability within the framework to be created for the fiscal policy. A Fiscal Policy Committee may be established to

[5]ECB has been purchasing Greece, Ireland and Portugal government bonds since May 2010; Spain and Italy government bonds since August 2011. Such bonds have been purchased for 211 billion euros (Gloggnitzer and Lindner 2011; Barth et al. 2011). However, according to Belke (2011) ECB's such acquisition holding high risk may prejudice the trust towards its political and financial independency.

prevent problems faced regarding fiscal policy. Thus, a system of rules may be created preserving solvency and efficiency without prejudice to arbitrary implementations by reaching to independent assessment and information on general fiscal appearance and fiscal position of Eurozone (Hughes Hallett and Jensen 2011).

Fiscal policy in Eurozone is conducted by not forming common polices but imposing restrictions on national policies. Main purpose of fiscal rules adopted with Treaty of Maastricht is to evade pressures by high budget deficit and debt rates on macroeconomic stability and growth. A monetary union established by particularly heterogeneous group of countries may not function without sufficient convergence (Krugman and Obstfeld 2009). According to Corsetti and Roubini (1993), Mulas-Granados (2006) and Catenaro and Morris (2008), such criteria imposed on high deficit and debt, restrict governments' ability to organise domestic demand to ensure stability. In other words, the monetary union and the fiscal rules adopted by the same restrict active fiscal policy and traditional preferences for national economy management. Accordingly, the increase in concerns regarding the sustainability of public finance is prevented. Also, high borrowing may prevent expenditures to be used in productive spaces by increasing interest load on the government. Based on all aforementioned reasons, fiscal policies of Eurozone countries are required to be disciplined.

3 Formation of Fiscal Framework in European Monetary Union and Defective Sides of Fiscal Framework

3.1 Treaty of Maastricht

Birth and formation of monetary union idea in Europe is a long process. This process expressed by Kenen (1995) that it has commenced in 1950s, is a need arisen from developments in 1960s according to Mayes and El-Agraa (2007), Mulas-Granados (2006) and Visser (2004). In 1960s, EU has commenced the search for a local stability mechanism and a committee has been formed under the lead of Werner with a resolution resolved at 1969 Hague Summit to transform EU to a fully economic and monetary union. As result of problems faced in 1970s, the inflation rates in the countries have risen, unemployment rates have increased at different levels and speed and Europe has left reforms aside and strived to deal with existing problems. Consequently, Werner Report has moved from the agenda.

European Monetary System (EMS) was founded in 1979 with the proposals of Germany and France as result of continuation of monetary stability need in Europe. Despite the fact that EMS has created a way towards European Economic and Monetary Union, it was not an economic and monetary union. Also, emphasis by French of the asymmetric features of EMS and attributing the system onto German monetary power has caused several disturbances. Upon this, steps on formation of

monetary union in Europe have accelerated and Delors Report has been drafted. Delors Report recommends that a monetary union will not be stabile without fiscal convergence and accordingly, binding fiscal rules should be imposed to restrict the will of policy makers while resolving on dimension and funding of fiscal deficits. Along with the reports, the fiscal policy coordination and need for strict fiscal rules have been discussed. For, without the same it is possible for EU to compose a policy mix for internal balance (Coeuré and Pisani-Ferry 2005; Corsetti and Roubini 1993).

According to Kenen (1995), while both Werner Report and Delors Report listing conditions required for the monetary union, they have focused on three basic conditions. These are convertibility of currency, irrevocable fixed rate and financial liberalisation. Embracing all incurs a common and single monetary policy. However, additional measures should be taken to avoid economic imbalances: Strengthening competition policies, drafting common policies which will aid source allocation and macroeconomic policy coordination particularly with binding rules in budget are required. Particularly uncoordinated and different budget policies will prejudice monetary stability. Therefore, forming a fiscal policy before Community to be protected from imbalances at real and financial sectors will only happen with the coordination of national budget policies. Studies conducted within this context, brings strengthened recommendations forth. Imposing top limit to budget deficits, limiting foreign debt in currency other than Community currency and preferring open markets for government bond sales by Community members are amongst such recommendations. Such recommendations, obviously, have opened the way for Treaty of Maastricht.

It was agreed in December 1991 at Maastricht that the "European Monetary Institute" would be founded in January 1994 and complete monetary union would be realised in January 1999. Treaty of Maastricht being the founding treaty of economic and monetary union has been signed in 1992 and come into force in 1993. Thus, the EU has been founded and the process has been completed in 1999 with the foundation of monetary union. It may be considered that the countries forming the monetary union were a homogeneous group when the criteria for entering into monetary union[6] defined under Treaty of Maastricht are examined. However, since increasing joining to monetary union is important in political aspect, it is seen that much flexibility has been granted and any gap has been benefited at the implementation of such criteria adopted. EMU bringing two country groups together has been founded in 1999 with the participation of eleven countries. First of these two

[6]The criteria of Treaty of Maastricht are five. Criteria regarding inflation rates; inflation rate of a country may not be 1.5 % more than average of three countries with lowest inflation rates. Criteria regarding interest rates; interest rates of long-term government bonds may not be 2 % more than average of three countries with lowest rates. Budget criteria; central government budget deficit may not exceed 3 % of GDP. Debt criteria; government debt/GDP rate should be under 60 %. Exchange rate criteria; national money should fluctuate at 2.25 interval. Also, currency exchange rate mechanism of European Monetary System should remain at narrow fluctuation interval within first 2 years and no devaluation should be imposed on other members within same period.

country groups are the core countries defined as founders and comprised in structurally developed countries. The second group is periphery countries, which are wished to be in the monetary union to deem the same as politically and economically successful; within developing countries category or which started to lose their competitive power despite they are big economies.[7] Consequently, countries having much stabile currency such as Germany, Austria, Belgium or Netherlands and Mediterranean countries famous with their inflationist currencies have gathered. Therefore, the new-born currency should be assessed as reconciliation between stabile and inflationist currencies (Prokopijevic 2010).

The monetary union has technically commenced in January 1999 with the circulation of Euro as mere and common European currency and all powers regarding monetary policy has been transferred to ECB. In other words, these countries jointly determine the monetary policy through international ECB (Enders et al. 2012; Rose 2006). EU members other than England, Denmark, Sweden and Greece which were amongst 15 EU countries have joined. Both Sweden and Denmark have rejected membership with a referendum. As result of some of the countries, which have been accepted for EU membership after 2004, have met entry requirements, the number of members has reached to 19 along with the Lithuania, which its membership has been certain in 2015.

3.2 Original Stability and Growth Pact and 2005 Reform

Breach of reference values on budget deficits and public debt stipulated under Treaty of Maastricht requires Excessive Deficit Procedure (EDP) opening. This procedure may cause financial sanctions for member states that embraced single currency. However, as set forth in the Treaty, the procedure has never been implemented mechanically and the resolution whether any measure would be taken, has been left to the discretion of EU Council of Ministers of Economic Affairs and Finance (ECOFIN). Fiscal restrictions of Treaty of Maastricht could not solve fiscal discipline problems and also define clear rules for the implementation of the same. As result of this, a "Stability Pact" has been proposed in November 1995 to form future regulations based on concern[8] of Germany from fiscal laxity.

[7]There are two views on this circumstance. One of them is coronation theory and it is the view, which accepts that only small and relatively homogeneous core countries group should be member at the beginning. Countries reaching required competition power might be accepted to the union by time. In other words, membership to economic and monetary union should be the last crowning step of a real convergence process. The second one is the locomotive theory and advocates that it should be a as comprehensive as possible club. For, the member countries will act by compelling each other on reforms to be made towards a more efficient competition need. In this case, locomotive theory is the one accepted (Cohen 2012).

[8]Germany has been insisting on negotiation regarding SGP in 1995 to strengthen German common sense that Euro may be as powerful and stabile as Mark (Mulas-Granados 2006; Inotai 2011).

Accordingly, a complete automatic sanction mechanism should be provided apart from the framework of standard treaty. However, it has been asked from ECOFIN to act in common sense and preserve its right of initiative while resolving based on the rule and thus, the Stability Treaty has been evolved to "Stability and Growth Pact" (Catenaro and Morris 2008; Corsetti and Roubini 1993; Mulas-Granados 2006).

First of many steps taken to ensure and maintain restrictions provided by the Treaty of Maastricht is the Stability and Growth Pact (SGP) being executed in 1997. The Pact being executed in 1997 is called as Original SGP. For, it was revised after troubles experienced in 2003. The purpose of SGP is to keep Eurozone in balance through sustainable economic and fiscal policies. For such purpose, a system strengthening the public finance monitoring and coordination of member countries is founded. In other words, the Pact has defined the purpose of member countries as to remove budgetary deficits in medium term or to give budget surplus. Pact is constituted of two sections. One of the same is preventive and the other one is corrective arm. The preventive arm focuses on deterring member countries from measureless and unsustainable fiscal policy implementations and contains a soft procedure. In case of any mistake by any member country, the corrective arm targets to turn member countries from any mistake as soon as possible. This section has been designed as a stricter and more formal procedure on the contrary of preventive arm (Catenaro and Morris 2008; Cohen 2012; De Tramezaigues 2010; Jovanović 2012; Mayes 2007; Schuknecht et al. 2011; Von Hagen 2008). SGP has brought a limit to budget deficits of Eurozone members at the rate of 3 % GDP and threatened countries excessing such annual limit with severe fines. Last resolution on the implementation of such sanctions is resolved by the Council of Ministers and it is resolved with qualified majority that the country exceeding such rate over 0.5 % may be sanctioned. Countries experiencing deep recession may be exempted from such fine provided that they would experience recession more than 2 % annually. However, ECOFIN emphasises that a lower recession may also be deemed as an exceptional situation. Therefore, a decrease in GDP between 0.75 and 2 % is considered as exceptional under supporting evidence.

As result of deterioration trend in fiscal positions experienced since 2001, ECOFIN has resolved that some countries have excessive deficits and made recommendations to decrease their excessive deficits. Consequently, France and Italy has repelled clearly to the Pact and Germany has rejected observing the rules of Pact in 2003.[9] Therefore, the Pact has lost all of its practical purposes (Visser 2004;

[9]European Commission has warned one Eurozone country for the very first time on January 30, 2003. This country is Germany, which is the biggest of European economies and insisting on strict fiscal rules in an ironic manner (Von Hagen 2008; Prokopijevic 2010). Afterwards, the Commission has warned France, Italy, Greece and Portugal. In 2003, sanctions on France and Germany, since they have not observed this clear limit, has been prevented with the voting made; thus, Germany and France has avoided from rules without suffering any penalty. For, it is understood that there would be a set of rules imposed for big countries and another set of rules for small countries (Buti et al. 2008; Inotai 2011; Jovanović 2012).

Wyplosz 2013). As result of all such developments, the need to renew the Pact has arisen and a new agreement has been reached in March 2005. The improvement adopted in 2005 has loosened both preventive and corrective arms of the Pact. More freedom on explaining any breach has been granted and thus, it has been allowed that going under obedience again to be lesser cost. The general principles of the Treaty have remained unchanged and correction of the breaches occurred has been loosened by considering a decrease at GDP particularly. Various recommendation sets have been submitted and discussed to reform the Pact. Consequently, revision has been made under ECOFIN advices and while basic rules have remained same, many criteria have been softened. Perhaps, the most important side of revision is the opportunity granted by the same to improve managed surveillance process by rehabilitating and tightening the quality of statistics in member countries (Buti et al. 2008; Catenaro and Morris 2008; De Tramezaigues 2010; Mayes 2007). After the crisis encountered in Eurozone, SGP has once more been taken under surveillance and one improvement more has been made in 2011. For, problems have been experienced rather than rules adopted each time but in observing such rules and sanctions regarding the same.

3.3 Critics on Fiscal Framework

EU member countries holding severe budget deficits and high debt before EMU have made big fiscal consolidations in mid 1990s to ensure fiscal criteria of Treaty of Maastricht. As result of this, while public debt to GDP ratio decrease at a low level, serious improvements in budget deficits have been seen. Real reason of this event, according to Catenaro and Morris (2008) and Gros (2006), is the increase in Eurozone ratio tax revenue to GDP between 1991 and 1999 and decrease in basic expenditures. However, this event has reversed after 1999. After 2001, increase in budget deficits of many countries has prepared a rapid basis to test SGP. The original SGP has a restricting effect on fiscal policy and procyclical use of fiscal policy has become wide-spread. While the corrective arm being implemented more strictly has forced countries towards fiscal contraction during hard times, the preventive arm being implemented more softly has been unsuccessful for countries to reach strong fiscal positions during good times. Despite positive growth figures in general since 1990s, no country could not hold fiscal positions strong enough to react to the crisis without breaching the boundaries of Treaty of Maastricht. Therefore, one of the priorities should be reconsidering fiscal rules to strengthen counter cyclical character of fiscal policy. The fiscal discipline and macro stability target foreseen for EMU member countries seems contradictory (Coeuré and Pisani-Ferry 2005; Profumo 2010). According to Blanchard and Giavazzi (2008), SGP has an increasing responsibility regarding continuation of demand and failure to achieve growth within European economies. Decrease in economic activities has caused budget deficits to grow. However, to force a country in recession to decrease its deficits through sanctions is an act against logic. Buti et al. (2008) have made

criticism on a similar subject. SGP inhibits particularly to the process of developing countries in the Eurozone to catch developed countries through binding rules adopted.

SGP rules have been qualified as temporary and faced with an increasing tension and criticism since they are not based on economic analysis, as result of such developments (Avellaneda and Hardiman 2010; Stein 2011). As a matter of fact, the criticism that the Treaty of Maastricht and SGP rules are not based on economic analysis is not quite valid. Corsetti and Roubini indicate in their studies conducted in 1993 that such figures are based on the average of steady state growth rates, real growth rates and inflation rates of countries with the method they abstracted from EU documents. According to Von Hagen (2008), Welfens (2011) and Wessels (2012), the problem arises from the fact that the fiscal rules adopted by SGP are examples of weak implementation of rules. Therefore, it could not be successful to remove various imbalances arisen in EMU. Despite partial improvement in budget deficits after 2005 reform, it could not be reached to a complete success.

Another reason of criticism on SGP other than rules adopted by the same is the mistakes arisen during implementation. Problems in surveillance and sanction mechanisms are qualified as a weakness of management. Since fiscal and structural policies are significantly national, it has been difficult to reach to an appropriate policy mix in Eurozone. Efforts to establish a common fiscal framework have been reached finally with Treaties however, the insufficiency of the same has been revealed with the problems faced since 2001 and crisis in 2008. While the original form of SGP has been found weak in terms of monitoring, attention has been drawn to the same in 2005; however, sufficient measures could not be taken (Belke 2011). One of the basic discussions regarding Eurozone after sovereign debt crisis has been ensuring coordination between national monitoring institutes by being strengthened or collection of surveillance function under a single institute (De Grauwe 2010). According to Von Hagen (2008), budgeting institutions should be established to strengthen fiscal discipline instead of improving monitoring mechanism and a political framework in which the rules adopted by the aforementioned could not be breached. For, the governments leading the surveillance mechanism may easily waive from the same when needed. According to Hughes Hallett and Jensen (2011), it has been inevitable to create a new framework for the fiscal policy in Eurozone after sovereign debt crisis. While the fiscal policy should lead long-term purposes such as social security, infrastructure and education, the monetary policy should maintain focusing on macroeconomic stability. Consequently, weaknesses regarding European economy management have been seen more clearly along with the crisis.

3.4 Fiscal Framework Renewed After Sovereign Debt Crisis

SGP principles could not be executed completely by member states due to sanction and monitoring activities. Also, the economy management has not considered the

increasing external imbalances and wage and price differences. New measures have been embraced to ensure economy management to contain both macroeconomic imbalances and fiscal policies. The economy and budgetary policies coordination called as "European Semester" has been formed to ensure more compatibility in economy policy mix at EU and Eurozone level (Gloggnitzer and Lindner 2011).

The regulations made to reform the economy management are called as "Six Pack—2011". This package recommended by European Commission (EC) is a procedure regarding third SGP reform and monitoring of new macroeconomic imbalances. Accordingly, since the debt levels of countries have affected the opportunities to provide financing from the market, the feasibility of EDP is tightened when public debt to GDP ratio is over 60 %. Indicators such as current account, real effective exchange rate, private sector debts, which will define imbalances in macro economy, will be used to decrease existing economic imbalances and to prevent new imbalances.

One of the steps taken to improve corporate and legal economy management in Europe is the idea of "fiscal stability union". The member countries have reached to consensus in December 2011 on an inter-governmental treaty to establish a fiscal union. Such treaty called as Fiscal Compact Treaty or Treaty on Stability, Coordination and Governance in the Economic and Monetary Union has come into force in 2013. The biggest reform brought forth with the treaty is debt brakes or golden rule. Member countries warrant that they will keep budget positions in balance or at surplus. Such rule about which its breach will be allowed in case of deep depression brings forth structural budget deficit limit at the rate of 0.5 % of GDP. It is obligated to include the same at constitutional level in the country to ensure its automatic implementation. European Court of Justice is assigned to audit whether this rule is implemented at national level. Also, structural deficit for countries, which their debt rates are highly under 60 % may be as high as 1 % of GDP. Apart from this, one in twentieth (1/20) rule is brought forth which Six Pack contains its similar. If a country which its debt rate exceeds 60 % may not reduce this rapidly then, EDP is opened. The country should decrease the one twentieth of difference between current debt rate and threshold debt rate annually to be sure that the country has spent its efforts. Countries, which are members to EDP, are liable to accept and execute economic partnership programs. The European Council and Commission will also monitor the execution of such programs.

According to EC (2014) the European Semester launched in 2010 has strengthened the framework in respect of monitoring of economy and budget policies of member countries and coordinating the same more. It also strengthens the new tools of EU aiming to prevent macroeconomic imbalances for a sustainable growth and supporting the same as well as the framework based on SGP requirements. Thanks to such framework, member countries have made important reforms and commenced to create right conditions towards growth. All these developments assisted increases in debt levels to reach stability by strengthening national fiscal frameworks and decreasing government bonds revenue differences by improving the perception of financial markets on the sustainability of public finance. However, despite developments such as banking markets being restructured, refreshment in

the trust of financial markets and accordingly, decrease in the credit costs, one of the readily continuing problems is the negative effects of fiscal consolidations on the growth. In this sense, the nature and compositions of fiscal consolidations are important. Due to such reasons, the consolidations should be completed with more advanced measures which will strengthen growth. The Commission gives advices towards such target: Measures, which will encourage private investments, consumption and growth friendly public investments should be taken by moving along the line created with SGP. This will be possible only by making consolidation with right public spending and tax choices.

All these measures taken, indicates that it is moved towards more economic and fiscal policy integration in Eurozone (Gloggnitzer and Lindner 2011; Hajek-Rezaei 2011; Schuknecht et al. 2011). All these steps taken in terms of fiscal policy are towards one single purpose; to bring stronger fiscal foundations and stricter fiscal discipline perception by removing fiscal laxities causing debt crisis. Both legal and corporate regulations should be made towards this. According to Obstfeld (2013), a strict administration to be formed will principally cause two adverse potential impacts. One of these is the direct negative impact on aggregated demand and direct positive impact to be created with the increase of trust towards the fact that public finance is sustainable. To assess those two distinct impacts is an important problem. However, any positive trust impact within Eurozone experience is dominant over other negative factors. This is seen with the relations between output increase between 2009 and 2012 and changes arising on structural budget surpluses. Measures to tighten public finance taken after debt crisis may have astonishing output effects assisting big decreases in debt rates or regaining the trust in short term.

4 Conclusion and Assessment

Fiscal policy, with its most simple status, is intervention to economy through state budget. Countries being member to monetary union wish to use the fiscal policy to deal with country-specific shocks. However, when they become monetary union member, they warrant moving within a certain fiscal framework. Interest rate increase to be created by excessive fiscal laxity during intervention through state budget will complicate maintaining public finance and adversely affect the output level. Also, weakening of intervention power of the government may cause country risk to increase by worsening the status and economy to contract by increasing the costs of the economy maintained with debt. This is the basic reason of the evolving of global crunch to a debt crisis for problematic countries in Europe. The concept qualified as important and discussed within this context has been formation of a common fiscal framework in EMU regarding fiscal policies. In fact, a common fiscal framework has already been formed in EMU before debt crisis with Treaty of Maastricht, SGP and multilateral surveillance. Even though the fiscal restrictions provided with the fiscal framework are criticised that the same leaves member

countries in a hard position before shocks, the main reason is the slack fiscal policies conducted particularly by periphery countries.

Particularly, excessive budget deficits and high public debts of Eurozone member periphery countries could take very small improving steps since 1999. Within this context, mistakes made during implementation of common fiscal framework may be criticised. In this sense, it may be stated that EMU has failed to perform sufficient monitoring, remained late for intervention, its sanctions have been insufficient besides corporate inadequacies. It is observed that such weaknesses are tried to be remedied while reforming the common fiscal framework. However, there is no alternative besides all these tightening measures within current conditions. First, fiscal coordination should be increased and fiscal convergence should be realised to ensure monetary stability. After realisation of fiscal convergence in member countries of monetary union and budget deficit and public debt has returned to ideal rates for each country, flexibility may be granted in fiscal rules which their very strict implementation has been warranted. In conclusion, member countries should first have adequate fiscal space to struggle shocks they encounter, namely, it may be stated that the only way for the former is fiscal dicsipline.

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The Impact of the Eurozone Crisis on Turkish Foreign Trade

İmre Ersoy and Bilgehan Baykal

Abstract The aim of this paper is to search for the impact of the Eurozone Crisis on Turkish foreign trade. To that end, panel data analysis is used for 15 Eurozone members and for the period of 1995–2011. The main finding of the empirical study is that private sector debt of the Eurozone states has a negative relationship with Turkish trade balance. This paper also presents the establishment of a monitoring mechanisms related to trade and debt and close cooperation of Turkish governmental institutions with EU authorities as policy recommendations.

1 Introduction

The global crisis started with the subprime crisis in the USA, evolved and triggered the Eurozone crisis due to the interaction not only between USA and Eurozone but also with the effect of the structural problems in the Eurozone. Problems concerning the decision-making process, disagreements among key policy makers like France, Germany, UK and the southern countries, lack of steps taken in fiscal integration after monetary unification may be counted as the root causes of the economic crisis at the union level. At the state level, uncontrolled capital flows, high public and private debt in different countries, differences between the current account deficit/surplus levels and also the competitiveness gap between national economies may be counted as significant reasons for the crisis. Corruption in some countries, differences in the regulations and the governance of the banking system may also be explanatory for the start and the evolution of the Eurozone crisis.

Global crisis not only caused severe losses in GDP, productivity, unemployment but also led recession in the world economy. Global crisis affected the global trade in three ways; first, there is a significant decline in demand mainly in developed countries due to the fall in GDP and trade by 2009. Second, the contradiction in

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trade finance has put hurdles on global trade. According to Bank for International Settlements (BIS 2014), trade finance supports one-third of world trade and letter of credit portion is half of it. The contradiction in trade finance and increasing demand for the letter of credit rather than other instruments hampered world trade. Third, the increasing protectionism has created trade distortions between the developed world and the developing countries. During the crisis, governments did not only apply import-restricting measures, but also new discriminatory measures to protect national corporations against the competition of the third countries. Therefore, all these three factors coming together created a significant decline in world trade.

Trade collapse was one of the most significant results of the global crisis. In their article, Eichengreen and O'rourke (2009) concluded that the impact of the subprime crisis is much heavier than 1929 crisis from either industrial production or trade volume perspectives. The decline is not limited to a geography and continent. Therefore, with the interaction between economies, the crisis spread in the Eurozone. Especially, southern states like Greece, Portugal, Spain, and Italy were severely affected by the crisis.

The Eurozone crisis also affected Turkish foreign trade. The affection was based on the impact on the currency volatility, change in the intensity of the usage of the trade finance instruments and also the trade defense strategy applied.

The paper is motivated, to the best knowledge of the authors by the following voids in the literature: First, many studies investigate the relationship between the economic crises and trade, however, there is no empirical study that investigates the impact of the Eurozone crisis from various points on the trade of Turkey. Second, the paper investigates which crisis indicator has the most significant impact on the Turkish foreign trade with the EU15 using panel models. The rest of the paper is organized as follows. Section 2 reviews literature, Sect. 3 describes the data and methodology; Sect. 4 presents the empirical results and discussions, and finally Sect. 5 concludes and makes some policy recommendations.

2 Literature Review

There are several studies on the impact of economic crisis on trade. In their study Aysan and Hacihasanoglu (2007) asserted that real exchange rate depreciation in Turkish exchange rate did not induce a huge increase in export, based on the results of their panel data study.[1]

Di Mauro et al. examined the impact of the crisis in the euro area and found out that Euro area merchandise exports decreased by about 16 % in September 2008–March 2009 interval (Di Mauro et al. 2010).

[1]The export data used in the study covers the time period of 1996–2006 for Turkish manufacturing sector based on a two-digit level ISIC. The data set related to wages and productivity of manufacturing sector is driven from TUIK and CPI-based REER data was obtained from CBRT.

In his study where he identified 18 key exogenous crisis events in 12 advanced and 13 emerging countries between 2010 and 2013, Stracca (2013) concluded that trade openness between the Eurozone and non-euro area countries were the most consistent and sizeable conduit of transmission channels for all assets except exchange rates as it increased the contagion effect whereas, there was not a clear evidence of a financial channel.[2]

Behrens et al. (2013) found out that the number of firms, the average number of destination and origin markets per firm, and the average number of products per market changed only very little during the crisis. Second, their analysis showed that there are some composition effects in the intensive margin fall along firm, product and country characteristics. According to their analysis, the most important factor explaining changes in exports of Belgium was the destination country's growth rate of GDP. Last but not least, they concluded as the fall in trade was mostly based on economic activity and this fall could better be described as a trade collapse rather than a trade crisis.

McDonald and Henn (2011) claimed that they have obtained strong evidence that during crisis import restrictions significantly decreased trade in affected products in their analysis on EU and 14 other G-20 states. They also added that trade flows fell by 5 % due to border measures and 7 % due to behin-the-border measures.

Cecchetti et al. (2011) asserted in their panel study[3] for 18 OECD countries that high debt causes significant problems for the overall economy and surpass of the threshold level of 90 and 85 % in corporate and household debt over GDP respectively, lead significant problems in the growth.

Anderton and Tewolde (2011) depicted that the sharp decline in world imports soon after the global crisis in 2008Q4–2009Q1 can be explained by the fall in exports and also by the decline in the highly-import-intensive category of investments in their panel study.[4]

Öztürk et al. (2012) explained that based on their Granger Causality analysis,[5] imports of Turkey is impacted by the industrial production index, exports, GDP and labor efficiency in a unidirectional mode and has a bidirectional relationship with the unit labor cost, inflation, and interest rates in the study where they explained the impact of the Eurozone crisis on Turkish trade.

Lee et al. (2013) depicted that euro crisis had an impact on developing Asia.[6] However, its magnitude would significantly be smaller than the global crisis as euro

[2]Data used in the study belongs to Australia, Canada, Denmark, Japan,Korea, New Zealand, Norway, Poland, Sweden, Switzerland, United Kingdom and United States of America as advanced economies and Argentina, Brazil, Chile, China, India, Indonesia, Malaysia, Mexico, Russia, South Africa, Thailand, Turkey and Venezuela as the emerging countries between January 2010–May 2013.

[3]Data used in the study belongs to 18 OECD countries between 1980 and 2010.

[4]Data used in the study is based on 29 OECD countries between 1995Q1–2009Q1.

[5]Data in the study belongs to Turkey and starts at 2000Q1 and end at 2012Q2.

[6]Data used in this study is between 2000Q1 and 2011Q3 and covers 11 Asian economies (the PRC, Hong Kong- China, India, Indonesia, the Republic of Korea, Malaysia, the Philippines, Singapore, Taipei-China, Thailand, and Viet Nam).

crisis mostly impacted Europe whereas the global crisis affected EU, Japan, and the USA simultaneously.

Tunçsiper and Biçen (2013) found out in their panel study that in the long term GDP of EU states and Turkish exports have a positive relationship in econometric terms whereas there is not a significant relationship in the short run.[7]

Last but not least, Bobeica et al. (2016) examined the trade-off between domestic demand and exports with a dynamic panel study for 11 euro area countries.[8] They stated that as far as the domestic demand declined in the crisis period, firms in the Eurozone reoriented themselves through increasing their exports which may be considered as a new adjustment channel. They also found out that exports are not significantly affected in boom times based on an expansion of domestic demand.

The relationship between the economic crisis and trade is a topic studied in the academy. However, the relationship between the determinants of the Eurozone crisis and its impact on trade with its partners has not been deeply investigated. This study examined the relationship between Turkish trade and independent variables such as government deficit, government debt, unemployment, tax data, GDP growth rate and private sector debt.

3 Data and Methodology

Data is collected from OECD and Eurostat. The analysis starts with the year that Turkey becomes a member of CU and ends in 2011 as 2012 is the year when financial crisis ended. The dependent variable is the trade balance of Turkey with 15[9] Eurozone member states. The analysis is based on the annual data of government deficit, government debt, unemployment data, tax revenue, GDP growth rate, Private Sector debt and the ratio of the trade balance of Turkey with the respective country and Turkey's trade balance with the world.

In the econometric analysis, panel data will be used to analyze the cross-sectional data. A panel data equation may be written as;

$$y_{it} = \rho_i y_{i,t-1} + z'_{it}\,\gamma_i + \epsilon_{it} \tag{1}$$

Where

[7]Data used in the study is Turkish exports data driven from TUIK and EU countries GDP data driven from the Worldbank between 1960 and 2012.

[8]Countries in the study are; Germany, France, Italy, Spain, Netherlands, Belgium, Austria, Finland, Portugal, Ireland and Luxembourg. Time frame covered is 1995 Q1–2013Q3. Data source is Eurostat and ECB.

[9]Luxembourg and Malta are not included in the analyis due to lack of significant data. Therefore, 15 member states were included in the analysis as of 2011.

$i = 1\ldots$, N indexes panels;
$t = 1\ldots$, Ti indexes time;
ρ_i is the significance level;
y_{it} is the variable being tested; and
$\in_{it}$ is a stationary error term.
z_{it} term can represent panel-specific means with or without a time trend depending on the unit root test.
γ_i is the linear time trend (Stata 2015).

Panel unit-root tests are used to test the null hypothesis
H_0: $\rho_i = 1$ for all i versus H_A: $\rho_i < 1$
As H_A may be valid for one i, a fraction of all i or all i; we may rewrite the equation as;

$$\Delta y_{it} = \phi_i y_{i,t-1} + z'_{it}\gamma_i + \epsilon_{it} \tag{2}$$

$H_0 : \phi_i = 0$ for all i versus $H_A : \phi_i < 1$
The unit root tests are conducted according to Im-Pesaran and Shin (IPS)[10] (2003) and Augmented Dickey-Fuller (1979)[11] which all have as the null hypothesis that all the panels contain a unit root.

To decide whether to implement a fixed effect or random effect regression model, Hausman specification test (1978) is applied as shown in Table 1. Hausman (1978) specification test compares estimator $\widehat{\theta_1}$ with estimator $\widehat{\theta_2}$ and checks whether it is consistent under the assumption it is tested. Based on the Hausman specification test, either fixed effects or random effects are selected (Table 1).

Panel analysis consists of a T-dimensional vector Yi and a Tx K-dimensional random matrix Xi. Random effects models assume that the error term is random and uncorrelated with the independent variables.

Random effects model can be defined as;

$$yit = \beta xit + \alpha + \mu it + \varepsilon it \tag{3}$$

where

y represents the dependent variable
i represents entity
t represents time

[10]IPS test is an extend version of Levin-Lin-Chu (LLC) test (2002) which does not require the panel data sets to be balanced and also developed a set of tests which relax the assumption of a common autoregressive parameter. "Im, Pesaran, and Shin assume that ε_{it} is independently distributed normal for all i and t, and they allow it to have heterogeneous variances σ_i^2 i across panels." (Stata 2015, p 13)

[11]Augmented Dickey-Fuller (1979) test asserts a null hypothesis as all panels are unit root, and the alternative is that at least one panel is stationary.

Table 1 Hausman tests

	Coefficients	–		
	(b)	(B)	(b−B)	sqrt(diag(V_b−V_B))
	Fe	re	Difference	S.E.
pdebt	−0.0002379	−0.0002343	−3.61E-06	1.4E-05
tax	0.0009192	0.0014016	−0.000482	0.00045
dgdebt	0.000296	0.0003017	−5.74E-06	5.6E-05
gdef	−0.0004234	−0.0004672	0.0000438	6.8E-05
dunemp	0.0022031	0.001992	0.0002111	0.00014
gdpgr	0.0006168	0.000558	0.0000588	4.9E-05
				b = consistent under Ho and Ha obtained from xtreg
				B = inconsistent under Ha efficient under Ho obtained from xtreg
				Test: Ho: difference in coefficients not systematic
	chi2(6)=	(b-B)'[(V_b−V_B)^(−1)](b−B)		
	=	3.52		
	Prob > chi2=	0.7408		

x represents the independent variable
β represents the coefficient of the independent variable
α represents the unknown intercept
μ represents the between entity error
ε represents the within entity error

Thus, we estimate a very simple reduced-form equation;

$$\text{Trade Balance} = (\beta_1 * \text{Gdef}_{it}) + (\beta_2 * \text{DGdebt}_{it}) + (\beta_3 * \text{Du}_{it}) + (\beta_4 * \text{Tax}_{it}) + (\beta_5 * \text{Gr}_{it}) + (\beta_6 * \text{Pdebt}_{it}) + \varphi_{it} + \varepsilon_{it} \quad (4)$$

where i denotes countries, and t denotes years; Gd denotes government deficit and; gdebt denotes government debt (first difference) and; U denotes unemployment (first difference) and; Tax denotes tax revenue and; Gr denotes growth rate and; Pdebt denotes private sector debt. This equation denotes that trade balance is affected by the changes in the government deficit, government debt, unemployment, tax, GDP growth rate and the private sector debt. First, the fixed effects regression will be run which will be followed by the random effects regression. Based on the Hausman test, a decision will be reached about which model to use. Consequently, a panel analysis with a country specific dummy and a panel analysis with year specific dummy will be run to understand the impact of specific countries or years on Turkish trade balance.

4 Empirical Results and Discussion

In the econometric analysis, as it is clearly seen in Table 2, Turkish trade balance has a strong relationship with the private sector debt in the Eurozone. This relationship is in a negative way which may be interpreted as Turkish trade surplus decreases as the private sector debt in the Eurozone increases.

When we apply Country specific dummy, it is seen that Germany and Italy impact Turkish trade positively. Private sector debt is significant in the cases when Germany and Italy are applied as a country specific dummy. Unemployment is very significant when Germany and Italy are applied as a country specific dummy. Other countries rather than Germany and Italy have no significant impact as a dummy variable.

When we apply year specific dummy, it is seen that year 1996, year 1997, year 1998 impact Turkish trade positively and year 2001 negatively. Private sector debt is significant in the cases when 1996, 1997, 1998 and 2001 are applied as country specific dummy unemployment is significant when 1996, 1997, 1998 and 2001 are applied as year specific dummy. Other years between 1995 and 2011 have no significant impact as dummy variable as shown in Table 3.

According to the results of the econometric study, there is a relationship with the tax revenue even if it is not very strong. However, this relation does not exist when

Table 2 Random effects regression

					Number of obs=	210
Group variable:	Country				Number of groups=	15
R-sq: within=	0.1348				Obs per group: min=	10
between=	0.171				avg=	14
overall=	0.1793				max=	16
Random effects u_i ~	Gaussian				Wald chi2(6)	32.29
corr(u_i, X)=	0(Assumed)				Prob > chi2=	0
tbtt	Coef	Std. Err.	t	P > | t|	[95 % Conf. Interval]	
pdebt	−0.0002343	0.0000463	−5.06	0	−0.0003251	−0.0001435
tax	0.0014016	0.0007506	1.87	0.062	−0.0000696	0.0028727
dgdebt	0.0003017	0.000395	0.76	0.445	−0.0004724	0.0010759
gdef	−0.0004672	0.0005121	−0.91	0.362	−0.0014709	0.0005364
dunemp	0.001992	0.0011079	1.8	0.072	−0.0001794	0.0041633
gdpgr	0.000558	0.000581	0.96	0.337	−0.0005806	0.0016967
_cons	−0.0069854	0.0303228	−0.23	0.818	−0.066417	0.0524462
sigma_u	0.02913962					
sigma_e	0.0164537					
rho	0.75824778	(fraction of variance due to u_i)				

Table 3 Summary of panel data analysis findings

Test	Independent variable	Coefficient	Relation	Level
No dummy applied	Private sector debt	−0.0002343	Negative	$p < 0.01$
	Tax	0.0014016	Positive	$p < 0.1$
	Unemployment	0.001992	Positive	$p < 0.1$
Country-specific dummy-Germany	Private sector debt	−0.0002102	Negative	$p < 0.01$
	Unemployment	0.0020389	Positive	$p < 0.01$
	Germany	0.0665335	Positive	$p < 0.05$
Country-specific dummy-Italy	Private sector debt	−0.0002085	Negative	$p < 0.01$
	Unemployment	0.0020309	Positive	$p < 0.05$
	Italy	0.0581856	Positive	$p < 0.05$
Year-specific dummy-1996	Private sector debt	−0.0001873	Negative	$p < 0.01$
	Unemployment	0.0018207	Positive	$p < 0.05$
	1996	0.0125091	Positive	$p < 0.05$
Year-specific dummy-1997	Private sector debt	−0.000192	Negative	$p < 0.01$
	Unemployment	0.0019526	Positive	$p < 0.05$
	1997	0.013471	Positive	$p < 0.05$
Year-specific dummy-1998	Private sector debt	−0.0001978	Negative	$p < 0.01$
	Unemployment	0.0020876	Positive	$p < 0.05$
	1998	0.0112651	Positive	$p < 0.05$
Year-specific dummy-2001	Private sector debt	−0.0002251	Negative	$p < 0.01$
	Unemployment	0.0018575	Positive	$p < 0.05$
	2001	−0.0104454	Negative	$p < 0.05$

country and year dummies are applied. EC (2015), in its report, pointed out that, by 2012, 51 % of the tax revenue of the EU was sourced by labor-related tax revenue whereas 21 % is from capital-related tax revenue and 28 % is from consumption related tax revenue. EC (2015) depicts that the social contributions form 37.1 % of the tax revenue of Eurozone 18 states in 2009. The increase of the social contributions may be interpreted as a welfare effect on labor and the retired population which basically constitute a significant portion of households. This welfare effect may lead an increase in their demand. However, it is not very easy to build up a relation with this indirect increase and Turkish trade balance.

Results of the econometric analysis show that there is a positive relationship between unemployment and the Turkish trade. It is common knowledge that unemployment rates increase in crisis era as recession means lower GDP growth rates and declining demand. Therefore, the expected relationship between the unemployment rate and Turkish trade balance may be expected to be negative. Therefore, this result which is low in terms of significance should not be considered as meaningful. The Eurozone crisis not only impacted the Eurozone states, but also its trade partners as well as Turkey. Based on the findings from our econometric study, it is solid that increase of the private sector debt in the Eurozone states have a negative impact on the Turkish trade balance.

Private sector debt consists of three main segments, financial corporations, non-financial corporations and the households. First of all, as the private sector debt of corporate and household segment increases, interest rates also increase. This two-way relationship decreases domestic demand. Second, an increase in interest rates also has an adverse impact on trade finance and affects overall GDP growth. There is increasing demand for the letter of credits and the governance brought by the EU in various ways (Basel II and Basel III, Bolkenstein Directive, etc.) puts a significant burden on private corporations. Third, the takeover of the banks by sovereigns that carry problematic credits by the government increases public debt and cause noncompliance with the Stability and the Growth Pact (SGP). Last but not least, debt restructuring issue is significant. As far as the private sector, including the corporate and the households goes into debt restructuring, it creates a rollout effect that definitely decreases the investments. The increasing debt of states as Ireland and Spain do not have a direct impact on Turkish trade. However, all the contagion effect of the risks it creates through the banking system affect markets like Germany, France and Netherlands who are the most significant trade partners of Turkey.

5 Concluding Remarks and Policy Recommendation

The increase in the private sector debt has two major impacts on the Turkish trade; the decline in the demand both from households and the non-financial sector perspective and the shrinkage on the trade finance. Claessens et al. (2011) investigated the effect of the Eurozone crisis on EU firms[12]and found out that trade linkages with periphery euro countries affected export demand and was a significant contagion channel for the firms whereas they also found out that crisis had a larger impact on firms especially in the creditor countries who are financially exposed to peripheral euro countries via banking channel.

The deleveraging process of the non-financial corporations had a negative impact on their import demands. The decline in demand of the households, the people of the Eurozone who were also impacted from their increasing debt position had a negative impact on the Turkish trade. Cecchetti et al. (2011) explained that both non-financial corporate and household debt had a significantly negative relationship with the growth. Especially the banks in Netherlands, France, Germany and Italy had financial problems during the Eurozone crisis.

Non-financial corporations' debt in the Eurozone may have affected its trade with Turkey in a negative way as corporations tend to suspend new projects and investments during the Eurozone crisis. Second, the shrinking demand from the household segment also decreased the demand of the private corporations for the

[12]Their study was conducted with 3045 non-financial firms from 16 different countries in the 2010–2011 era.

imported raw, semi and finished products. Finally, usage of trade finance channels became harder during the crisis for the non-financial corporations which may also be sourced off the risky situation of the financial institutions of the Eurozone. Jenkins and Masters (2012) explained that with the change in the regulations in the Basel III framework, the leverage ratio of 3-month trade finance loan as a year-long exposure forced banks to keep more capital on the loans they provided. This caused an increase in the trade finance prices by 300 % or more.

As policy recommendations, the first step may be the establishment of a monitoring mechanism for the debted corporations in the Eurozone by the Turkish government in association with Turkish Exporters Assembly (TIM). Second, the Non Profit Institutions Serving Households (NPISH) debt ratios must be monitored continuously especially by the exporters who are specialized in consumer goods. Third, there should be close cooperation between Central Republican Bank of Turkey (CRBT) and European Banking Authority to monitor the financial sector in the Eurozone, which has a strong presence also in the Turkish banking sector.

In the trade finance domain, trade finance instruments must be used effectively especially in the trade with heavily debted states. An Export Credit Insurance Institute should be established for the new trade agreements with new trade partners. Eximbank should increase its financing capacity for the exporters and also provide in-depth information on risk for the foreign trade partners.

The econometric analysis also pointed out that Germany and Italy specifically impact Turkish trade positively. Therefore, the structure of the trade with these countries must be examined from various angles and opportunities must be reflected in the trade with the other Eurozone countries.

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Regulating Financial Markets After the Global Crisis

Narman Kuzucu

Abstract The global financial crisis was the most severe international economic crisis since the Great Depression. As it was the case after the earlier crises, the financial system was intensely discussed and the regulatory framework was shaped accordingly. The regulatory changes are still in process. The purpose of this chapter is to provide insights into the financial regulations after the financial crisis and to submit some details about the regulatory bodies and changes. This chapter includes a general review of the discussions in the global financial system in the wake of the financial crisis. The regulatory changes in bank capital, the shadow banking system, trading and financial reporting of the financial products and credit rating agencies are briefly described. The criticisms of bank capital regulations are submitted. The effect of both the crises and the regulatory changes are discussed.

1 Introduction

Efficient and stable financial markets are essential for a well-functioning financial system. Nevertheless, market failures and crises are inevitable for reasons such as information asymmetries, principal-agent problems and externalities. Whatever these reasons are, financial markets must be regulated in order to build a more resilient financial system. Furthermore, interconnectedness of financial markets requires a global regulatory and supervisory framework to ensure the soundness and stability of financial institutions. The last global financial crisis (GFC)[1] showed an example of this.

In the wake of every financial crisis, substantial regulatory changes are experienced. After the Great Depression of 1929, the New Deal and other acts, including the Banking and Securities Exchange Acts, were created. The Sarbanes–Oxley Act

[1]Global Financial Crisis is abbreviated to GFC throughout the chapter.

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of 2002, which promotes internal control and public oversight, was accepted after the Enron case in the US. In response to the GFC, most governments and policy setters acted globally together. Coordination between international regulatory bodies and national authorities was developed. The objective when taking action was to promote and maintain financial stability. On the part of financial institutions the main purposes were to improve risk management practices, to imply more robust liquidity management and to ensure more transparent governance processes. Reforms are still in the process of implementation. The ultimate purpose is to build a more resilient financial system.

The purpose of this chapter is to provide insights into the financial regulations in the wake of the GFC and to provide some details about the regulatory bodies and frameworks involved. A detailed description of the regulatory changes is beyond the scope of this work, however, this chapter describes some key events and the discussions related to global financial regulatory framework. We should remember that many reform initiatives are still under way, being debated, or in the process of implementation.

The following section offers lessons learned from the GFC involving causes and effect. The third section lists the global and European agencies involved in the governance of financial reforms. In the fifth section, the regulatory changes are briefly presented in the context of regulations in bank capital, shadow banking, accountancy and credit rating agencies. Finally, a summary and concluding remarks are presented.

2 The Lessons from the Crisis

When designing regulations in order to organize the financial system and reinforce the resilience of the markets in the future, it becomes important to understand the underlying reasons of the GFC. The causes of the GFC are instructive and those became the starting points for the solution-seeking dimensions of a new regulatory framework. This requires an assessment of the causes of the crisis.

Primarily, the complexity of securitized products and an inadequacy of information led to the creation of risky assets. Shadow banking systems (market-based financial institutions such as hedge funds, private equity funds, structured investment vehicles, other funds), which unlike banking system were unregulated, were widespread. The system was outside banking regulations, and thus out of control. Another discussion involves the insufficiency of rating agencies in determining the risks of the newly securitized financial products. The financial crisis originated in such an environment and became a global matter, despite it mostly affected developed western economies.

Although academics and policy makers generally agree that securitization was the primary cause of the crisis, the GFC was not just a subprime securitization crisis. The crisis, which was triggered by the subprime mortgage loans in the US, became global and was more severe than the previous crises because the financial

markets are more interconnected today. The status of large, global financial institutions also played a significant role in the exacerbation of the crisis. A critical level of public debt in the Eurozone deepened the crisis in Europe.

Contagion and counterparty risk were impressive factors in the crisis. The asset prices in markets sharply decreased during the crisis. Low-value assets triggered the default of financial institutions. Loan losses forced the banks to deleverage their assets. This process definitely had negative effects on the overall economy. Commercial banking should therefore be separated from capital market activities in order to tackle contagion and counterparty risks. Riskier investment banking lines should not be mixed up with commercial banking activities (Gurria 2010).

One of the important lessons learned from the GFC is that the financial supervisory authorities must monitor and supervise the markets more closely. Identifying possible systemic risks and regulating is not sufficient for the stability of the markets. The difficulties of new measures are much more in putting them into practice, not in their design. The effectiveness of the recommendations of the authorities depends on their binding capacity (Heise 2010).

Davies (2010) thinks that seeking solutions and working on the existing financial structure is not a remedy for the crisis. Creating new regulatory bodies is not sufficient, but implementing a hierarchy could provide a solution. He proposes a world financial authority for the stability of financial markets, modelled on the model of the World Trade Organization. The International Monetary Fund (IMF) and the World Bank are international bodies. Their role is not financial regularization, but oversight and monitoring. Obeying the rules and resolutions of these bodies is voluntary. They do not have any sanctioning power. Davies (2010) recommends that the Financial Stability Board be upgraded to a Financial Stability Council, as a central regulator.

Macro-prudential approaches to financial regulation have been proposed, as have micro- prudential regulations. Corporate social responsibility is mostly seen as a part of a company's marketing strategy. Actually, humans are a key factor in the healthy functioning of markets. The GFC showed that the international financial system is not a casino. The crisis has sparked debate about the roles of governments and markets in promoting confidence and trust. Trust is a key factor in financial markets and should be restored again (Petersen and Wiegelmann 2014).

The GFC provided an opportunity to overhaul the global financial system, despite the huge costs incurred by all economies and financial markets. The crisis allowed the policy-setters and decision-makers to question their approaches. Principles-based regulation, which predicates the spirit of the regulation, not the form, is preferred in advanced economies. Rules-based regulation, which involves more direct control by the supervisory authorities, is more appropriate for emerging markets. The GFC exposed the developed markets rather than emerging markets. It is understood that neither approach is sufficient when regulating the financial institutions in order to cover the systemic risk. Basic principles should be reconsidered for designing a new regulatory framework in which financial innovations and institutions are laid (Prasad 2011).

3 Global Governance of the Reforms

The Group of Twenty (G20) replaced the G7/8 in Washington DC in November 2008. G20 summits were organized to improve financial stability after the GFC. The heads of group member governments held meetings about twice a year in order to discuss the regulatory changes in the financial infrastructure and the measures to overcome the GFC. London, Pittsburgh and Toronto meetings, where the governments' finance ministers and central banking governors met and developed strategies, followed the Washington Summit.

The Financial Stability Board (FSB) was established in April 2009 as the successor to the Financial Stability Forum (FSF). The FSB's predecessor institution, the FSF, was founded in 1999 in order to promote stability in the international financial system by the G7 Finance Ministers and Central Bank Governors. At the Pittsburgh Summit, governments of the G20 approved the charter and the objectives of the FSB with a broadened mandate to promote financial stability.

The reform topics on which the G20 leaders agreed are summarized below (FSB 2010a):

- Strengthening bank capital and liquidity standards,
- Determining systemically important financial institutions and resolutions,
- Improving over-the-counter (OTC) derivatives markets and core financial market infrastructures,
- Reforming compensation practices to support financial stability,
- Strengthening adherence to international supervisory and regulatory standards, including accounting standards,
- The coordination of supervisory boards to develop macro-prudential frameworks and contingency planning, and improving resolution tools.

A new global financial and supervisory framework may be achieved through the cooperation and the coordination of several regulators in different fields. Sector-oriented regulators are the Bank for International Settlements (BIS), Basel Committee on Banking Supervision (BCBS) in the banking sector, the International Association of Insurance Supervisors (IAIS) in the insurance sector, and the International Association of Securities Commission (IOSCO) in the security markets. The International Accounting Standard Board (IASB), the Financial Accounting Standard Board of the USA (FASB) and some international organizations like the World Bank and the Organization for Economic Co-operation and Development (OECD) are standard setters in their respective fields.

An integrated prudential governance may be created through the coordination of both micro- and macro-prudential supervision. A global prudential policy was set with several steps: preventive action, crisis management and crisis resolution. A new financial regulatory and supervisory model was based on several principles from the G20 summits; promoting sound regulation and financial market integrity, reinforcing international cooperation and reforming international financial institutions. New regulations were needed to provide measures to limit moral hazard in the

markets. The FSB published a set of principles in order to guide the national resolution regimes which were to be established (FSB 2011; Perrut 2012).

The G20 is the main authority delegating the conduct of the supranational regulatory reform to the Basel Committee and the FSB, however it is not clear whether the G20 is only a temporary governance committee for the crisis or intends to be a steering committee for global financial governance (Goldbach 2015: 193–194).

Prudential regulation reform was launched in October 2008 in the European Union, with the European Commission's proposal. Reforms of the Capital Requirements Directive and of the Deposit Guarantee Directive and Credit Rating Agency Regulation came into force in 2009. The European Systemic Risk Board (ESRB) was established in 2010 as an EU level body with a mandate to oversee risk in the financial system as a whole. The main objective of the organization is to prevent and mitigate systemic risks. The president of the ESRB is the president of the European Central Bank (ECB). The micro-prudential supervisory level, the European System of Financial Supervisors (EFSF), which includes the ESRB, works as a decentralized network. Three new authorities were established in 2011. These are European Banking Authority (EBA), European Securities and Markets Authority (ESMA) and European Insurance and Occupational Pensions Authority (EIOPA). The purpose of these new bodies is to coordinate the implementation of European supervisory standards, and ensure strong cooperation between national supervisors. These three organizations are independent bodies, and have some limited power on financial institutions. Their role is to elaborate a single set of rules and principles and to solve conflicts between cross-border institutions. The purpose of the ESRB is to ensure supervision of the EU's financial system. Some weaknesses and questions remain, however. For instance, the ESRB has limited binding power (Perrut 2012).

4 Regulatory Changes

4.1 Dodd-Frank Act (Volcker Rule) in the US

After the Great Depression in 1929, financial regulatory changes were made and several acts were designed to address the actual causes of the crisis, including the Securities Act of 1933 and the Securities Exchange Act of 1934 in the USA. Similarly, after the Global Financial Crisis, the Dodd-Frank Act, which regulates financial markets and banking activities was adopted and signed in 2010.

The act brought some heavy regulations to the banks and the financial markets. The proprietary trading of banks and their affiliates is forbidden by the act. Only some activities, such as market-making, underwriting or certain types of hedging, are exempted from the rule. This rule is commonly known as the Volcker Rule. In a proprietary trading transaction, the bank acts on behalf of itself and profits from the

difference between the purchase and the sale price rather than from commissions. Since the full profit or loss of the trade is accepted by the bank, such transactions carry a great deal of risk. The proprietary trading restrictions are applicable to a wide range of securities including options and derivatives. US government securities and, under some conditions, foreign sovereign debt are exempted.

The Volcker Rule aims to stop banks trading without the links to clients and to limit involvement in riskier kinds of investment funds. The Volcker Rule thus prohibits banks from acquiring "covered funds", which includes most hedge funds, venture capital funds and private equity funds. Some kinds of securitizations, covered bonds, exchange-traded funds, and other similar products are, covered by the prohibition since the definition of covered funds is very broad. The proprietary trading ban has been applicable from the middle of 2015, however, the implementation of some other prohibitions on covered funds were delayed to 2017 (PwC 2015: 277–278).

4.2 Bank Capital Regulations (Basel III)

The Basel Committee on Banking Supervision (BCBS) was established in 1974. Its original purpose was declared as enhancing financial stability by improving supervisory knowhow and the quality of banking supervision worldwide. The Basel Committee has focused on risk-weighted capital regulation in the context of the harmonization of its members' regulatory standards since the 1980s. The BCBS issued a set of recommendations for bank capital requirement, which is commonly known as the Basel Accord, in 1988. The Committee developed these rules and published a new set of rules for capital adequacy framework in 2004. The so-called Basel II has three pillars: (1) minimum capital requirements; (2) supervisory review of banks' capital adequacy and internal assessment; and (3) effective use of disclosure (BIS 2015).

The BCBS submitted proposals for a reform of the regulation of capital requirements for banks in 2009. The Basel Committee proposed that banks had suffered from the shortage of capital during the GFC, and thus, the capital adequacy and liquidity should have been strengthened as a remedy. The proposed standards were issued by the Committee 1 year later in December 2009. The enhanced Basel framework, and certain other innovations are known as 'Basel III'.

In the wake of the GFC, Basel II.5 was designed as a short-term, quick solution to banks resilience in the financial system before the implementation of Basel III. Basel III is an extensive and detailed framework which requires risk-based capital adequacy calculations, as did the earlier versions. The new accord introduced four new considerations: higher-quality capital requirements, capital buffers, a new leverage ratio, and liquidity requirements (Goldbach 2015: 183).

The significant adjustment in Basel III is the stricter definition of Tier 1 capital. Under Basel III, common equity, so-called Tier 1 capital, has to be 8.5 % of the total risk-weighted assets. 7.0 % have to be Common Equity Tier 1 (CET1). CET1 is the

sum of common shares, stock surplus (share premium), retained earnings, other accumulated comprehensive income, common shares issued by the consolidated subsidiaries and regulatory adjustments. 2 % can be added from Tier 2 capital, which consists of the sum of the instruments issued by the bank or by the consolidated subsidiaries of the bank that meet the criteria for inclusion, stock surplus resulting from their issue, certain loan loss provisions and some regulatory adjustments. In general, the breakdown of the 10.5 % minimum capital requirement is as follows under Basel III: 7 % CET1, 1.5 % common equity, and 2 % Tier 2 capital (BCBS 2010a; Goldbach 2015: 183).

Basel III draws attention to 'going concern' capital, which is core equity. CET1 equals to the book value of equity—intangible and revaluation reserves. Tier 1 simply refers to the equity, and Tier 2 represents equity plus subordinated debts in which the maturities are longer than 5 years. The Basel II formula which was initiated in 2004, calibrates the measure of risk-weighted assets (RWA) that ensures a bank capital of 8 % of risk weighted assets covers loan losses. The Basel III capital adequacy regulation increases the ratio (Dermine 2013).

The effective date of ful implementation of the minimum requirement was postponed to 2019. The minimum requirement was set at 60 %. A gradually increasing minimum requirement was applied, from 60 to 100 %, between 2015 and 2019.

Capital regulations brought by Basel III have been criticized, as has Basel II. Hellwig (2010) criticizes the capital regulations of Basel and underlines three deficiencies: "*(i) The precise objective of the regulation is unclear. (ii) The dynamics of implementation over time have not been given sufficient attention. (iii) Systemic concerns have been neglected*." Capital regulations provide a buffer for banks and prevent banks from insolvency in crises, but the purpose of the regulatory capital is not precisely and explicitly stated in the Basel documents. Secondly, the implementation process through the time period is not described in detail. It is not clearly explained how a bank should adjust its balance sheet when equity capital decreases due to unexpected losses. Thirdly, systemic risk issues are not included in the regulatory capital framework. For example, if a bank deleverages due to losses in accordance with the capital regulation, this will harm to another bank's assets, and will increase systematic risk. Contrary to the purpose of the regulation, deleveraging may worsen financial institutions in this case.

Hellwig (2010) asserts that bank capital regulations need a thorough overhaul. He proposes that the calibration of regulatory capital should not be accommodated and determined by the risks which the banks take. Secondly, the regulatory capital must be so high that the bank owners and managers get rid of the idea of "too-big-to-fail". The stability of the financial system may thus be maintained. The target should be the whole system, not the individual financial institutions.

Some critics claim that Basel III framework is too complicated, as is Basel II, because it is very difficult to estimate the probability of default. The estimate of loan losses under severe economic conditions is made by scenario-based stress testing techniques. A stress test involves a number of calculations with several assumptions, and so leads to complexity.

Capital adequacy regulation should not be excessive as it should be sufficient to cover bank solvency, because there are unintended results of excessive capital. When a bank holds excessive capital to maintain the assets, it causes banks to securitize loans in order to circumvent the capital regulation. Excessive capital increases the cost of capital for banks and banks raise the interest rates they impose, particularly small and medium size enterprise loans (Dermine 2013).

Increasing capital by regulations may have unintended impacts. Banks may tighten the supply of loans or turn to securitization because equity funding is costly. Increasing the required capital by 50 % from Basel II to Basel III may cause severe distortions. Dermine (2013) suggests that empirical data on loan losses during the GFC should be reviewed and considered for a new capital requirement design.

In sum, the three pillar architecture of the Basel accord is maintained. More disclosure requirements have been prescribed to increase the transparency. The supervisory framework has been considerably reinforced by Basel III. The new Basel regulations did not bring a clear regime change. Only some rules were changed and some new definitions and complementary ratios came into effect. The general principles and he transnational regulatory regime is unchanged (Goldbach 2015: 186).

4.3 Market Liquidity Risk

The GFC showed that the liquidity of financial institutions caused significant contagion of the turmoil. The interconnectedness of banks and other financial institutions lends special significance to the liquidity and the quality of liquid assets as well as capital adequacy.

The Basel III regulatory framework involves not only in capital adequacy but also in bank' liquidity. The Basel Committee (2010b, 2013a) set two liquidity ratios, which are the Liquidity Coverage Ratio (LCR) and the Net Stable Funding Ratio (NSFR).

Under the liquidity coverage ratio, banks are required to hold sufficient high quality assets to cover cash outflows in cases of stress lasting thirty days. The Basel III liquidity requirements were relaxed in 2013. Level 2 assets such as corporate bonds, high securities and equities were included in high quality liquid assets, as well as level 1 assets such as government bonds. The LCR was introduced in 1 January, 2015.

The NSFR requires matching the duration of sources of funds with assets which have had maturity for more than one year, however NSFR is not applied for the assets which have matured for less than one year, therefore, implementing a Dynamic Liquidity Coverage Ratio (DLCR) which ensures liquidity for the next twelve months is better than NSFR. Dermine (2013) thinks that liquidity rules limit the liquidity transformation role of banks and adjusting the maturity profile of a bank's funding structure should be left to a bank's dynamics. Excessive liquidity

rules will confine the maturity transformation of banks, leading to incentives to securitize. The NSFR rule will be applied in 2018.

Dermine (2013) proposes the independence of individual banking supervisory agencies like central banks. This will induce the accountability of banking supervision and too-big-to-fail practices will be ended. Creditors, including interbank creditors, should be put at risk in order to reduce moral hazards, because they have the comparative advantage of having information. In the meantime, small depositors should continue to be protected for a well-functioning economy.

New capital accord introduced new definitions under Basel III. The new rules brought by Basel III are summarized below:

- A new capital definition (CET1) and a risk-based capital ratio are introduced. The minimum risk-weighted capital ratio is increased. Banks require additional capital buffers, including a systemic risk buffer for systemically important banks, a capital conservation buffer, and a countercyclical capital buffer. The micro-prudential tool (the capital ratio) is strengthened. A macro-prudential tool is added through capital buffer. Banks need to have higher quality capital to fund their more conservatively calculated risk weighted assets (RWAs).
- Wider risk coverage: Bank regulatory capital has to cover against credit valuation adjustment (CVA) risk as well as counterparty default risk.
- The Liquidity Coverage Ratio (LCR) ensures banks have an adequate stock of high quality liquid assets that can be easily and immediately converted to cash so that banks promote short-term resilience to liquidity risks.
- The Net Stable Funding Ratio (NSFR) ensures that a bank has a sufficient amount of stable funding to back its activities. The NSFR requires banks to have stable funding at least 100 % of required sources over a one year period.
- Leverage Ratio: Basel III also introduces a new tool called the leverage ratio. The minimum leverage ratio requirement is 3.0 %. The aim of the requirement is to keep banks from using excessive leverage. Banks must hold sufficient Tier 1 capital against their total assets and off-balance sheet exposures (BCBS 2010a, 2013; Perrut 2012; PwC 2015).

4.4 Shadow Banking System and Systemic Risk

The number of financial intermediary firms other than banks and the share of those in the financial system dramatically increased after the 1980s. These financial institutions were highly leveraged and less regulated than banks. Moreover, the OTC derivatives issued by the financial intermediaries increased the risks that were taken. Those derivatives caused some large financial institutions to take risks that were unknown to the investors. Less regulated financial intermediaries, so-called 'shadow banking', made the financial system more vulnerable to shocks (Cecchetti and Schoenholtz 2014: 65).

Systemic risk refers to all threats to the financial system. Systemic risk occurs when vulnerabilities in markets and financial institutions threaten and distort the intermediation function. Interconnectedness, barriers to the flow of information and illiquidity are common sources of systemic risk (Cecchetti and Schoenholtz 2014: 116). Regulations regarding capital allocation, liquidity and market risk are made to tackle vulnerabilities and retain the stability in the financial system. Systemic risk in financial markets does not solely concerns prudential regulation of financial institutions, nonbanking intermediaries also influence the stability of financial systems. The risks created by shadow banking are difficult to understand and hard to control (Karmel 2012).

The shadow banking sector played a significant role in the crisis. The volume of shadow banking products was about USD 20 trillion, whereas the total size of conventional banking securities was about USD 11 trillion in 2008 (Petersen and Wiegelmann 2014). Excessive leverage and maturity mismatches in shadow banking exacerbated the turmoil in the financial system. After the crisis, the authorities and policymakers recognized the need to take shadow banking under control. The regulators focused on financial intermediaries, as well as on banks' capital adequacy to mitigate systemic risk.

Systemically important financial firms which are likely to seriously damage the whole financial system and the economy in case of their defaults are also termed 'too big to fail'. The FSB made recommendations on Systemically Important Financial Institutions (SIFIs) in 2010. The FSB, IMF and BIS published a paper with guidance on the formulation of guidelines on how the systemic importance of financial institutions can be assessed. SIFIs must be identified and supervised. The FSB identified some institutions as global SIFIs (G-SIFIs). G-SIFIs are the institutions whose "distress or failure will cause significant dislocation in the global financial system and adverse economic consequences across a range of countries" (FSB 2010b, 2011).

The Basel Committee and FSB conducted a study, and identified 29 banking groups as global systemically important banks. Size, interconnectedness, complexity, and the prevalence of global activities were some of the criteria used in the selection. The notion of a lender of last resort for administrative authorities was modified. During the GFC, the failure of systemically important institutions was prevented by the governments. "too-big-to-fail" principle replaced "lender of last resort" because of the concerns related to the failure of the whole system. Authorities should manage moral hazard problems and avoid excessive risk-taking of SIFIs because the managers of SIFIs may think that they are protected (Perrut 2012).

Basel III sets additional capital requirements for global systemically important banks (G-SIBs). The new accord aims to eliminate or minimize the distortions of too-big-to-fail institutions in the global financial system and requires large banks to meet additional loss absorbency requirements and to disclose additional information to the public. The determination of a G-SIB is based on five criteria: size, interconnectedness, lack of readily available substitutes or financial institution infrastructure, cross-jurisdictional activity, and complexity. The additional loss

absorbency requirements are applied from 1 % to 3.5 % of CET1 capital according to a bank's exposure to systemic risk (Goldbach 2015: 183–185).

In the US, the regulatory reforms aimed to improve the management of risks threatening financial stability and also involved under-regulated elements of shadow banking. The Federal Reserve has been authorized to supervise and regulate large institutions with systemic importance in financial markets. Before the new regulations, non-banking institutions that may grant mortgages and consumer credits were ignored. The new legislation requires systemically important nonbank firms, regardless of legal form, to apply stricter capital and liquidity requirements, as well as large banks. The Federal Reserve is responsible for conducting annual stress tests and supervising the capital adequacy of systematically important financial firms. Those measures are expected to reduce any "too-big-to-fail" distortions (Barr 2012: 97–99).

4.5 Accountancy and Convergence of IFRS and US GAAP

Fair value accounting has been criticized for its contribution to the GFC. Critics argue that the fair value of assets is misleading and irrelevant for investors. Assets held for a long time, or held to maturity should not be measured at their market price because the value may be distorted by market inefficiencies or liquidity considerations. Laux and Leuz (2009) assert that fair value accounting provokes the procyclicality of the financial system. Advocates of fair value accounting claim that fair values for assets or liabilities reflect market conditions and provide relevant information. Investors need transparent information and rely on current market prices. According to the supporters, fair value involves more information than historical costs in financial statements (Mala and Chand 2012).

In 2008, the International Accounting Standards Board (IASB) held meetings to review the role of fair value accounting in the GFC and published proposals regarding the fair value measurement of financial instruments and disclosures. In the meantime, the Securities Exchange Commission of US (SEC) discussed mark-to-market accounting and its applications. It was generally agreed not to quit fair value, but the SEC provided recommendations about the applications of mark-to-market accounting, particularly when the markets are illiquid and inactive. For example, accounting for impairments where market prices are not readily available was reconsidered (Mala and Chand 2012).

The process of convergence between International Financial Reporting Standards (IFRS) and US Financial Accounting Standards (FAS) had been continuing when the GFC took place. At the G20 summits, the importance of convergence, and achieving a single set of high quality, improved global accounting standards, was emphasized. The regulatory bodies took account of the lessons of the GFC and put forward the four key areas for financial reporting: impairment of assets, derecognition, fair value measurement and offsetting financial instruments. Specifically, when the markets are less active, the fair value measurement of financial

instruments and developing globally common standards are critical. The FSB recommended that the regulatory bodies of IFRS and FAS develop improved converged standards, however the opinions of IASB and FASB on the fair value measurement of lending instruments, including loans and investments in debt securities, are divergent (FSB 2010b). Convergence between the standards is underway, however some practices, such as loan loss provisioning, still differ across the countries.

4.6 Credit Rating Agencies

Credit rating agencies (CRAs) play an important role in today's capital markets because most investors base their investment decisions on credit ratings of the financial products. After the crisis, the activities of CRAs were questioned and were harshly criticized because the securities involving mortgages and collateralized debt obligations which triggered the GFC had been highly rated by the CRAs. In the 1997 Asian debt crisis and the collapse of Enron, CRAs similarly failed to anticipate the problems. Actually, a high rating does not mean that the securities are very good instruments for investing but many regulatory frameworks, including SEC and the Basel Accord, recognize that the grading of CRAs, and creditworthiness of issuers is represented by those ratings (Karmel 2012: 867).

At the G20 summits, the leaders agreed that the regulatory oversight regime of CRAs must be consistent with the Code of Conduct issued by the IOSCO. Increased transparency and reducing reliance on CRAs are the common goals of different national and global agencies. The FSB developed and recommended some principles to reduce reliance on external ratings in central bank operations and in the supervision of banks. The FSB aims to develop alternative standards of creditworthiness and to enhance firms' credit assessment capabilities (FSB 2010b).

In the US, the Dodd-Frank Act increased the SEC's responsibilities to ensure the transparency of the methodologies used by the CRAs. The Act enforced new conflict-of-interest restrictions, internal control mechanisms for the management of CRAs, and imposed new burden to compliance officers. By removing certain statutory references to credit ratings, the regulation aimed to decrease the function of credit ratings. The Dodd-Frank Act allowed the SEC to establish a new Office of Credit Ratings. The SEC's rules are consistent with the IOSCO's Code of Conduct and the SEC pursues accountability, transparency, disclosure, and competition in the credit rating industry.

In November 2009, a regulation which requires the CRAs to be authorized by their national authorities was accepted by the EU. Accordingly, EU entities would be rated only by such authorized CRAs. In May 2011, the EU issued a new regulation and authorized the European Securities and Markets Authority (ESMA) for the registration and supervision of CRAs. This regulation is in parallel with the US CRA regulatory regime. Board member assignments are limited to

5 years, and independence and the avoidance of conflicts of interest must be ensured (Karmel 2012: 871).

The IOSCO provided international support for the convergence of US and EU regulations on CRAs. Since the three biggest rating agencies have a US origin, the SEC's regulatory initiatives have a special importance. EU politicians are uneasy due to the dominance of the big three rating agencies in the financial system. They tend to reduce investor reliance on credit ratings (Karmel 2012: 874).

The EU CRA Regulation introduced measures to mitigate and manage conflicts of interest. The regulation has been amended several times already because it aims to increase transparency and strengthen competition between CRAs. ESMA is authorized to conduct investigations and has the power to ensure the compliance of CRAs with the regulation.

5 Summary and Concluding Remarks

The GFC, which was triggered by subprime securitization, dispersed and damaged global economies due to contagion and interconnectedness. The interconnectedness of global financial markets required close cooperation between authorities to tackle the systemic risk. The G20 and the FSB acted as focal bodies that monitored and generated remedies for the crisis.

The GFC provided an opportunity to overhaul the global financial system. The national authorities and supranational regulatory agencies endeavored to build more stable markets and more resilient financial institutions and tried to mitigate the risks, including the too-big-to-fail phenomenon. For the first time, globally systemic important financial institutions were defined and specific measures were addressed. An integrated prudential governance was achieved largely by the coordination of both micro- and macro-prudential supervision. Bank capital regulations, including capital buffers and liquidity requirements, taking shadow banking system under control, convergence between accountancy systems and supervising CRAs. The Dodd-Frank Act, and specifically the Volcker Rule, which strictly regulates and limits banks' trading came into effect amid oppositions from European parties and even US banks.

Bank capital regulations, namely the Basel III standards, require additional capital buffers. The effects of Basel III are discussed and criticized as increasing the cost of banks. Ultimately, regulating the banking system versus free banking is a cost-benefit analysis where governments do not prefer the costs to be borne by deposit holders. The financial crises demonstrated that costs in the failure of banks are incurred not only by deposit holders but also by all the other related parties in the financial system. Nevertheless, an unintended effect of bank regulations is the potential loss of innovation dynamism.

The experience from the recent crisis provided evidence that the financial system has evolved from a western-dominated structure to a more global one, and moreover, the crisis accelerated this transition. In today's conditions, emerging

economies obviously have more significant roles in the global system. Developed markets and financial institutions from western economies were unexpectedly more fragile during the crisis and the effects were catastrophic. The collapse of giant financial institutions provided important lessons for policy setters and global decision makers.

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Fiscal Sustainability in the G-7 Countries

Ece H. Guleryuz

Abstract The main objective of this chapter is to assess the fiscal sustainability performance of the G-7 countries before, during, and after the global financial crisis. We examine the movement of various socio-economic and fiscal indicators before, during, and after the crisis period in the G-7 countries. We find that the trends of the key fiscal balance indicators clearly reflect the negative effects of the crisis in the G-7 countries. Furthermore, the ageing population and increases in public health expenditure produce an additional fiscal strain. However, Germany has been able to achieve a good financial performance compared with the other G-7 countries.

1 Introduction

The 2008–2009 global financial crisis has critically challenged the world economy in terms of maintaining plausible economic growth rates and fiscal sustainability. The crisis has affected not only emerging and developing markets but also the G-7 advanced economies in a negative way. Figure 1 shows the real GDP per capita changes in the G-7 countries in two periods: 1997–2006 and 2007–2016 (period averages). The 2007–2016 period overlaps with the time range during and after the global financial crisis. Excluding Germany and Japan, the remaining five G-7 countries experienced substantial reductions in their real GDP per capita growth rates in the second period. For instance, it decreased from 1.3 to −1.1 % in Italy and from 2.7 to 0.4 % in the United Kingdom. The United States, Canada and France have also experienced substantial economic growth deterioration.

In this chapter we try to assess the fiscal sustainability performance of the G-7 countries during and in the aftermath of the global financial crisis. To achieve this purpose, we compare the trends of crucial socio-economic and fiscal balance

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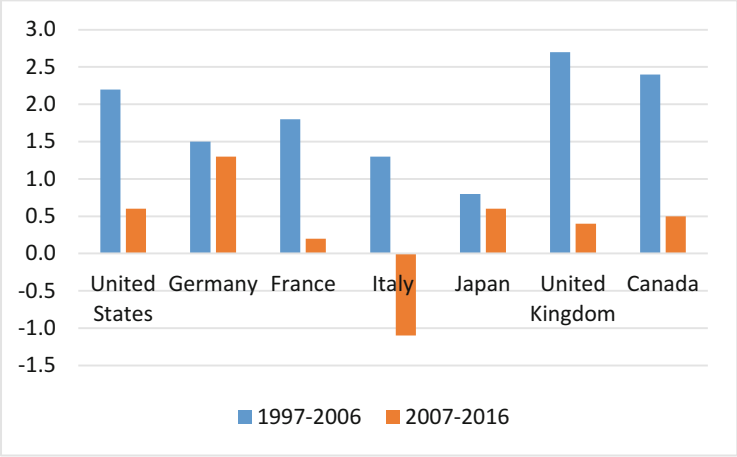

Fig. 1 Real GDP per capita growth rate. Source: Author's own calculations

indicators in two distinctive periods: before the global financial crisis and during and after the crisis. We find that the debt balances in the G-7 countries substantially worsened and the aggregate production deteriorated during the crisis. Germany has achieved a better fiscal sustainability performance than the other G-7 countries.

The chapter continues as follows. Section 2 discusses the related literature. Section 3 carries out a detailed analysis of the movements of significant socio-economic and fiscal indicators, and Sect. 4 presents the conclusion.

2 Literature Review

There is a rich body of literature that analyzes the fiscal sustainability of different country groups. Chalk and Hemming (2000) provide an overview of various approaches to fiscal sustainability analysis based on IMF studies. Some of the studies use panel unit root and panel cointegration tests. Afonso and Jalles (2015) examine the fiscal balances of OECD subgroup countries. They find no strong cointegration between government revenues and expenditures and causality from debt to primary balances. They observe that primary balances improve after debt ratios have risen higher. Afonso (2005) and Afonso and Rault (2010) attempt to assess the fiscal sustainability of a group of European Union (EU) countries in different time periods. They argue that the high indebtness levels are challenging the EU governments' ability to maintain plausible fiscal balances and policy.

Mahdavi and Westerlund (2011) examine the ability to run budget deficits and debt financing at the state–local government level in the U.S. while taking into account strict, formal fiscal rules. Kia (2008) investigates the fiscal sustainability of Iran and Turkey using cointegration and tax-smoothing techniques. He also

concludes that Iran's over reliance on oil and natural gas income risks the responsibility of its fiscal policy. In another paper Alexis (2014) argues that the high primary fiscal deficit levels of 18 developing and emerging countries contribute to their fiscal unsustainability.

A large group of related studies investigate advanced and G-7 economies. Ghosh et al. (2013) use a fiscal reaction function for 23 advanced economies to compute their ability to increase their primary balances in an environment of rising debt. Chen (2014) examines the fiscal sustainability performance of the G-7 and various European countries by using the debt-to-GDP ratio as the primary indicator. In another study within G-7 countries, Feve and Henin (2000) use the feedback-augmented Dickey–Fuller statistic as a fiscal sustainability test. Cottarelli and Schaechter (2010) emphasize the necessity of sustainable fiscal adjustment, macro-prudent structural reforms, and better-functioning fiscal institutions to fight the high debt levels in the G-7 countries. Hauner, Leigh, and Skaarup (2007) argue that the increasing ageing-related government spending creates a big challenge for fiscal sustainability in the G-7 economies. They also support an immediate fiscal adjustment rather than a delayed one.

3 Key Indicators Before, During, and After the Global Financial Crisis

In this section we examine the trends of important socio-economic, general government fiscal balance and debt indicators before the global financial crisis and during and after the crisis. The data sources from which we obtain data are the World Bank's World Development Indicators and the IMF's World Economic Outlook (WEO) reports. For the indicators depicted through Figs. 2, 3, 4, 5, 6 and 7, we identify the first time range as before the global financial crisis and the 2008–2014 range as the period during and after the global financial crisis.

All of the G-7 countries experienced cash deficits between 1999 and 2014, as can be seen in Fig. 2. Only in Canada and Germany did the cash deficit decrease in the 2008–2014 period. On the contrary, we see distinctive increases, and even sharp jumps, in the cash deficit during the second period in the rest of the G-7 countries, namely more than 4 % in Japan and around 5 % in the United Kingdom and United States.

Figure 3 shows the increase in the elderly population ratio. Compared with the 1980–2007 period, the elderly population ratio increased in the G-7 countries during the 2008–2014 period. This indicates that the G-7 countries possibly faced a challenge in ageing-related expenditures during and after the global financial crisis. For example, Germany and Italy, which experienced an increase of almost 5 %, and Japan, which experienced a surge of over 9 %, in the elderly population ratio have already positioned themselves to confront the aging population problem in the medium run.

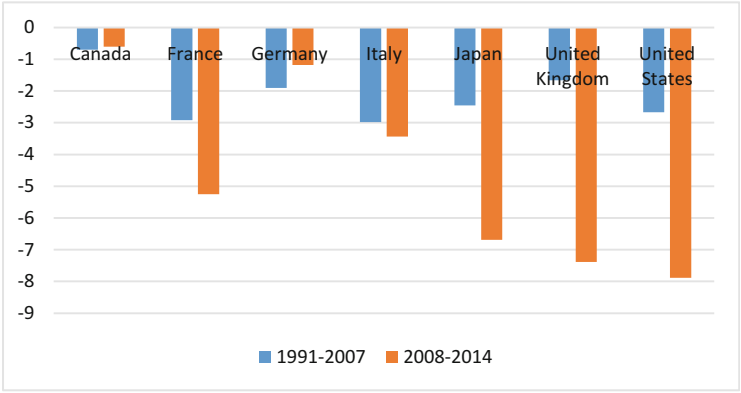

Fig. 2 Cash deficit. Source: Author's own calculations

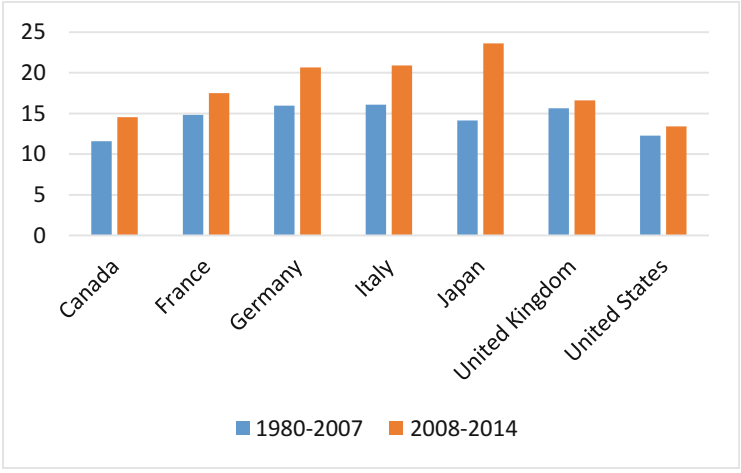

Fig. 3 Old population rate. Source: Author's own calculations

Figures 4, 5, and 6 depict the movements of the government expenditure on education, public health expenditure, and military expenditure, respectively. The government expenditure on education shows more balanced trends, with small ups and downs between the two periods. Only Canada experienced a decline of more than 1 % in the 2008–2014 period compared with the 1980–2007 period. Public health spending increased in all the G-7 countries by 0.35–2 % during and after the global financial crisis. This change in public health spending put an additional strain on the fiscal balances of the G-7 countries. The biggest increases took place in Japan, the United Kingdom, and the United States. During the 2008–2014 period, only Japan and the United States increased their military expenditure. In the other

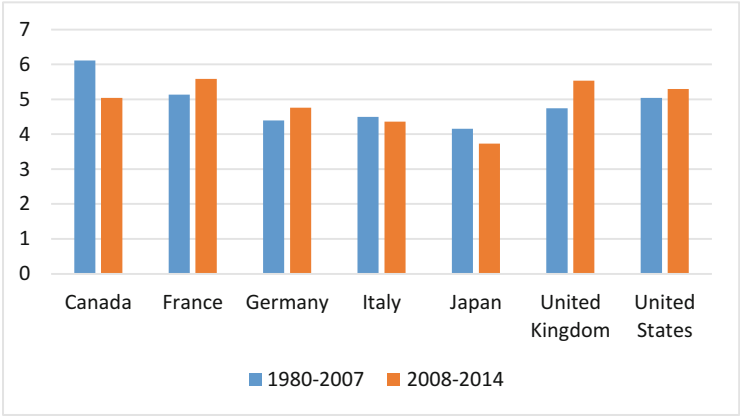

Fig. 4 Government expenditure on education. Source: Author's own calculations

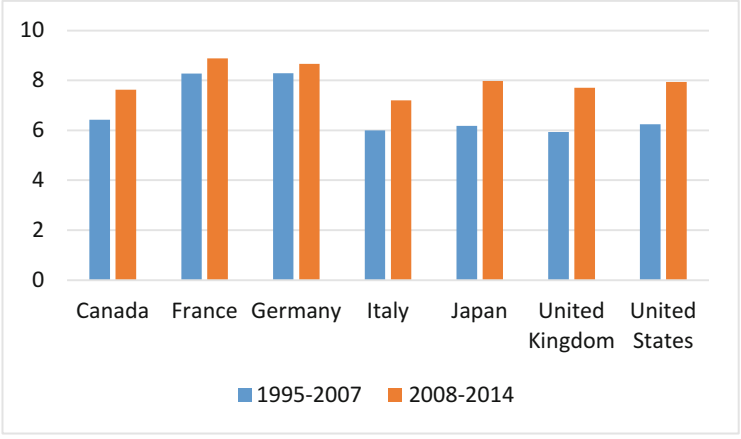

Fig. 5 Public health expenditure. Source: Author's own calculations

five G-7 countries, the military spending declined during and after the crisis. Figure 7 shows that the tax revenue decreased in the G-7 countries, except Germany in the 2008–2014 period. This reduction in tax revenues might generate additional difficulties in achieving and maintaining fiscal sustainability.

The analysis period for the general government fiscal balance debt indicators is 2006–2016 (2015 and 2016 values are projected), and the IMF WEO October 2012 and October 2015 reports are used. The G-7 countries experienced the lowest government net lending levels (mostly negative) in the years 2009 and 2010, which correspond to the highlighted period of the global financial crisis. The government net lending/borrowing graphs in Fig. 8 depict deep V-shaped trends

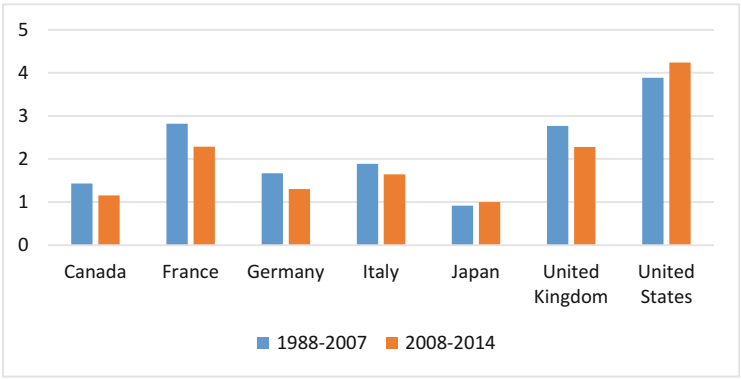

Fig. 6 Military expenditure. Source: Author's own calculations

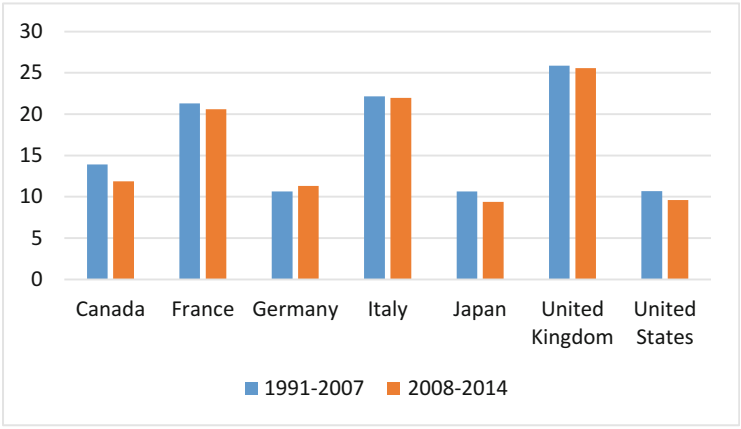

Fig. 7 Tax revenues. Source: Author's own calculations

for the G-7 countries between 2008 and 2011 (for the United States this period extends to 2013). Only Germany managed to sustain positive government net lending values starting in 2012.

Most of the G-7 countries experienced the lowest output gaps (mostly negative) in 2009 (the United Kingdom had a −3.0 % output gap in 2012), which can be seen in Fig. 9. By the end of 2016 it is projected that, in the G-7 countries with the exception of Germany, the output gap levels will still be negative. This indicates that, during the global financial crisis, the real aggregate output values remained lower than the potential aggregate output values.

We can see a V-shaped movement, first worsening and then improving, of the structural balance in the United States, Germany, France, the United Kingdom, and

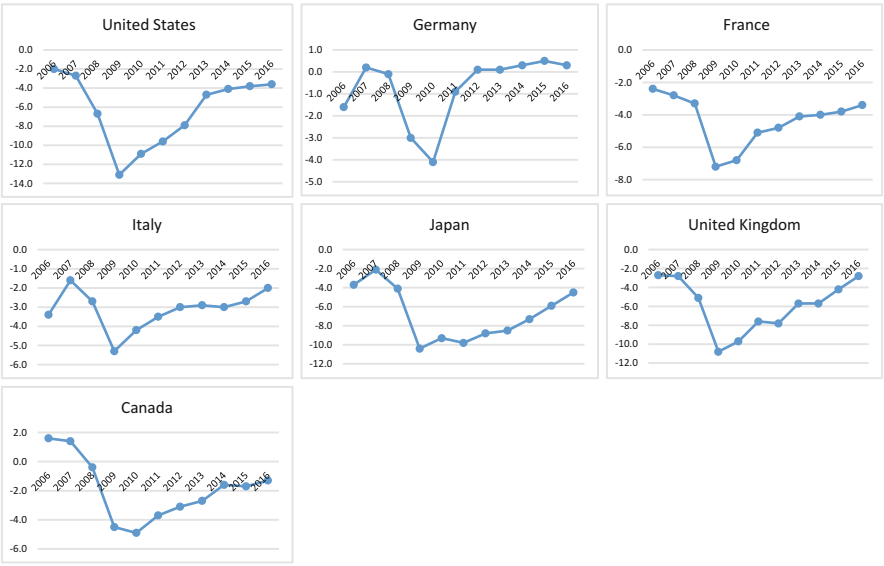

Fig. 8 Government net lending/borrowing

Canada in Fig. 10. Japan performed poorly and is forecast to have a −4.3 % structural balance (as a percentage of its GDP), which is even worse than Japan's 2006 score of −3.5 %. Germany and Italy have improved considerably, with Germany achieving positive structural balance values from 2013.

The graphs in Fig. 11 show that the net debt (as a percentage of the GDP) increased in all the G-7 countries between 2006 and 2016. In Italy and Japan, it is expected that it will definitely surpass 100 % of the GDP by the end of 2016. We also find that the gross debt (as a percentage of the GDP) inclined substantially in the United States, France, Italy, Japan, and the United Kingdom (Fig. 12). Interestingly, in Germany the gross debt only changed in a band of 13 %, reaching its highest value of 80.6 % of the GDP in 2010. Regarding the current account balance (Fig. 13), the United States, Germany, France, and Italy have experienced improving records, while Japan, the United Kingdom, and Canada have had worsening records. Italy managed to achieve a current account surplus starting in 2013, and Germany has experienced a current account surplus since 2006.

4 Concluding Remarks

The primary aim of this chapter is to assess the fiscal sustainability performance of the G-7 economies by examining the trends of important socio-economic and fiscal indicators before, during, and after the 2008–2009 global financial crisis. We find

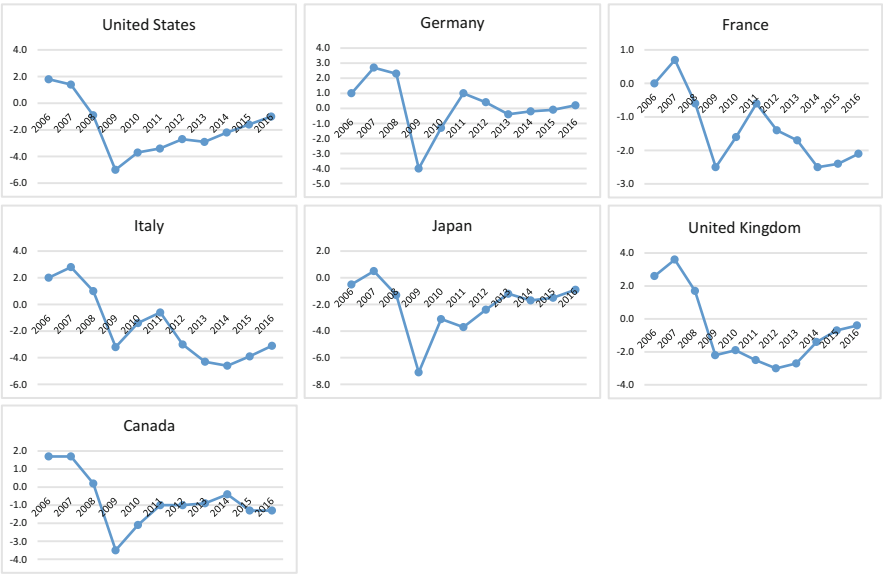

Fig. 9 Output gap

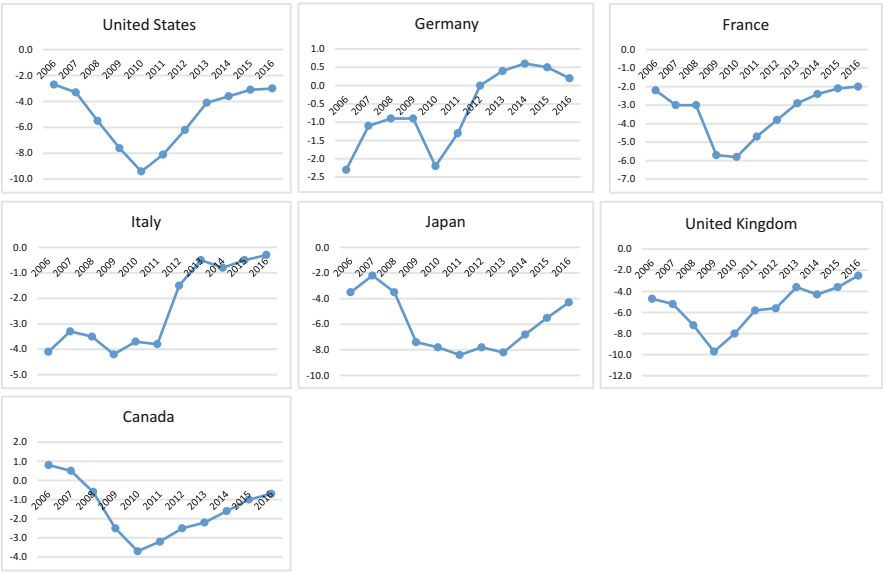

Fig. 10 Structural balance

that the cash deficit inclined substantially in France, Japan, the United Kingdom, and the United States with the onset of the crisis between 2008 and 2014. The increases in the elderly population ratio and public health expenditure during the

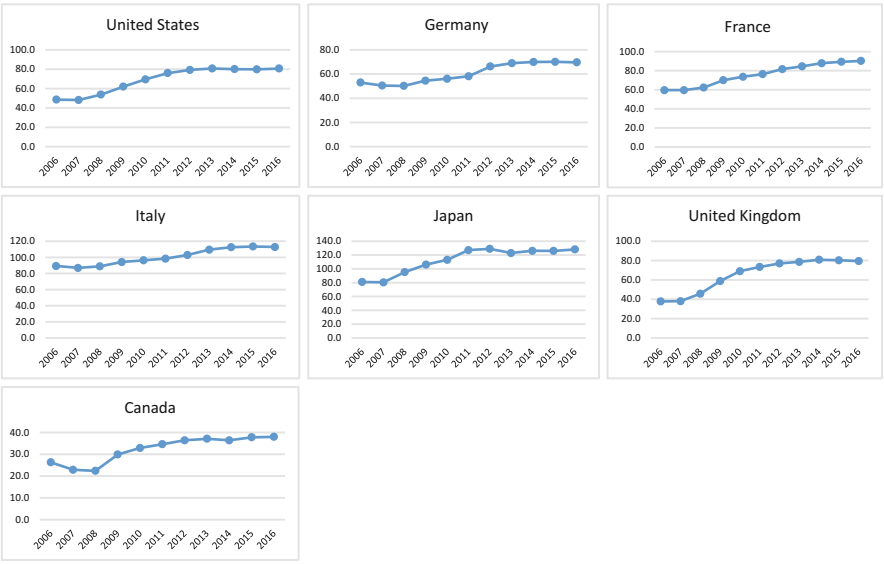

Fig. 11 Net debt

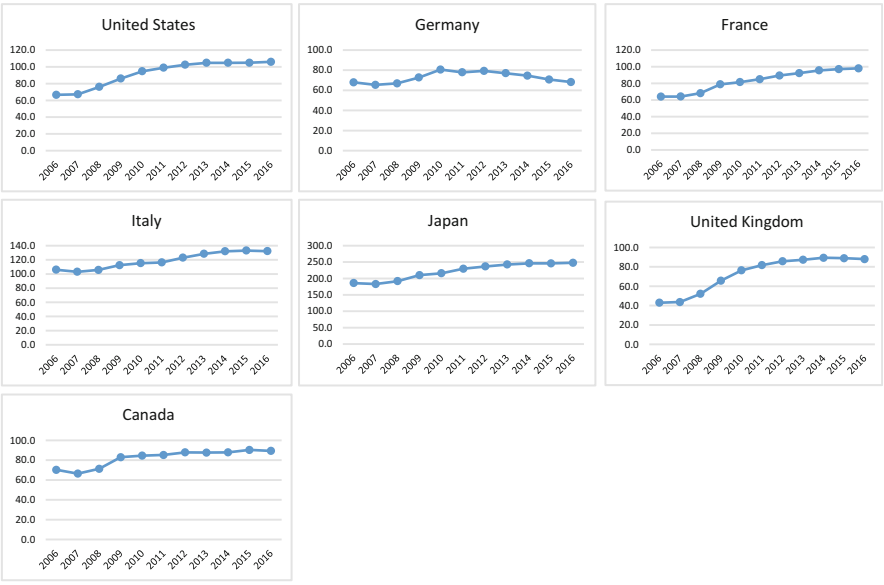

Fig. 12 Gross debt

same period in all the G-7 countries added a further burden to the ageing-related expenditures and labor market rigidities. These factors made it more difficult for the G-7 economies to maintain fiscal sustainability after the crisis started.

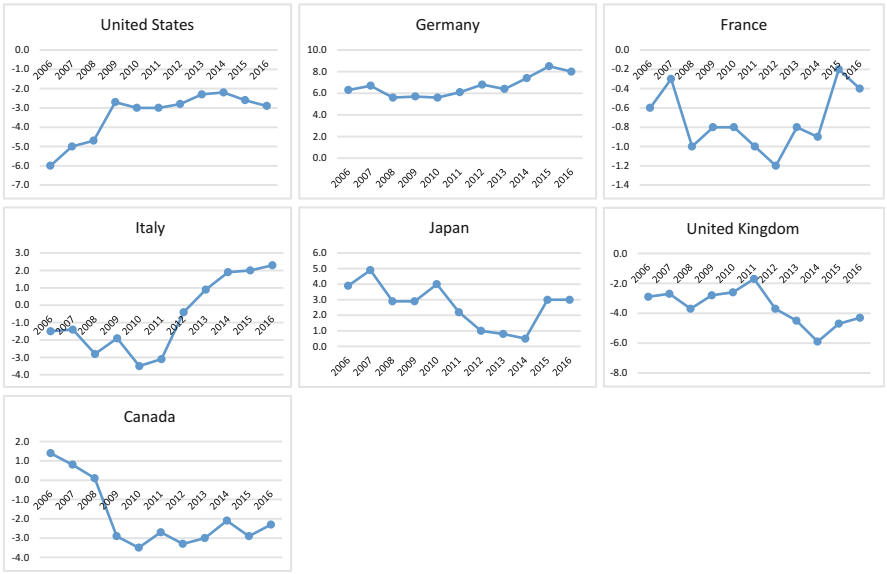

Fig. 13 Current account balance

The fiscal sustainability challenges that the G-7 countries have faced are clearly revealed when we examine the movements of various fiscal balances and debt indicators. The government net lending levels plunged in all the G-7 countries, with the lowest levels (mostly negative) recorded in 2009, 2010, and 2011. During the same period, the output gap deteriorated to very low, negative values. Between 2006 and 2016, the net debt and gross debt increased steadily. Overall, during and in the aftermath of the global financial crisis, the G-7 countries experienced challenging fiscal vulnerabilities. Germany stood out as the strongest G-7 economy, being able to waiver the negative effects of the crisis with mild and temporary volatilities and maintain fiscal sustainability. Japan, on the other hand, appeared to be an economy in which the negative impacts of the crisis have lingered much longer, making the recovery path more painful and extended.

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Monetary Coordination and Regulation Policies of Spillover Effects on Asset Dynamics

Erdem Kilic

Abstract In this study we propose a model for excessive volatility regulation. The model deals with the control of shocks in capital markets. After describing a transmission mechanism that transfers shocks in a macroeconomic variable, we establish a model how to control the shocks in the framework. Two economies are considered with alternative constellations in coordination of policies. Spillover effects under coordination are less severe, than the spillover effects under Nash equilibrium in the case of comovements of asset volatilities. In other terms, coordination helps to cure the contagious effects, in the case, where two countries are affected by the same spillover effect in the same direction.

1 Introduction

Policy coordination is associated with important aspects of open-economy monetary economics, such as the role in equilibrating relative demand and supply in both countries, because real exchange rate is relative price of outputs in both countries. Since foreign shocks matter for the domestic economy, spillover effects of supply and aggregate demand shocks (See Walsh 2003). Gains from coordinating monetary policy were discussed in earlier stage by Hamada (1976) as a basic framework, Canzoneri and Henderson (1991) conducted a discussion of monetary policy coordination issues, Currie and Levine (1987) gives a survey on monetary policy coordination. James Tobin (1968, 1986) advocated that the absence of coordination will make nationalistic solutions more likely: trade barriers, capital controls, and dual exchange-rate systems will have a more nationalistic impetus. This lead to the following question why is international policy coordination beneficial?

Firstly, it provides a facilitating mechanism for internalizing spillover effects and externalities. A global optimum requires that such externalities should be taken into account in the decision-making calculus. The rationale and the scope of

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coordination can be discussed under the following aspects. Larger countries exercise certain degree of influence over prices. The real exchange rate system and open international trading are valued as public goods. Optimizing policy against harmful shocks in group of countries constitute new constraint lines. Further, policy coordination helps to protect from domestic peer pressure. Coordination itself is not a guarantee, welfare improvements are not automatically achieved; an important distinction has to made between good coordination and bad coordination. Most commonly policy instruments are treated as objectives itself. Disagreements among peer groups about the effects that policy changes has on policy targets are a widely seen phenomenon. The difference in the degree of interdependence determines target of spillovers and feedbacks, that creates different incentives to coordinate. Growth and inflation objectives at the national level leave little room for measures on international level. Encouraging arguments for coordination is a multi-issue approach, which increases the probability of coordination/policy bargaining benefits. Here, structural and trade policies matters. These are related to a simultaneous approaching, policy mix, policy deal. Another question arise from the countries to be included. Countries with largest externalities should be included. Conflicts increase with number of parties. Moreover, costs of bargaining increase with number of players. Contrary, by focusing on fewer participants, limited benefits with a small number of parties occur.[1] Issues in coordination comprise multiperiod bargaining: discounted welfare value, repeated bargaining. The role of reputation is another important issue, related reasons for this are effectiveness, credibility, and time inconsistency. The routine of coordination enhances the likelihood of deviation from policy arguments. These considerations lead to some mechanisms of coordination. Rule-based approaches and simple rules are mechanisms that easily reveal manipulation of predictability. Protection against destabilizing fine-tuning, penalties for breaking rules are to be weight out against the freedom of action. Finally, coordination of policies should be done under the premise that each policy action sets future signals to the markets, effecting the consistency of policy instruments and targets at the same time. In this study we propose a model for excessive volatility regulation. The model deals with the control of shocks in capital markets; namely, asset prices and exchange rates.[2] We try to determine the relevant variables and control mechanisms. After describing a transmission mechanism that transfers shocks in a macroeconomic variable, we establish a model how to control the shocks in the framework.

An initial basic framework can be summarized non-technically as follows. Two economies are considered, each has the authority to determine its inflation rate. Nominal rigidities in the monetary settings allow for short-run effects from the monetary policy. While alternative constellations in coordination of policies can be conceived, coordinated policy is regarded in form that inflation rates are chosen jointly

[1]Compare Frankel et al. (1990) for implications of policy coordination in capital markets.

[2]See Aït-Sahalia et al. (2015) for a recent modelling of contagion effects in capital markets, and Brunnermeier and Sannikov (2012) for modelling of finacial frictions.

to maximize a weighted sum of the objective functions. Non-coordinated policies are deemed to be interacting in a Nash-equilibrium, maximizing its own objective function given the inflation rate in the other country. A particularity is the conception of a Stackelberg leader, one country is aware of the impact of its own choice. In this relation, reputation considerations as described by Canzoneri and Henderson (1991) are very important. Table 1 shows an overview of the related literature.

2 Equilibrium Model for Coordination and Regulation Policy of Spillover Effects on Asset Dynamics

We begin to introduce the model assumptions and preliminaries. Consider that there are two types of heterogeneous agents. Agent A owns capital, is endowed with equity flows and uncorrelated asset dynamics. Agent B is equity constrained, owns liabilities and is endowed with correlated asset dynamics (Table 2).[3]

The asset price dynamics are captured by SDE's. Risky assets follow correlated diffusion terms

$$\frac{dP_t}{P_t} = bdt + \sigma_1 dw_{1,t} \tag{1}$$

$$\frac{dP_t^*}{P_t^*} = b^* dt + \sigma_2 d\overline{w}_t \tag{2}$$

We assume that a standard augmented filtration $\mathsf{F}_t : t \geq 0$ generated by W is fixed, $\rho \in (-1, 1)$ with w. The consumption rate for each agent is given as: $C_{1,t}\, C_{2,t}$, where $c_{1,t} = \frac{C_{1,t}}{x_{1,t}}$, $c_{2,t} = \frac{C_{2,t}}{x_{2,t}}$. The consumption process of space L_t is consisting of any a non-negativity F_t progressively measurable process C subject to $E\left(\int_0^T C_t dt\right) < \infty$ for any $T > 0$. The agent's utility function for consumption is following $G : L_t \to R^+$. The bond price dynamics are described as follows. The riskless government bond follows the randomly fluctuating model.

$$dr_t = f(r_t)dt + \sigma_3 dw_{3,t} \tag{3}$$

$$r_0 = r$$

$$dr_t^* = f\left(r_t^*\right)dt + \sigma_4 dw_{4,t} \tag{4}$$

$$r_0^* = r^*$$

[3]Compare Xie (2009) and Yang and Zhang (2005) for similar asset pricing methodology.

Table 1 Literature overview

Author (Year)	Subject	Variables	Methodology	Findings
Hamada (1976)	Gains from coordinating monetary policy	Foreign exchange rates, interest rates, currency reserves	Basic game theoretical framework, Stackelberg leadership solution	If the creation of international reserves exceeds the aggregate preference, expansion of the monetary policy will lead to international inflation
Canzoneri and Henderson (1991)	Monetary policy coordination issues	Interest rates, monetary macroeconomic variables	Open-economy monetary policy game theoretical approach with intertemporal linkages	Welfare losses arising as a result of non-cooperative behavior, proposed solution to move closer to socially optimum solution
Currie and Levine (1987)	Mechanisms on monetary policy coordination	Macroeconomic variables	General foundations for optimal and time-consistent policy, linear stochastic rational expectation model	Optimal feedback rules in macroeconomic policy
Tobin (1986)	Formalize crowding out effect by identifying the roles of the parameters of monetary and fiscal policy	Real and monetary variables	Dynamic equilibrium model, numerical simulations	Optimal policy conditions about government debt
Frankel et al. (1990)	Policy coordination in capital markets	GDP, exchange rates	Empirical experiments using a global macroeconomic model	Limited benefits with a small number of parties occur
Aït-Sahalia et al. (2015)	Contagion in stock markets	Stock market returns	Stochastic jump volatility model, GMM estimation, Monte Carlo simulation	Transmission of contagion from big to small markets, asymmetry in contagion
Brunnermeier and Sannikov (2012)	Financial frictions in capital markets	Monetary macroeconomic variables, financial variables	Framework general equilibrium model with financial frictions	Macro prudential policies to ease effects of financial frictions

Table 2 Heterogeneous agents

Agent A	Agent B
Equity flows	Equity constrained
Own capital	Liabilities $l = c - x$
Uncorrelated asset dynamics	Correlated asset dynamics
	$d\overline{w}_t = \rho dw_{1,t} + \sqrt{1-\rho^2}dw_{2,t}$

The agents have the objective to maximize their utilities. Since agents have to consume and to invest, they have to take investment and consumption decisions. In sequel, we assume that Agent B is liquidity constrained. That means that the agent has to search for opportunities of credit borrowing.

2.1 Asset Dynamics

In this section we describe the asset dynamics. Correlated diffusion terms allow for comovement of asset dynamics,

$$d\overline{w}_t = \rho dw_{1,t} + \sqrt{1-\rho^2}dw_{2,t} \tag{5}$$

where, $\rho \in [-1, 1]$ is a constant parameter, $w_{1,t}$ and $w_{2,t}$ are independent, so this gives us

$$E[dw_{1,t} \cdot d\overline{w}_t] = \rho dt.$$

For any pair of $\{c_t, x_t\}$ the wealth process X_t is described by the following stochastic differential equation:

$$dx_t = x_t[r_t + (b - r_t)u_t - c_t]dt + \sigma_1 u_t x_t dw_{1,t} \quad with \;\; x_0 = x, \tag{6}$$

$$dx_t^* = x_t^*\left[r_t^* + \left(b^* - r_t^*\right)u_t^* - c_t^*\right]dt + \sigma_2 u_t^* x_t^* d\overline{w}_t \quad with \;\; x_0^* = x^*. \tag{7}$$

Then, the optimal solution are given by

$$U(C) = \frac{1}{\gamma}C^\gamma, \; -\infty < \gamma < 1, \gamma \neq 0. \tag{8}$$

The objective function is given as:

$$J(x, r, u, c) = E_{x,r}\int_0^\infty e^{-\beta t}U(c_t, x_t)dt \tag{9}$$

$$V(x,r) = \sup_{u,c} E_{x,r} \int_0^\infty e^{-\beta t} U(c_t, x_t) dt. \tag{10}$$

The value function is derived as: Optimal pair of a portfolio (c*,x*) with the Transversality/Terminal condition given as the is non-negative Utility function U, $\beta > 0$. Optimality is defined as J for the Value function with $J(c,x)$ 0 for all $(c,x) \in [0,\infty) \times \boldsymbol{\Theta}$.

Further, we determine specific utility functions for each agent. We consider a HARA utility function $U(\cdot)$:

$$U(C^*) = \frac{1}{\gamma} C^{*\gamma}, \; -\infty < \gamma < 1, \gamma \neq 0. \tag{11}$$

The objective function is given as:

$$J(x^*, r^*, u^*, c^*) = E_{x,r} \int_0^\infty e^{-\beta t} U(c_t^*, x_t^*) dt, \tag{12}$$

the value function is derived as:

$$V(x^*, r^*) = \sup_{u,c} E_{x,r} \int_0^\infty e^{-\beta t} U(c_t^*, x_t^*) dt. \tag{13}$$

In the following we will analyze the identification of equilibrium conditions for each policy choice. Governments and central banks intervene by regulation and stabilization policies due to systematic risk. We assume that a country is implementing monetary policies and fiscal policies to generate equilibrium. To analyze the spillover effects of policy choices, we assume that the monetary policy choice of Agent A will affect asset prices in country B. Welfare gains of Agent B will depend on Agent B's policy choice and on Agent A's policy choice. Agents follow alternative investment strategies. We consider two asset classes, a risky asset and a riskless asset. The investment decisions of Agent B depend on a leverage ratio, because Agent B is liquidity constrained.

In the following, we analyze the role of monetary policy. Agent B is liquidity constrained, thus he cannot afford investing in risky assets [$r \uparrow, \sigma_r \uparrow$]. Although the return is higher, the volatility and riskiness of this asset is higher. Agent B cannot afford high capital losses. Government B must compensate for insufficient liquidity. One way to secure the situation is to follow expansionary fiscal policy, since expansionary fiscal policy yields to higher welfare gain in current period. In times of recession, a downturn in the asset prices with increased volatility takes place. The stabilizing role of policy becomes more essential in this case. Price stability is a further aspect that determines the asset price dynamics in both countries. Another further point is the cost of debt service. Financing the budget deficit determines

expanding or limiting the available resources. Therefore, it profoundly determines which policy to be followed. The instruments of monetary policy are as follows. Enhancing the liquidity of government securities through open market operations and modalities of rediscount and reserve requirement regulations. Through the application of appropriate policy tool it is possible to lower the cost of the public debt service. In the following equations we describe the optimization problems in a two-country model.

Case I: Coordination

- Joint Maximization (Domestic + Foreign Country)

$$\max_{c,u,c^*,u^*} E_{x,r}\int_0^\infty e^{-\beta t}\left[U\left(c_t^*, x_t^*\right)dt + U(c_t, x_t)dt\right] \tag{14}$$

subject to loss function

$$\begin{aligned} \mathsf{L}V = (b-r)ux\frac{\partial V}{\partial x} + \left(b^* - r^*\right)u^* x^* \frac{\partial V^*}{\partial x^*} + \frac{1}{2}\sigma_1^2 u^2 x^2 \frac{\partial^2 V}{\partial x^2} + \frac{1}{2}\sigma_2^2 u^{*2} x^{*2} \frac{\partial^2 V^*}{\partial x^{*2}} \\ + \rho\sigma_1\sigma_2 \frac{\partial^2 V^*}{\partial x x^*} + \frac{\partial V}{\partial x}\sigma_1 dw_{1,t} + \frac{\partial V^*}{\partial x^*}\sigma_2 dw_{2,t}, \end{aligned}$$

whereby, the dynamics of policies on consumption and investment are described as follows: $\frac{dx}{dG} > 0$, $\frac{dc}{dG} > 0$, $\frac{dx}{di} > 0$, $\frac{dc}{di} < 0$, $\frac{dx}{dM^s} > 0$, $\frac{dc}{dM^s} < 0$.

Case II: Without Coordination

- Domestic Country Case:

$$\max_{c,u} E_{x,r}\int_0^\infty e^{-\beta t}U(c_t, x_t)dt \tag{15}$$

subject to loss function

$$LV = (b-r)ux\frac{\partial V}{\partial x} + \frac{1}{2}\sigma_1^2 u^2 x^2 \frac{\partial^2 V}{\partial x^2} + \frac{\partial V}{\partial x}\sigma_1 dw_{1,t}.$$

- Foreign Country

$$\max_{c^*,u^*} E_{x,r}\int_0^{\infty} e^{-\beta t}U\left(c_t^*, x_t^*\right)dt \tag{16}$$

subject to loss function

$$LV^* = \left(b^* - r^*\right)u^*x^*\frac{\partial V^*}{\partial x^*} + \frac{1}{2}\sigma_2^2 u^{*2}x^{*2}\frac{\partial^2 V^*}{\partial x^{*2}} + \rho\sigma_1\sigma_2\frac{\partial^2 V^*}{\partial x x^*} + \frac{\partial V^*}{\partial x^*}\sigma_2 dw_{2,t}.$$

3 Solve Model for Market Clearing Conditions

In this section we will solve the model for some equilibrium conditions or market clearing conditions. We pick the equilibrium rates of our policy variables for investment and consumption. Keep in mind the asset price dynamics are evolving stochastically. We analyze the different domestic and foreign country effects for each policy mix. As a theoretical background we use the IS/LM and the Mundell-Fleming model. In Table 3. we see the pay-off matrix in terms of welfare gains of the policy mix of monetary policies and fiscal policies. We observe a Nash equilibrium for a policy mix of fiscal policy contraction and monetary policy expansion. However, this equilibrium is Pareto inferior. The below table in Table 3 shows a higher welfare gain, which is achieved under coordination rule.[4]

The Policies to achieve a Nash equilibrium and an equilibrium in the case of Coordination in the two country model are given as follows.

In the Case of Nash Equilibrium Policies:

(a) Fiscal Policies:

i. F3: Domestic contractionary/Foreign expansionary
ii. F4: Domestic contractionary/Foreign contractionary

(b) Monetary Policies:

i. M1: Domestic expansionary/Foreign expansionary
ii. M2: Domestic expansionary/Foreign contractionary

In the Case of Coordination Policies:

(a) Fiscal Policies:

[4]See Laurens and Piedra (1998) and Blinder (1982) for Coordination of Fiscal Policies and Monetary Policies.

Table 3 Dynamic policy calculations

	Monetary contraction	Policy expansion
Fiscal contraction	1/4	2/2*
Policy expansion	3/3	4/1
	Monetary contraction	Policy expansion
Fiscal contraction	1/4	2/2
Policy expansion	3/3**	4/1

*Nash equilibrium but pareto inferior
**Should be achieved under coordination rule, higher welfare gains

i. F1: Domestic expansionary/Foreign expansionary
ii. F2: Domestic expansionary/Foreign contractionary

(b) Monetary Policies:

i. M3: Domestic contractionary/Foreign expansionary
ii. M4: Domestic contractionary/Foreign contractionary

In the Tables 4 and 5 we describe the comparative dynamic policy effects of the Policy Mix in the Nash equilibrium; and in Tables 6 and 7, respectively, for the Coordination case.

In Table 8 we present the policy mix effects on the value function under Coordination [See Eq. (14)].

In Table 9 we present the policy mix effects on the value function under Nash equilibrium [See Eqs. (15) and (16)].

In Tables 10 and 11 contagion effects under Coordination and Nash equilibrium is reported. We describe the dynamics of the effects of each policy choice based on Eq. (14) and Eq. (16).

The correlation coefficient $-1 \leq \rho \leq 1$ can cause counteraction of effects. Coordination is more effective in the case of positive correlation.

We can argue that Nash equilibrium is more effective in the case of negative correlation.

4 Summary and Further Work

Based on our model results we see that the spillover effects under coordination are less severe than the spillover effects under Nash eq. in case of comovement of asset volatilities. In other terms, coordination helps to cure the contagious effects, in the case, where two countries are affected by the same spillover effect in the same direction. Welfare gains to be calculated by numerical approximation of SDE's. The effects on consumption and investment on should be investigated in more detail.

As further extensions policy variables can be expressed as functions of a state variable (η). This consideration would allow for modeling regime switching

Table 4 Comparative dynamic policy effects

		Domestic			Foreign	
Policy mix		Fiscal policy	Monetary policy		Fiscal policy	Monetary policy
F3 + M1	$\frac{\partial V}{\partial x}$	<0	<0	$\frac{\partial V^*}{\partial x^*}$	>0	<0
	$\frac{\partial^2 V}{\partial x^2}$	>0	<0	$\frac{\partial^2 V^*}{\partial x^{*2}}$	>0	<0
				$\frac{\partial^2 V^*}{\partial x x^*}$	>0	<0
F3 + M2	$\frac{\partial V}{\partial x}$	<0	<0	$\frac{\partial V^*}{\partial x^*}$	>0	>0
	$\frac{\partial^2 V}{\partial x^2}$	>0	>0	$\frac{\partial^2 V^*}{\partial x^{*2}}$	<0	>0
				$\frac{\partial^2 V^*}{\partial x x^*}$	>0	>0

Table 5 Comparative dynamic policy effects

		Domestic			Foreign	
Policy mix		Fiscal policy	Monetary policy		Fiscal policy	Monetary policy
F4 + M1	$\frac{\partial V}{\partial x}$	<0	<0	$\frac{\partial V^*}{\partial x^*}$	<0	<0
	$\frac{\partial^2 V}{\partial x^2}$	>0	>0	$\frac{\partial^2 V^*}{\partial x^{*2}}$	>0	>0
				$\frac{\partial^2 V^*}{\partial x x^*}$	<0	<0
F4 + M2	$\frac{\partial V}{\partial x}$	>0	<0	$\frac{\partial V^*}{\partial x^*}$	<0	>0
	$\frac{\partial^2 V}{\partial x^2}$	>0	>0	$\frac{\partial^2 V^*}{\partial x^{*2}}$	>0	<0
				$\frac{\partial^2 V^*}{\partial x x^*}$	<0	>0

Table 6 Comparative dynamic policy effects

		Domestic			Foreign	
Policy mix		Fiscal policy	Monetary policy		Fiscal policy	Monetary policy
F1 + M3	$\frac{\partial V}{\partial x}$	>0	>0	$\frac{\partial V^*}{\partial x^*}$	>0	<0
	$\frac{\partial^2 V}{\partial x^2}$	<0	<0	$\frac{\partial^2 V^*}{\partial x^{*2}}$	<0	>0
				$\frac{\partial^2 V^*}{\partial x x^*}$	>0	<0
F1 + M4	$\frac{\partial V}{\partial x}$	>0	>0	$\frac{\partial V^*}{\partial x^*}$	>0	<0
	$\frac{\partial^2 V}{\partial x^2}$	<0	<0	$\frac{\partial^2 V^*}{\partial x^{*2}}$	>0	>0
				$\frac{\partial^2 V^*}{\partial x x^*}$	>0	>0

dynamics in asset prices. Further extensions might include explicit modeling of common shocks and country specific shocks. Leverage effects can change the coordination needs very much. Market frictions are further aspect to be observed, because they increase the need for more planned coordination. As a final point of consideration, certain difficulties to manage crises should be kept in mind in the policy coordination.

Table 7 Comparative dynamic policy effects

		Domestic			Foreign	
Policy mix		Fiscal policy	Monetary policy		Fiscal policy	Monetary policy
F2 + M3	$\frac{\partial V}{\partial x}$	>0	>0	$\frac{\partial V^*}{\partial x^*}$	<0	<0
	$\frac{\partial^2 V}{\partial x^2}$	<0	<0	$\frac{\partial^2 V^*}{\partial x^{*2}}$	>0	>0
				$\frac{\partial^2 V^*}{\partial x x^*}$	<0	<0
F2 + M4	$\frac{\partial V}{\partial x}$	>0	>0	$\frac{\partial V^*}{\partial x^*}$	<0	>0
	$\frac{\partial^2 V}{\partial x^2}$	<0	<0	$\frac{\partial^2 V^*}{\partial x^{*2}}$	>0	<0
				$\frac{\partial^2 V^*}{\partial x x^*}$	<0	>0

Table 8 Policy mix effects on value function under coordination

Policy mix	Joint effects
F1 + M3	Positive effects
	Fiscal policy based
F1 + M4	Strong positive effects
F2 + M3	Moderate loss
	Dependent on foreign fiscal + monetary policy
F2 + M4	Positive effects
	Monetary policy based

Table 9 Policy mix effects on value function under Nash equilibrium

Policy mix	Domestic	Foreign
F3 + M1	Negative effects High loss	Volatility correlation Fiscal policy
F3 + M2	Worst scenario Negative effects, capital outflow	Positive effects
F4 + M1	Negative effects High loss	Negative effects Volatility dependent
F4 + M2	Moderate loss Capital outflow	Monetary policy (+) Fiscal policy (−)

Table 10 Contagion/spillover effects under coordination

Policy mix	Coordination spillover	Comments
F1 + M3	High positive fiscal effects Minimal negative monetary effects	Depends on interest rate
F1 + M4	High positive fiscal effects High positive monetary effects	Depends on government spending
F2 + M3	Minimal fiscal negative effects Minimal monetary negative effects	Depends on interest rate
F2 + M4	Minimal negative fiscal effects High positive monetary effects	Depends on government spending

Table 11 Contagion/spillover effects under nash equilibrium

Policy mix	Nash spillover	Comments
F3 + M1	Minimal positive fiscal policy effects Strong negative monetary effects	Depends on government spending
F3 + M2	Minimal positive fiscal policy effects Minimal positive monetary policy effects	Depends on government spending Depends on interest rate
F4 + M1	Negative fiscal policy effects Strong neg. monetary policy effects	
F4 + M2	Negative fiscal policy effects Minimal positive interest rate effects	Depends on interest rate

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Is the Link Between the Real and Financial Sectors Affected by Mechanism of Governance? A Cross-Country Analysis in Asia

Kamal Ray and Ramesh Chandra Das

Abstract In the post modern economic thinking, the real and financial sectors of an economy are found to be interlinked. The magnitude of such a linkage between the real and financial sectors can further be fuelled by the mechanisms of governance of an economy. It is expected that good governance always works as a catalyst for an economy to grow and develop in different aspects. The present study tries to examine how do the World Bank governance indicators influence or get influenced by the chain of interplays between the real and financial sectors measured by the domestic credit to GDP ratio (CGDP) in some selected Asian economies for the period 1997–2014. The results show that, in most cases, there is no such interplay between themselves. The countries where some sorts of causations are observed, like that in India, Japan, Indonesia, Malaysia, governance indicators work a little. In most cases, the demand side approach, that is the CGDP ratios, work as the catalyst to the ways of governing of the selected economies, works significantly. On the other hand, the countries like S. Korea and Bangladesh do not experience any sort of causation; governance indicators do not work at all for them. So, the World Bank generated governance indicators is not general, rather partial in affecting the credit to GDP ratio of the countries.

1 Introduction

There have been long debates among different schools of economists on the issue of whether there should be a link between the real sector and financial sectors of an economy to have sustainable development. The classical economists led by Smith (1776) did not believe in this type of linkage while the others like Schumpeter (1911), did believe in the counter thought. According to Smith, it was the business enterprise, competition and free trade that would lead the farmers, producers and the businessmen to expand market size and which, in turn, made the economic

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development inter-related. According to Schumpeter, on the other hand, society progresses through the trade cycle in a dynamic and discontinuous process. In order to break the circular flow, the innovative entrepreneur's business activities are to be financed by expansion of bank credit. Schumpeter calls it as 'creative destruction'-a process by which invention and innovation replace old production methods with the help of the financial intermediaries.

Among the followers of Smith's thought, Lucas (1988) did not found any association between economic growth and finance and he termed the relationship between finance and economic development as 'over-stressed'. Other related studies in this regard are of Demetriades and Luintel (1996) and Sarkar (2009). On the other hand, Patrick (1966) is probably the first to define clearly the inter-relationships between bank credit and growth of output, especially for the undeveloped countries. Some studies have shown that growth of the financial sector has a positive influence on the economic growth of an economy (Diamond 1984; Greenwood and Jovanovic 1990; King and Levine 1993; Demetriades and Hussein 1996; Beck et al. 2000; Kiran et al. 2009). Additionally a study related to Indian economy by Bhanumurthy and Singh (2009) has shown that the present high growth of Indian GDP has been, among others, due to financial inclusion. A study related to Nigeria, Marshal et al. (2015) examined the impact of banks' domestic credits on the economic growth of the country. Using time series data for the period of 33 years from 1980 to 2013, credit to private sector, credit to government sector and contingent liability were used as proxy for bank domestic credit while gross domestic product represents economic growth. The analysis revealed the existence of poor long run relationship between bank domestic credit indicators and gross domestic product in Nigeria. This study recommends that the managers of the Nigeria economy should fashion out appropriate policies that will enhance the bi-directional flow of influence between the banking sector where investable funds are being sourced and the real sector of the economy where goods and services are produced, and there should be efficient and effective utilization of borrowed funds in order to achieve the nominated objective of investment, productivity and economic growth.

In the post modern economic thinking, most of the sectors of an economy are found to be interlinked in the way that any change in one sector leads to a simultaneous changes to other sectors in either positive or negative directions. The magnitude of such a linkage between the real and financial sectors can further be fuelled by the mechanisms of governance of an economy. It is expected that good governance always works as a catalyst for an economy to grow and develop in different aspects. Hence, good governance should have some impacts upon the linkage between the real and financial sectors of an economy in one hand [it may be treated as the Supply Leading Approach in line with Patrick (1966)], and the well functioning of the linkage between the two again influences the governments of different economies to design and modify their way of governing the economy (it may be treated as the Demand Following Approach), on the other. Hence, the nexus between the real sector-financial sector link and governance becomes an important issue of discussion in economic and political spheres of a country today.

Intrinsic values of good governance in view of growth and development is universally accepted today. Attributes of governance of a particular government for a nation are very much tangible today, despite the drawback of measurement problem of quality of governance since it is a subjective in nature; no doubt, it is a broad concept covering many subjective and partly objective factors working behind governace mechanism. The approximation of subjective or qualitative factors cardinally generates a debate to the fundamental or classical type of social scientists. Conversion of qualitative characters into quantitative terms generates problems of accuracy upon which we often explain the relationship between explained and explanatory variables. Perhaps approximation of governance quality by sophisticated measuring tools directs us to grasp some gross idea about the relative difference of governance quality, for an example, between Sudan or Afghanistan and Scandinavian countries to speak of. The gross difference between them might convey some messages to the developing nations when growth and development are accelerated by the good governance. The resurgence of dataset on World Wide Governance Indicators with the effort of World Bank is a benchmark as there is no data available on the quality of governance of a nation especially before 1996. Data collected by World Bank from three important sources: representative, non-representative and original data box widely circulated across the countries. Accordingly, quality of governance, as per World Bank, is measured in terms of indices covering entire administration of the respective nation. The indicators are rule of law, control of corruption, governance effectiveness, regulatory quality, political stability and voice & accountability.

Besides the public governance mechanisms, the corporate houses often additionally inclined towards other types of governance to operate their systems which are known as Corporate Governance. It is a system of rules, practices and processes by which a company is directed and controlled; it essentially involves balancing the interests of the many stakeholders in a company—these include its shareholders, management, customers, suppliers, financiers, government and the entire community. Corporate governance in relation to banking performance can be described as a system that tries to provide guidelines and principles to the board of directors in order to execute their responsibilities appropriately and to satisfy shareholders eliminating moral hazard problems. It could not be responsive to local economies (Macey and O'Hara 2003). Corporate governance is of two types: Anglo-American model and Franco-German approach. The governance of Anglo-American model tries to maximize only the interest of shareholders and hence shareholders' wealth maximization approach hinders the pecuniary interests of other corporate constituencies; obviously interests of some other stakeholders are being ignored unless management includes all the probable beneficiaries into account. In contrast; Franco-German approach to corporate governance considers corporations to be "industrial partnerships" in which the interests of long-term stakeholders are served; banks and employee groups are treated equally to the shareholders. The principle of American corporate governance is to maintain contract between shareholders and the firms or managers and directors maximize firm value for shareholders.

Credit is supposed to be confidence that allows one to lend money or resources to another subject to the condition that second party does not reimburse the first one immediately, a time lag works practively, cost of delaying repayment of loan sounds in other way, itersest to speak of. Credit may be provided by a country's central bank to domestic borrowers / investors, government and commercial banks; or domestic credit is simply a lending that a country's central bank makes available to borrowers within the same territory. On the other side, government and other agencies have to borrow money at the cost of certain interest rate in order to fund its projects and offer services to the society. Flow of financial capital dependent mostly on credit.

Credit or more specifically the domestic credit of a country is an indicator of financial sector, among others, and gross domestic product (GDP) is an indicator of the real sector, among others. We can make association between these two indicators from two different sectors by means of a ratio which is domestic credit to GDP ratio or simply the credit to GDP (CGDP) ratio. The CGDP ratio can best be treated as the index for the link between the real and financial sector. That means, how much of the GDP is rolled back as credit to different productive sectors stands as one of the important indicators of development of an economy. The working of this Credit-GDP linkage again holds good if the economy has good mechanisms of governance. In the present study, we use four indicators of the World Bank Indicators of Good governance, viz.Governments Effectiveness (GE), Regulatory Quality (RQ), Rule of Law (RL) and Control of Corruption (CC) to justify whether a country rich in anyone or all of the four governance indicators have also produced a sizeable CGDP ratio or not. On the other hand, whether an economy with a sound CGDP ratio does at all influence its levels of governance to improve. If none is found, can we then be assuming the stated indicators of the world bank as generalized, or very partial.

2 Review of Literature

Empirical works on the link between financial sector and real sector matters much with respect to the present study besides the work on the link between growth and development indicator with the prevailing framework of governanc in a concerned economy. We are citing some of them to justify our study as far as possible.

There is a vast literature on the link between the growth and development indicators with the World Bank governance indicators but there is scanty of literature on the link between these governance indicators and financial indicators.

According to Hussain (2000), not only is the incidence of absolute poverty higher than in any other region of the world but that the number of people deprived of basic services such as safe drinking water, health and sanitation is even greater than those in poverty. At the same time, the analysis proposes that the nature of governance currently being practiced in South Asia precludes certain resource allocation and economic policy initiatives. Another study (Kaufmann and Kraay

2002) tried to show the interrelationship between growth and governance in terms of Rule of Law indicator for 175 countries. The study observed that governance and per capita incomes of the countries are positively and strongly correlated. Also they found a positive causal link from governance to growth of per capita incomes but find a negative causal link from growth of per capita income to governance. Criticizing Kauffman's findings of a positive correlation between growth and governance a study argues that the estimates of such a positive relation are biased in the sense that they fit well for the developed countries where the bilateral causalities could also happen (Pritchett and Weijer 2010). Another criticism is that the positive correlation works for the developed countries that operate under already established good governance systems (Khan 2008). On the basis of its assessment it claimed that separate analyses of governance-growth relations were to be carried out for different classes of countries. The study of Resnick and Bimer (2006) tried to review a range of quantitative cross-country studies that include measures of governance as independent variables and focuses on the dependent variable in at least two of the three notions of pro-poor growth: poverty, inequality, and growth. The study showed that governance indicators such as political stability and rule of law, were associated with growth but provide mixed results in regard to poverty reduction. The growth governance relation for the developing country is kink shaped in the sense that at low levels of governance the country can have positive and rising growth rates but after a certain level of growth was attained then governance had to be improved to manage the rising growth profile (Dixit 2004). The important lesson from the fast growing countries like China and India that even with poor degrees of governance these two countries have maintained a sizeable growth rates in their territories (Keefer 2007). The reason of such high growth rates is that China and India were able to leverage policy reforms into sustained, fast growth because of their large markets and abundance of low cost labor. Another theoretical work tried to show how political accountability work as a determinant of corruption and economic growth (Aidt et al. 2007). Easterly (2006) argues, on the basis of empirical observations, that countries adopting ruinous polices in view of high unemployment rate, intolerable black money, high budget defict might be deviated from targeted or desired growth rate. Oster (2009), on the other hand, opines that the political access of citizens to the profile of governance is closely linked with development performance. With same tone, Kumar (2013) notes how discriminatory governance mechanisms results in poor development. In another extensive study on 44 countries by Das (2013) to test the causal relation between growth of GDP and all governance indicators for the period 1996–2010 observed that governance factors cause growth rates for developing countries and negative governance trends cause negative growth trends of developed countries. The study also observed that not all governance indicators are needed to play role in determining growth of the countries where governance is one of the factors of growth. The study also concludes that the World Bank's claim of 'a good governance as a precondition to growth' should not be applicable to all the countries in a generalized manner and it needs to trim the numbers of governance indicators to make it compact to avoid additional cost of collecting information on all indicators. Han

et al. (2014) have gone through a study whether the countires with above-average governance grows faster than the counties with below-governance during the period 1998–2011; impling the close link between governance indicators and variations of the variables of real sectors growth or growth of GDP to speak of. As per result of the study,the indicators like government effectiveness, political stability, control of corruption and regulatory quality influence positvely the country growth performance than voice and accountability and rule of law. Good governance is associated with both a higher level of per capita GDP as well as higher rates of GDP growth over time.

With respect to the issue of link between credit and growth and development of a country vis-à-vis its level of governance we did not find a sizeable research works in the literature. Occasionally, the impacts of corporate governance on the banks' performance are done with no specific literature on credit delivery and their impacts on GDP via governance mechanisms are found. For example, the study of Ermina and Maria (2009) investigates the relationship between bank performance, corporate governance and other financial elements by using a sample of 79 banks from Europe, Canada, America, Australia and Japan covering the period 2004–2008. The study did not grab any strong evidence that corporate governance affected bank performance, while it observed strong relationship between bank performance, Leverage and Sales growth. In another study, Rose (2007) used a sample of 443 Danish firms listed at the Copenhagen Stock Exchange for the period 1998–2001 excluding banks and insurance companies showed that increased ownership by institutional investors did not have an impact firm's performance. However decomposing the results, it was evident that ownership by banks had a positive significant impact on performance. Barako and Greg (2007) investigated the association between ownership structure and bank performance in Kenya. The results provided a strong support that ownership structure influence bank performance. Hallward-Driemeier et al. (2006) in their effort did a research on 1500 Chinese enterprises in five cities in order to investigate the components of the investment climate and their effects on firm performance. The survey revealed that both ownership and investment climate measures influence firm performance and more specifically productivity and growth.

The survey of literature that we did so far does not cover any study related to the linkage between the real and financial sectors via the mechanisms of governance in any economy. The present study tries to fill up this vacuum in the literature.

3 Objective of Study

The objective of the present study is to examine how do the World Bank generated governance indicators influence or get influenced by the chain of interplays between the real and financial sectors measured by the domestic credit to GDP ratio empirically in some selected Asian economies.

4 Data Source and Methodology

In the present cross-country analysis, we have taken the time series data from the source of Asian Development Bank on domestic credits and GDP of eight countries selected purposively for the period 1997–2014 of the selected eight countries of Asia. Both the data series are given in billion local currencies at current prices. We also collected secondary data on governance indicators from World Bank for the same period of our study. The countries are India, China, Japan, South Korea, Pakistan, Indonesia, Bangladesh and Malaysia.

The four indicators of the World Bank Indicators of Good governance considered to explain the CGDP linkage are Governments Effectiveness (GE), Regulatory Quality (RQ), Rule of Law (RL) and Control of Corruption (CC). The average range of values of estimates in all six indicators is −2.5 to 2.5. A country with a value close to −2.5 in any of the indicators implies the working of bad governance and a value close to 2.5 means very good governance. We have interpolated some missing data with respect to the averages of nearest figures to maintain continuity of the series of data in all the four indicators.

We have presented graphically all the series of the governance indicators and the CGDP ratio. A correlation matrix has been derived to get a quick look about the degrees of associations between the CGDP ratio and all the governance indicators separately for all the countries. But correlation does not mean causation. To test for causality between CGDP ratio and all the governance indicators in a pair wise manner we have run Granger Causality Test (1969). Since, the data series is of just 18 time points, we did not run the stationary test for all the series. The causality test can give us an idea about the direction of interlinkage between the real-financial sector link by means of CGDP ratio and governance indicators. The equations for causality test are

$$Y_t = \sum \alpha_i X_{t-i}^{n} + \sum \beta_j Y_{t-j}^{n} + u_{1t} \quad (1)$$

$$X_t = \sum \lambda_i X_{t-i}^{n} + \sum \delta_j Y_{t-j}^{n} + u_{2t} \quad (2)$$

Where

Y_t = time series values of the variable Y at period t
Y_{t-j} = time series values of the variable Y at period lag t-j
X_t = time series values of the variable X at period t
X_{t-i} = time series values of the variable X at period lag t-i
u_{1t}, u_{2t} = normally distributed error terms that are serially independent
α_i = responsiveness of Y_t w.r.t. X_t for ith country
δ_j = responsiveness of X_t w.r.t Y_t for the ith country

X variable causes Y if $\sum\alpha_i = 0$ is rejected or $\sum\alpha_i \neq 0$ is accepted in Eq. (1) and $\sum\delta_j = 0$ is rejected by Eq. (2). On the other hand, Y causes X when the null hypothesis of $\sum\alpha_i = 0$ in Eq. (1) is accepted and $\sum\delta_j = 0$ in Eq. (2) is rejected. There will be bidirectional or feedback causality between X and Y if the null hypothesis of $\sum\alpha_i \neq 0$ is accepted in Eq. (1) and $\sum\delta_j \neq 0$ is accepted in Eq. (2).

5 Results and Discussion

Before to quantify the linkage between the real and financial sectors' interplay via selected governance indicators of the World Bank, let us have a look on the country wise trends of CGDP ratio and governance indicators (refer to Figs. 1, 2, 3, 4 and 5, and Table 1). There are three clubs of the countries with respect the CGDP ratio depending on its values. Japan is at the top all the time holding the CGDP ratio above 2 or domestic credit as double of the GDP, S. Korea, China and Malaysia in the second tier with the ratio lying between 1–1.5 and the rest i.e. India, Indonesia, Pakistan and Bangladesh with the value less than 1 fall in the lower strata. Except Indonesia, Pakistan and Bangladesh, all the five countries also follow rising trends of the interplays between the two.

Whenever we compare the extent of good governance among the countries, we observe that Japan, S. Korea and Malaysia are all time in the upper slot with regard to all the four indicators holding the values greater than +0.5. All the remaining countries maintain negative figures of governance implying bad or lax governance.

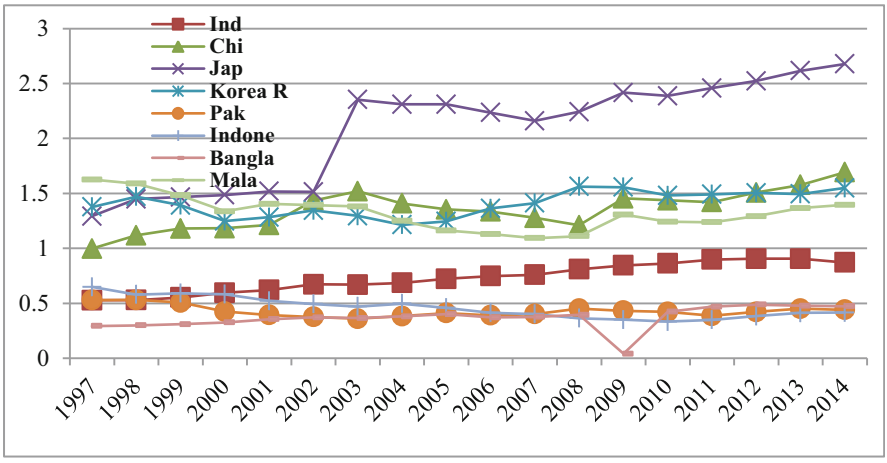

Fig. 1 Credit-GDP ratio of countries

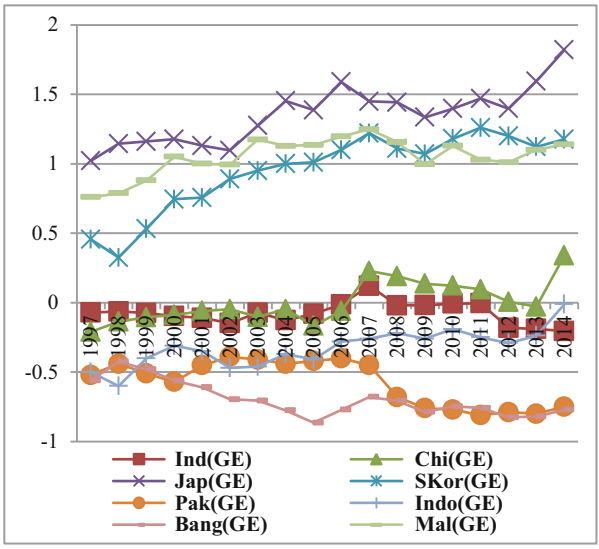

Fig. 2 Trends of GE of countries

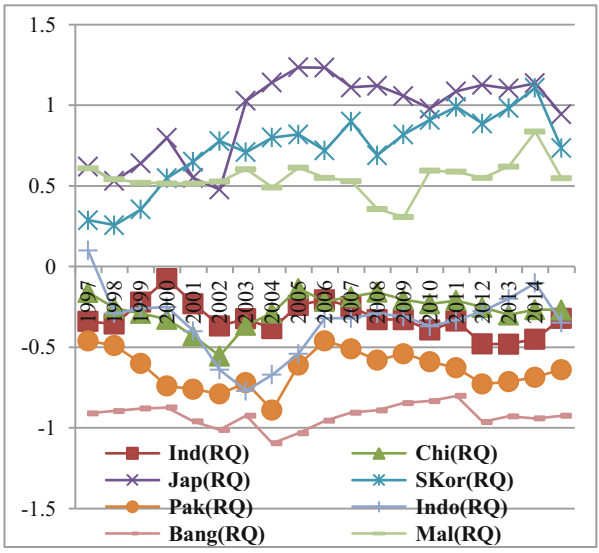

Fig. 3 Trends of RQ of countries

China and India maintain increasing trends in the GE only with decreasing trends in RQ, RL and CC. The worst governance in all the four is observed in Pakistan and Bangladesh. The GE and RL for the two even follow downward trend.

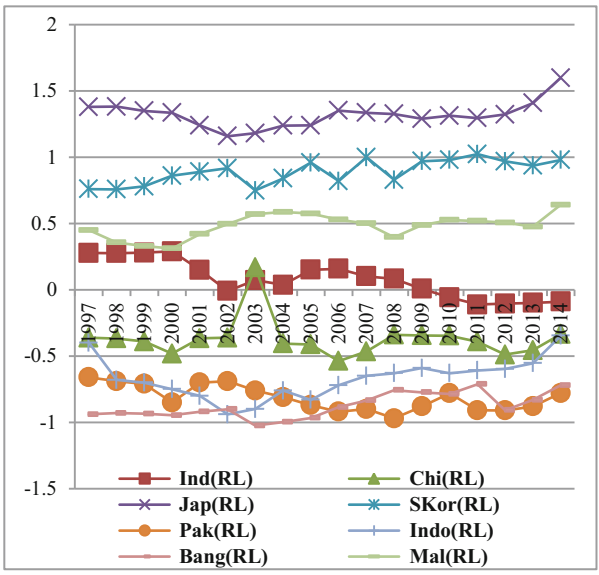

Fig. 4 Trends of RL of countries

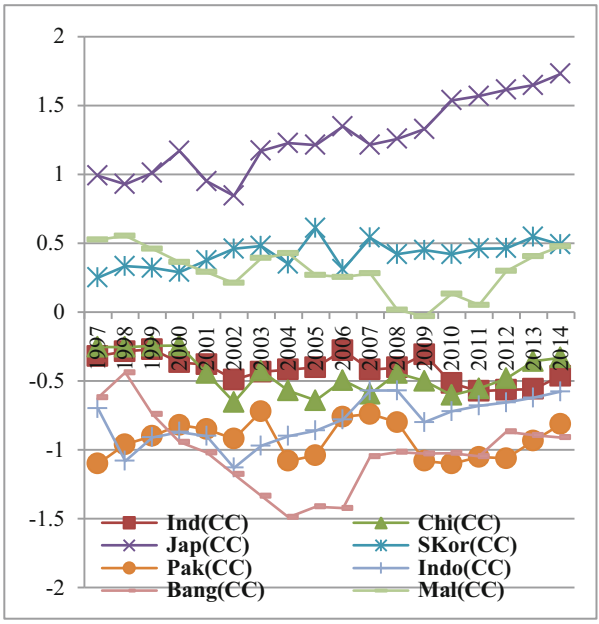

Fig. 5 Trends of CC of countries

5.1 Correlation Results

The diagrammatic presentation of the concerned variables provides us the impetus to test whether there are interplays among the concerned variable. Before, to go for

Table 1 Mean of the indicators and correlation coefficient of CGDP with the governance indicators

Statistical values		CGDP	GE	RQ	RL	CC
Mean	India	0.73	−0.07	−0.32	0.08	−0.41
	China	1.35	0.003	−0.26	−0.37	−0.44
	Japan	2.08	1.35	0.94	1.31	1.26
	S. Korea	1.40	0.94	0.73	0.89	0.42
	Pakistan	0.43	−0.57	−0.63	−0.81	−0.92
	Indonesia	0.46	−0.32	−0.34	−0.67	−0.79
	Bangladesh	0.36	−0.69	−0.92	−0.87	−1.02
	Malaysia	1.32	1.05	0.54	0.48	0.29
Correlation coefficient	India	1	−0.04	**−0.54**	**−0.89**	**−0.70**
	China	1	**0.49**	−0.18	0.20	−0.38
	Japan	1	**0.89**	0.19	**0.87**	**−0.40**
	S. Korea	1	**−0.46**	**−0.49**	**−0.49**	**−0.49**
	Pakistan	1	−0.12	**0.52**	0.35	−0.24
	Indonesia	1	**−0.69**	0.15	−0.14	**−0.54**
	Bangladesh	1	−0.33	−0.22	0.12	−0.13
	Malaysia	1	**−0.84**	0.24	−0.35	**0.64**

Note: The bold figures stand for significant result at 5 % levels of significance

exploring the direction of the said interplays, we have constructed the correlation matrix of CGDP ratio with the four governance indicators of all the eight countries to have an idea about the degree of association between the CGDP and all governance indicators across the countries. Table 1 presents the said results.

We obtain positive and significant correlation between CGDP and GE in case of Japan and China, with the positive magnitude in RQ in Pakistan, same in RL for Japan. Negative and significant correlation is observed for S. Korea in all the indicators, RQ, RL and CC in India and S. Korea, Japan and Indonesia in CC. Positive correlation means CGDP and the concerned governance indicators are going side by side but negative means the reverse. But we know that correlation does not mean causation. We need to test whether there are causal relations among the selected indicators.

5.2 Causality Test Results

To run the Granger Causality test we estimate the equations stated in the methodology section. The obtained values of F Statistics and the associated values of probabilities are presented in Table 2. We find six countries namely, India, China, Japan, Pakistan, Indonesia and Malaysia, where some sorts of causalities between the CGDP ratio (as the notion of the link between the financial and real sector) and some of the governance indicators are noticed. India, Japan and Indonesia have

Table 2 Granger causality results

Country	Hypothesis	F-statistics	Probability	Remarks
India	GE does not cause CGDP	**7.28574**	**0.01728**	→
	CGDP does not cause GE	0.40529	0.53464	
	RQ does not cause CGDP	**3.28335**	**0.09148**	→
	CGDP does not cause RQ	**5.50029**	**0.03427**	←
	RL does not cause CGDP	1.01159	0.33159	
	CGDP does not cause RL	**4.23013**	**0.05885**	→
	CC does not cause CGDP	1.10244	0.31152	
	CGDP does not cause CC	**3.58556**	**0.07914**	→
China	GE does not cause CGDP	0.38972	0.54249	
	CGDP does not cause GE	1.02689	0.32808	No
	RQ does not cause CGDP	0.59495	0.45333	
	CGDP does not cause RQ	**4.68605**	**0.04818**	→
	RL does not cause CGDP	0.38335	0.54576	
	CGDP does not cause RL	0.12058	0.73357	No
	CC does not cause CGDP	0.08451	0.77554	No
	CGDP does not cause CC	0.07064	0.79428	
Japan	GE does not cause CGDP	0.37628	0.54944	
	CGDP does not cause GE	**7.75511**	**0.01461**	→
	RQ does not cause CGDP	**3.16365**	**0.09701**	→
	CGDP does not cause RQ	**4.93844**	**0.04325**	←
	RL does not cause CGDP	2.57229	0.13106	
	CGDP does not cause RL	**8.01969**	**0.01332**	→
	CC does not cause CGDP	0.29317	0.59671	
	CGDP does not cause CC	**3.55513**	**0.08029**	→
S. Korea	GE does not cause CGDP	0.13297	0.72083	No
	CGDP does not cause GE	1.31457	0.27079	
	RQ does not cause CGDP	0.26685	0.61352	
	CGDP does not cause RQ	1.17335	0.29702	No
	RL does not cause CGDP	0.30665	0.58848	No
	CGDP does not cause RL	1.09244	0.31364	
	CC does not cause CGDP	0.36931	0.55311	No
	CGDP does not cause CC	1.40897	0.25498	
Pakistan	GE does not cause CGDP	0.20026	0.66188	
	CGDP does not cause GE	**4.27374**	**0.05922**	→
	RQ does not cause CGDP	2.68842	0.12504	
	CGDP does not cause RQ	0.67823	0.42505	No
	RL does not cause CGDP	0.15574	0.69951	No
	CGDP does not cause RL	1.53619	0.23709	
	CC does not cause CGDP	0.01179	0.91520	
	CGDP does not cause CC	0.01888	0.89281	No
Indonesia	GE does not cause CGDP	**2.96854**	**0.10690**	→
	CGDP does not cause GE	2.00351	0.17879	
	RQ does not cause CGDP	0.26943	0.61182	No

(continued)

Table 2 (continued)

Country	Hypothesis	F-statistics	Probability	Remarks
	CGDP does not cause RQ	**4.11438**	0.06199	
	RL does not cause CGDP	0.07884	0.78299	
	CGDP does not cause RL	**9.77783**	**0.00742**	→
	CC does not cause CGDP	1.67899	0.21602	
	CGDP does not cause CC	**9.76587**	**0.00745**	→
Bangladesh	GE does not cause CGDP	1.34422	0.26568	No
	CGDP does not cause GE	0.13134	0.72246	
	RQ does not cause CGDP	0.56266	0.46561	
	CGDP does not cause RQ	1.16904	0.29787	No
	RL does not cause CGDP	0.88317	0.36327	No
	CGDP does not cause RL	0.00208	0.96425	
	CC does not cause CGDP	0.23976	0.63196	No
	CGDP does not cause CC	0.02109	0.88661	
Malaysia	GE does not cause CGDP	0.00076	0.97839	
	CGDP does not cause GE	**10.1828**	**0.00654**	→
	RQ does not cause CGDP	0.29892	0.59317	
	CGDP does not cause RQ	0.30619	0.58876	No
	RL does not cause CGDP	0.14011	0.71378	
	CGDP does not cause RL	1.97221	0.18201	No
	CC does not cause CGDP	0.08029	0.78105	
	CGDP does not cause CC	**4.29541**	**0.05716**	→

produced maximum cases of causal relation between the two. S. Korea and Bangladesh do not produce any sort of causal relation between the two. That means, there is no link between the chain of interplay between the real and financial sector and at least one of the governance indicators so far as the World Bank generated governance indicators are concerned.

Let us come to the country specific analysis. There are similarities in results of causality test in India and Japan in the sense that RQ and CGDP are producing bidirectional causalities among themselves, CGDP is making a cause to the RL and CC. This means, regulatory qualities of the countries are influencing the linkage between the real and financial sector in one hand and the said linkage between the two sectors is also influencing the governments of India and Japan to adopt governance mechanism in terms of regulatory quality, rule of law and the magnitudes of corruption free economy. In other way to state that the demand side approach of the said linkage (i.e. CGDP causes governance) is the dominating source to reorient the ways of governing the economies of India and Japan. But the difference between the countries lies in the ways of causations in GE and CGDP. While GE as a cause to CGDP happens in India, the reverse happens in case of Japan. So, the demand side approach of the link works prominently in Japan than in India which is usually followed for the developed economies like Japan. The case of Indonesia, another developing country, is again similar to India in case of GE, RL

and CC but the difference lies within RQ in the sense that CGDP causes RQ in case of the former but bidirectional causality in case of the latter. In case of Malaysia, only the demand side factor (CGDP) is pushing the governance mechanism to affect. Both the GE and CC are affected by magnitudes of the link between the real and financial sector.

The marginal countries in this respect are China and Pakistan where only one direction of causality are observed out of the four. In case of China, RQ gets affected by CGDP and in case of Pakistan; GE gets affected by CGDP, although there is positive and significant correlation between CGDP and GE in China and positive and significant correlation between CGDP and RQ in case of Pakistan. Finally, in case of S. Korea and Bangladesh, no governance indicators either influence the CGDP or get influenced by the CGDP. No demand side or the supply side linkages between the two are observed for these two countries.

What follow from the above analysis that good governance as measured by the World Bank Governance Indicators does not necessarily mean well functioning of the Real and Financial Sector linkages. In case, when it works marginally for some of the countries like India, Japan and Indonesia, only one or two of the four governance indicators do have some impacts. In addition to that, this dismal performance of governance upon the real and financial sector outputs even does not work for all the countries as what happened for S. Korea and Bangladesh in our study. In most cases what we observe that the co-effect of the real and financial sector conjugation makes the countries' levels of governance to motivate. Hence, the World Bank constructed governance indicators, although affects the growth and development of some countries of the world, but fails to affect the linkage of the real and financial sectors which again be treated as one of the good indicators of development of an economy.

6 Conclusion

It is followed from the above discussion on examining the linkages between the World Bank generated governance indicators and the chain of interplays between the real and financial sectors as measured by the domestic credit to GDP ratio empirically in some selected Asian economies, that in most cases, there is no such interplay between themselves. The countries where some sorts of causations are observed, like that in India, Japan, Indonesia, Malaysia, governance indicators work little. In most cases, the demand side approach, that is the CGDP ratios, work as the catalyst to the ways of governing of the selected economies. On the other hand, the countries like S. Korea and Bangladesh do not experience any sort of causation; governance indicators do not work at all for them. These two countries, though, are similar in terms of causality results, are absolutely dissimilar in respect of the correlation results. There are significant negative correlations of CGDP of S. Korea with all the governance indicators but causality results rule out this correlation results. So, the World Bank generated governance indicators is not

general, rather partial in affecting the credit to GDP ratio of the countries. There is a necessity of reformulating the governance indicators by the World Bank so that it can explain all the possible developmental indicators across all status of countries.

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Part II
Assessment of Financial Stability in Emerging Markets and Business Cycles

External Financial Conditions and Slower Growth in Emerging Economies: 2013–2015

Ece H. Guleryuz

Abstract Emerging economies have experienced a slower economic growth period in the aftermath of the global financial crisis. In this chapter we examine the important external and internal conditions that were effective in causing growth deterioration in emerging economies during the period 2013–2015. We utilize a pooled panel ordinary least squares (OLS) estimation using a sample containing 68 countries. Regarding the external conditions, emerging market economies experienced growth deceleration when (i) the current account deficit increased, (ii) trading partners' import demand decreased, and (iii) the terms of trade deteriorated. Furthermore, we find that certain internal conditions, such as higher consumer prices, a more expansionary fiscal policy, more government borrowing, lower investment, and lower labor force participation, significantly contributed to the economic growth decline.

1 Introduction

Many emerging market economies experienced stable and higher growth during the period 2000–2012, thanks to high oil and commodity prices and a supportive external financial framework. Domestically, lower trade barriers, financial openness, and responsible fiscal and monetary policy contributed to the favorable external environment. However, since 2012 emerging economies have experienced significant economic growth deterioration. We hypothesize that a certain set of both external and internal factors played a role in bringing about this result.

Figure 1 depicts the real GDP growth in emerging economies (annual averages are calculated), the US, and the euro area in 2013, 2014, and 2015. While the economic growth rate decreased from 3.42 % to around 2.35 % between 2013 and 2015 in emerging economies, it rose steadily in the US and the euro area. The US

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Fig. 1 Real GDP growth in the emerging economies, U.S., and Euro Area. Source: Author' own calculations

experienced a humble increase in its growth rate. The real GDP growth rate in the euro area was a disappointing −0.3 %. The euro area economic growth rate rose to 0.89 in 2014 and then to 1.5 % in 2015. Figure 2 shows the case of the BRICS countries (Brazil, Russia, India, China, and South Africa), Indonesia, Mexico, and Turkey. From 2013 to 2015, only India and Mexico managed to achieve positive growth; even their real GDP growth rates remained stagnant from 2014 to 2015. All the other countries in this group experienced aggregate output reductions. Brazil and Russia even experienced negative economic growth of −3 % and −3.80 %, respectively, in 2015.

In this chapter we examine the external and internal factors contributing to the growth reduction that took place in emerging market economies during the period 2013–2015. We use a pooled panel ordinary least squares (OLS) estimation with a sample covering 68 countries. The estimation findings indicate that international trade-related external factors, such as the current account balance, terms of trade, and trading partners' import demand, significantly affected the decelerating growth performance of emerging economies. Moreover, internal factors, such as the inflation rate, fiscal policy, investment level, government lending/borrowing position, and labor market conditions, affected the macroeconomic performance of these countries.

The chapter is organized as follows. Section 13.2 briefly discusses the related literature. Section 13.3 provides the data details and estimation, and Sect. 13.4 presents the concluding remarks.

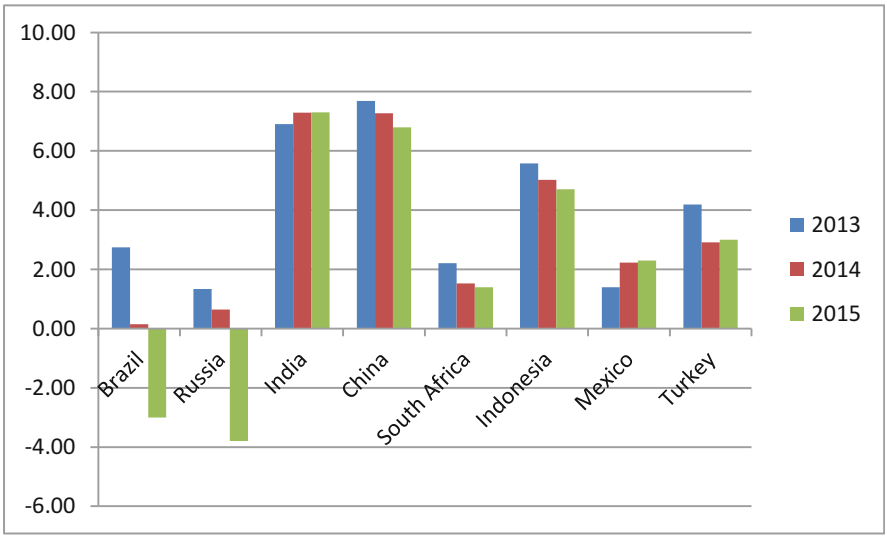

Fig. 2 Real GDP growth in BRICS, Indonesia, Mexico and Turkey. Source: Author' own calculations

2 Related Literature

The volume of important studies analyzing the slower economic growth in emerging economies during and after the global financial crisis has increased considerably in recent years (Claessens et al. 2010; Didier et al. 2012; Gray et al. 2010). Fayad and Perrelli (2014) examine the external and domestic determinants of the growth surprises and synchronized slow growth experienced in emerging economies. They argue that reductions in trading partners' import demand and contractionary fiscal policy are the primary determinants. Domestic structural challenges can also hamper medium- and long-term growth prospects. Almansour et al. (2015) find that higher economic growth in developed countries positively affects the macroeconomic performance of emerging economies. In spite of this effect, certain domestic conditions may deteriorate long-run economic growth. In a similar manner, the IMF (2014) argues that external factors statistically explain almost 50 % of the growth fluctuations in emerging economies.

Åslund (2013) emphasizes the importance of structural reforms and institutions. He argues that, unless emerging economies improve their democracy, economic freedom, governance quality, and property rights, they cannot catch up with developed countries. Tsounta (2014) examines the supply-side determinants of the high economic growth during the period 2000–2012, suggesting increasing the total factor productivity and female labor force participation as policy recipes for long-run sustainable growth.

In another paper Dabla-Norris et al. (2014) find that lower-middle-income economies should carry out reforms in the banking and agricultural sectors, encourage more competition in the goods markets, diminish the FDI barriers, improve the infrastructure, and invest in high-quality secondary and tertiary education to achieve higher economic growth. For the same purpose, they recommend that upper-middle-income countries should deepen the capital markets, invest more in human capital accumulation and research and development, and decrease the labor market rigidities.

Cubeddu et al. (2014) argue that, to isolate themselves from challenging external conditions, emerging economies should rigorously implement structural reforms and increase their productivity levels. A report prepared by the Institute of International Finance (IFF 2013) explains that emerging economies are caught up in a slow economic growth period not only because of external cyclical factors but also due to the absence of structural reforms, which should have been pursued during the high growth period before the global financial crisis. In a similar report by Credit Suisse (2013), it is argued that the decrease in fixed investment spending primarily caused the economic growth decline in emerging economies. Furthermore, the domestic demand is still susceptible to both external and internal factors.

Blanchard et al. (2010) find that the emerging market economies that accumulated higher short-term external debt experienced greater production reductions. Aiyar et al. (2013) analyze the connections between institutions, economic growth deceleration, and the middle-income trap. There are also studies focusing on country groups' global financial crisis experience. For instance, Anand et al. (2014) argue that reductions in total factor productivity growth caused declines in economic growth in China and India. Sosa et al. (2013) find that labor market rigidities, the ageing population, and the relatively mediocre accumulation of physical capital are causing growth deterioration in certain Latin American emerging economies.

3 Data Details and Econometric Analysis

We explain the slower economic growth in emerging economies between 2013 and 2015 with a pooled panel ordinary least squares (OLS) estimation. Our sample covers 68 emerging economies (see Table 3 for the country list). We collect annual data for the years 2013, 2014, and 2015 and the initial conditions measured for the year 2012. We measure the effects of external and internal factors on economic growth in emerging economies, so the sample includes a wide array of external and internal variables. Nonetheless, we experience the problem of missing data, especially for the year 2015, in almost all the data sources. We extract the data from the World Bank Statistics, World Development Indicators, IMF Balance of Payments Statistics, IMF Direction of Trade Statistics, IMF International Financial Statistics databases, IMF World Economic Outlook (WEO) reports (WEO, October 2012 and WEO, October 2015), and Bloomberg (public source).

We use the following equation for the estimation:

$$(GDP\,Growth)_{it} = \beta_0 + \beta_1(External\,Factors)_{it} + \beta_2(Internal\,Factors)_{it} + \beta_3(Initial\,Factors)_{i\,2012} + u_{it} \quad (1)$$

The dependent variable is the annual real GDP growth rate. The external factors include growth in exports (trading partners' import demand growth), foreign direct investment, current account balance, merchandise exports to high-income countries, terms of trade (measured in constant local currency), trade volume, global volatility index (vix), US real GDP growth, US inflation rate (consumer price index), US real interest rate, euro area real GDP growth, euro area inflation rate (consumer price index), and oil prices. The internal factors cover the inflation rate measured by the consumer price index, fiscal policy tool measured by the general government final consumption expenditure, monetary policy tool measured by the real interest rate, investment measured by gross fixed capital formation, female labor force participation rate, labor force participation rate, working age population ratio, and general government net lending/borrowing. The initial conditions, measured for the year 2012, include a financial openness indicator[1] (Chinn and Ito 2006), a trade openness indicator, the output gap,[2] and the exchange rate overvaluation.

We choose to adopt pooled panel OLS estimation instead of a fixed-effects model for a couple of analytical reasons. Since the estimation period includes only 3 years, year fixed effects are not included. In this respect, the external factors affecting all the countries in the sample simultaneously work to achieve a similar purpose. To measure the impacts of country-specific time-invariant initial conditions, we also do not include country fixed effects.[3]

The estimation results indicate that certain variables of interest turn out to be statistically insignificant. These variables are foreign direct investment, trade volume, global volatility index (vix), US yearly GDP, US inflation rate, US real interest rate, euro area yearly GDP, euro area inflation rate, and oil prices, which are external factors. We suppose that the rather short time span of the sample leads to this result. We expect that, if the estimation time period were longer and included time lags, these external factors would carry statistical significance. Among the internal factors, the real interest rate, the indicator for the monetary policy, appears to be statistically insignificant. The initial factors, output gap, financial openness, and trade openness also show no significance.

Table 1 shows the estimation results of the factors with statistical significance. Regarding the external factors, emerging economies experience slower growth

[1]The financial openness indicator is based on the Chinn–Ito index, which measures a country's capital account openness degree.

[2]The output gap is calculated by taking the difference between the 2012 real GDP growth and the projected 2012 real GDP growth based on the IMF WEO reports.

[3]The estimation results in Table 1 and Table 2 report robust standard errors.

Table 1 Determinants of Real GDP growth 2013–2015—comprehensive sample

Dependent variable: real GDP growth rate	
Current account balance	0.0577*
	(0.0341)
Export growth	0.127**
	(0.0496)
Merchandise exports to high income countries	−0.0248*
	(0.0145)
Terms of trade	1.22e-14**
	(3.46e-15)
Domestic inflation rate	−0.144*
	(0.0813)
Fiscal policy	−0.147**
	(0.0564)
Investment	0.114**
	(0.0432)
Female labor force participation	−0.129**
	(0.0613)
Labor force participation	0.184**
	(0.0921)
Working age population	−0.175**
	(0.0609)
Government lending/borrowing	0.156**
	(0.0746)
Initial exchange rate overvaluation	0.0000994*
	(0.0000581)
Constant term	11.34**
	(5.188)
Observations	91
R^2	0.640

Note: Robust standard errors are shown in parentheses
*Significant at 10 %; **significant at 5 %

when: (1) their current account balance deteriorates, (2) their export volume shrinks (trading partners' import demand decreases), (3) their merchandise exports to high-income countries increase, and (4) their terms of trade worsen. Considering the internal factors, emerging economies' growth diminishes if the inflation rate increases and a more expansionary fiscal policy is implemented. As expected, a higher investment level supports greater economic growth. When the general government net lending/borrowing balance changes in favor of lending, it positively affects the growth performance. Regarding the labor market conditions, while labor force participation is positively correlated with the real GDP growth rate, in the estimation years of 2013, 2014, and 2015, increases in female labor force participation and the working age population rate unexpectedly affected growth negatively in emerging economies. Last but not least, initial exchange rate overvaluation appears to be positively correlated with the real GDP growth rate.

Table 2 Determinants of real GDP growth 2013–2015—sub-sample

Dependent variable: real GDP growth rate	
Global volatility index	0.0569*
	(0.0429)
Oil prices	0.00895*
	(0.00756)
Domestic inflation rate	−0.0962**
	(0.0164)
Output gap	0.393*
	(0.220)
Initial exchange rate overvaluation	0.000192**
	(0.0000384)
Constant term	2.021**
	(0.828)
Observations	179
R^2	0.327

Note: Robust standard errors are shown in parentheses
*Significant at 10 %; **significant at 5 %

Next, we construct a sub-sample composed of only the variables with observations that are available in all the 3 years, 2013, 2014, and 2015. This sub-sample includes the external factors (i) current account balance, (ii) global volatility index (vix), (iii) US real GDP growth, (iv) US inflation rate, (v) euro area real GDP growth, (vi) euro area inflation rate, and (vii) oil prices, the internal factors (i) inflation rate and (ii) government net lending/borrowing, and all the four initial factors that are also used in the main sample. The estimation results depicting only the statistically significant variables can be seen in Table 2.[4] The global volatility index and oil prices appear to be positively correlated with the growth performance in emerging economies. Regarding the initial conditions, a more positive output gap and exchange rate overvaluation in the year 2012 positively affected economic growth in the following 3 years in emerging economies.[5]

4 Concluding Remarks

The emerging economies have been experiencing slower growth transitions in the aftermath of the global financial crisis. A set of external and internal conditions have contributed to this output growth deceleration. In this chapter we analyze the determinants of the slower economic development in emerging economies between 2013 and 2015. Our sample is composed of 68 emerging market economies and it

[4]The cluster-robust VCE estimator is used for this estimation. The clustering variable is the countries.

[5]The 2012 exchange rate overvaluation data are missing for four countries: Ecuador, Estonia, the Slovak Republic, and Slovenia. Export growth and terms of trade data are also missing for Angola.

covers a wide selection of cyclical and structural factors that are hypothesized to be effective in determining the macroeconomic performance of the sample countries. We utilize a pooled panel OLS estimation method due to the short time period examined and to include country-specific time invariant indicators.

The estimation results obtained using the comprehensive sample highlight important policy implications. Among the external factors, the current account balance, export growth, merchandise export growth, and terms of trade are found to be statistically significant at the 5 % and 10 % levels. Emerging market countries experienced slower economic growth when their export demand diminished. This means that the growth performance in emerging countries was negatively affected if their trading partners' import demand fell. In a similar way, terms of trade deterioration exerted a negative impact on economic development during the analysis years of 2013, 2014, and 2015. On the other hand, the merchandise export volume appears to be negatively correlated with real GDP growth. Increases in current account deficits also slowed down the trend growth in emerging economies. The US real interest rate, one of the highlighted external financing factors, turns out to be statistically insignificant for the 3-year analysis period. This result may be surprising, but similar results are recorded in recent studies (Fayad and Perrelli 2014).

When we turn our focus to the internal factors, we find that a higher inflation rate and higher government final consumption expenditure, which indicates a more accommodative fiscal policy, could cause emerging market economies' growth prospects to be bleaker. We find interesting results related to the labor market conditions. While increases in the labor force participation rate appear to be positively correlated with economic growth, when the female labor force participation and working age population rates rise, these factors might contribute to growth decline. Furthermore, emerging market countries were prone to slower growth when the investment rates decreased, government borrowing increased, and initially an exchange rate undervaluation happened. The monetary policy tool, proxied by the domestic real interest rate, appears to be statistically insignificant.

As the second level of the exercise, we construct a sub-sample composed of only the variables for which observations in all the 3 years 2013, 2014, and 2015 are available. Then we use the benchmark equation (1) with these variables. The estimation results demonstrate that emerging economies experienced growth slowdowns when the global volatility and worldwide oil prices declined. Regarding the significant internal and initial factors, a higher inflation rate, a reduction in a positive output gap, and initial exchange rate undervaluation (measured in 2012) could cause a lower real GDP growth rate.

In a globalized world economy, it is not surprising to find that the external conditions related to international trade, such as a higher current account deficit, lower trading partners' import demand, and terms of trade deterioration, are significantly correlated with the growth decline in emerging economies in the years 2013–2015. In addition to this, the estimation results emphasize that internal and long-run structural factors, specifically a lower inflation rate, more disciplined

Table 3 Country list

Albania	Croatia	Jordan	Poland
Algeria	Czech Republic	Kazakhstan	Romania
Angola	Dominican Republic	Korea, Rep.	Russian Federation
Argentina	Ecuador	Kuwait	Serbia
Armenia	Egypt, Arab Rep.	Latvia	Singapore
Azerbaijan	El Salvador	Lithuania	Slovak Republic
Barbados	Estonia	Malaysia	Slovenia
Belize	Georgia	Mauritius	South Africa
Bolivia	Guatemala	Mexico	Sri Lanka
Bosnia and Herzegovina	Honduras	Morocco	Thailand
Brazil	Hong Kong SAR, China	Nicaragua	Trinidad and Tobago
Brunei Darussalam	Hungary	Nigeria	Tunisia
Bulgaria	India	Pakistan	Turkey
Chile	Indonesia	Panama	Ukraine
China	Iraq	Paraguay	Uruguay
Colombia	Israel	Peru	Venezuela, RB
Costa Rica	Jamaica	Philippines	Vietnam

(less accommodative) fiscal policy, lower government borrowing, investment enlargement, and greater labor force participation rate, which is accompanied by a skilled labor force (Bils and Klenow 2000), could have protected emerging market economies from the worldwide slower growth epidemic in the aftermath of the global financial crisis (Table 3).

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Mortgaging the Future? Contagious Financial Crises in the Recent Past and Their Implications for BRICS Economies

Asim K. Karmakar and Sovik Mukherjee

What we know about the global financial crisis is that we don't know very much.

— Paul Samuelson

Abstract Financial crises in the recent past have been transmittable because of the strategic interdependence of the macroeconomic factors. The more is the interdependence among the countries via the exposure to common macroeconomic factors, the higher will be the effect of the contagion. In this present context of globalization, rise of BRICS economies in the global stage demands special attention because BRICS epitomizes a tectonic shift of global economic power away from the developed countries towards the developing world. The formation of BRICS has been essential for achieving sustainable global economic growth. But the question is to what extent is BRICS vulnerable to these contagious shock waves. The present paper in this context analyzes the issue by building up an empirical model which essentially highlights the consequences of financial crises in the new millennium and their impact on BRICS. The spotlight then shifts to the theoretical foundations of the crises. Section 3 draws attention to the economic impacts of these financial crises on BRICS economies. In particular, we highlight the effects of the East Asian crisis during 1997–1998, 2007–2008 US sub-prime mortgage market crisis and the recent Eurozone crisis along with the associated implications. The econometric analysis performed in Sect. 4 marks off the significant factors accountable in this regard. Finally, this paper comes to a close by resolving the fusillade of questions that motivated this topic.

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1 Introduction

Foreign capital inflows into emerging economies have been growing very rapidly as compared to the developed countries since 1990s. The gradual integration of the developing economies into the global financial markets has turned these economies into an important destination for global capital. This is the good side of the fairy-tale. But a direct consequence of bigger capital flows is larger current account deficits, given appreciation in the exchange rate. When global financial markets are unstable, both the current account deficits and exchange rate appreciation increases the possibility of an economy getting affected from the global financial crisis. The happening of a financial market crisis in a developed economy either in the form of a banking sector crisis or currency crisis or a convex combination of both will eventually spread to other countries by means of exposure to common macroeconomic factors. A majority of the financial crises in the late 1990s and 2000s and beyond affected the developing and emerging markets, leading to an animated debate regarding the causes and the desired antidotes.

Now, the question is why this paper scrutinizes the impact of these financial crises on BRICS economies. To answer this, we will run through some recent evidences. Not only does BRICS account for 40 % of the world population but also 25 % of the world GDP in PPP terms. The share of the developing economies in world merchandise exports has increased from 25.4 % in 2000 to 42.3 % in 2012. Almost 60 % of this increase is attributed to the BRICS economies. China's trade has seen the highest growth rate of 20.3 % followed by Russia, India and Brazil. Given this background, rise of BRICS economies in the global stage demands exclusive attention because it epitomizes a tectonic shift of global economic power away from the developed countries towards the developing world.

There exists a rich literature on the effects of financial crises on the world economy but hardly there exists any empirical analysis on the analytical impacts of accumulation of public debts, unemployment and inflation, fiscal and monetary measures on per-capita GDP growth rate. For example, economic growth rate is likely to have a linear negative impact on the public debt-to-GDP ratio, that is, a decline in the economic growth rate is, *ceteris paribus*, associated with an increase in the public debt-to-GDP ratio. It is specifically this issue that also motivated us to investigate whether the linear relationship between GDP growth rate and accumulated public debt holds good in times of crises.

The present paper analyzes this issue by building up an empirical model which highlights the consequences of financial crises in the new millennium and their impact on BRICS economies. The spotlight then shifts to the theoretical foundations of the crises in Sect. 2. In particular, our objective is to highlight the effects of the East Asian crisis during 1997–1998, 2007–2008 US sub-prime mortgage market crisis and the recent Eurozone crisis along with the associated implications. The econometric analysis performed in Sect. 4 marks off the significant factors responsible in this regard. The paper comes to a close by resolving the fusillade of questions that motivated this topic.

2 Theoretical Explanations: A Brief Recapitulation

The Latin American crises in the 1960s and 1970s gave rise to the concept of **first-generation speculative attack models**. These models focused more on the monetary and fiscal causes that led to the crises. In that epoch of pegged exchange rate, governments pursued both fiscal and monetary policies which were inconsistent with the aforementioned regime and consequently unsustainable level of fiscal deficits led to Balance of Payments (BoP) deficits which in turn led to an incessant fall in the level of FOREX reserves. According to Krugman (1979), a sudden fall in the amount of FOREX reserves below a threshold fuels up a BoP crisis which eventually culminates into currency crises.

The first-generation crisis models paved the way for **second-generation crisis models**. These models argue that the inconsistencies pointed out in the first generation models make a country vulnerable to a crisis but proper policies can aid in reducing the chances. When a country lies in the 'zone of vulnerability', sudden speculative attacks trigger a policy change. If the policy change favours the speculators or in other words are consistent with what the speculators expect then only this model would arrive at equilibrium. Obstfeld (1988) highlights the lack of a suitable rationale behind sudden shifts in expectations as one of the foremost shortcomings of these second-generation crisis models. The European Monetary System crisis in 1992–1993 is an example of this sort of a crisis (Karmakar 2014).

This school of thought asserts that **third-generation models** are in reality models of financial sector crisis as opposed to the speculative attacks or currency crisis models *per se*. When the financial intermediaries raise money at lower interest rates but lend it at much higher rates to finance risky investments, it gives rise to the problem of moral hazard. Domestic asset price bubbles are created when the people invest in these financial intermediaries perceiving their financial strength to be good but actually it's not. Ultimately, when the bubble explodes, the financial intermediaries are on the verge of insolvency, prices collapse leading to severe capital flight. The East Asian crisis in 1997–1998 is an example of third-generation crisis. Now, we shall provide a theoretical construct in line with the Mundell-Fleming model to give an explanation to a third-generation crisis. Following Krugman (1999), the basic model given below consists of three equations.

$$y = E\left(y, r, eP^{*}/P\right) + NX\left(eP^{*}/P, y\right) \tag{1}$$

Equation (1) gives us the goods market equilibrium condition. Here, y is the aggregate output, E denotes the expenditure in the domestic economy, r is the interest rate, P and P^{*} denote the domestic and foreign economy prices respectively. eP^{*}/P is the real exchange rate. We have introduced a Bernanke-Gartler effect in the model by making domestic spending a function of the real exchange rate.

$$M/P = L(y, r) \tag{2}$$

Equation (2) gives us the money market equilibrium condition.

With the assumption of risk neutral investors and static expectations with regards to exchange rate, we define the interest rate arbitrage condition

$$r = r^* \tag{3}$$

Investments by the firms will be restrained by their balance sheet if they are having a massive proportion of their debts denominated in foreign currency. From this model, it is quite obvious that when companies are unable to invest due to adverse real exchange rates, there would be a direct effect on aggregate demand (y) through the Bernanke-Gartler effect in the first equation. Consequently, this would result in the corporate sector becoming insolvent and simply small firms would benefit from this weakened exchange rate regime. The direct effect would soon start affecting the exports as the country would lose its competitive edge in the market. Thus, the notion of depreciation of exchange rate leading to expansion of the economy does not get validated. So, financial leverage of MNCs is crucial in explaining a third-generation crisis.

Krugman's proposition of asset prices in place of the exchange rate is at the core of **fourth-generation crisis models**. His argument was that asset prices play a crucial role in triggering a crisis in addition to economic and political variables like financial regulations, government distortions, shareholders' rights, etc. The US sub-prime mortgage market crisis belongs to this school of thought. The Greek financial crisis in 2015 has opened up an additional branch of theoretical explanations which makes use of Robert Mundell's 'Optimum Currency Areas' (OCA) concept. OCA theory maintains that you cannot have a common currency for a group of very dissimilar economies. Unless there exists a strong similarity between the participating economies or at least some strong convergence process—a common currency could end up in a disaster. This is exactly the case with Greece.

A new **cross-generation crisis mode**l has also been developed by Flood and Marion (2000). They have endogenized real business cycles to explain the speculative attacks in the second-generation models along with the commitment to a pegged exchange rate which caused the inconsistencies in the first-generation models. This model is not foolproof and requires more research. Given this backdrop, our paper tries to illustrate how contagious financial crises in the new millennium have affected the BRICS economies.

3 Global Financial Crises in the Recent Past and the Impact on BRICS

This section intends to look at the transmission routes by means of which the financial crises in the new millennium affected Brazil, Russia, India and China and South Africa, the magnitude of the impact of the crises and the consequent policy interventions. Almost all the economies in the world felt the ripple effects of

Table 1 Financial crises in the new millennium

Time span	Financial crises	Classification/type
2001–2002	Argentine financial crisis	Second-generation crisis
2008-2009	Global financial crisis	Third-generation crisis
2010	Eurozone crisis	Fourth-generation crisis
2015	The Greek financial crisis	Fourth-generation crisis

the crises. The four linkage channels, namely, trade, finance, commodity, and confidence channels have been instrumental in spreading the crises to BRICS.

Here, we are going to talk about the crises that have occured in the new millennium. We have compiled Table 1, which lists the major crises in the new millenium.

3.1 Brazil

To start off the journey, Argentina's $132 billion default in 2002 affected their cultural rival, Brazil severely. The trade route, especially the industrial sector was the channel through which Brazil got affected. The shock waves started to mushroom in the international financial markets as the S&P 500 Index and NASDAQ-100 suffered a massive fall. But since then, the Brazilian economy was doing well when the 2008 global financial crisis struck them. Fuelled by strong capital flows and booming exports, the Latin American giant, made a year-on-year growth rate of over 6 % right up to 2008. The global financial crisis witnessed a reduction of external credit, as well as a decline in commodity prices and export demand. GDP declined by 4.8 % in the last quarter of 2008 and the first quarter of 2009. These shock waves hard hit the economy. Goldman Sachs projected its growth as low as 1.5 %.

On top the 2008 US Subprime crisis, the aftermath of the 2010 Eurozone crisis on Brazil led to a complete deacceleration of its economy, at the same time inflation is at a 6 year high of 7 %, and the country's growth rate of GDP has been halved to almost 3.5 %. Severe job losses as a result of cutbacks which had started with the Eurozone crisis has been going on since then. Now, that Greece has gone into a serious crisis it would depend on how the other European economies react to the crisis and consequently affect Brazil.

3.2 Russia

Russia was not affected as a result of the Argentine crisis because Russia did not have direct trade relations with Argentina. It is indeed a great blessing for a country to have large energy and mineral resources which it can sell. It is great to own such

quantum of mineral resources when commodity prices are rising, but when they fall an economy can quickly look vulnerable. This was exactly the case with Russia in 2008 during the global financial crisis. In the first half of 2008, Russian economy was growing at 8 %, fuelled by the surge in global prices for oil and other commodities. With the collapse of the oil prices after July 2008 and global financial markets in September 2008, Russia has been hard hit: its GDP fell by 8 %, as a result of the falling of global oil prices, exports contracted, industrial production was reduced to 9 % by November 2008, share prices were down by a shocking 70 %, FOREX reserves dropped by $150 billion during the first half of 2009, and refinancing external borrowings became a problematic assignment. The government's policy interventions (namely ruble devaluation and capital injections) proved to be inefficient and failed to stimulate domestic demand (Chin 2011). The situation worsened as the country contracted by nearly 8 % in 2009. Losses in output and employment were larger than expected but with the rise in oil prices and global demand, the Russian economy began to recover in the second half of 2009.

Europe is and has always been Russia's trading partner, so naturally, when Europe Union (EU) is in trouble, the main question for Russian companies is how they will be impacted. Russia has already saddled itself with far too many bad bets in the past 2 years to make another basket case attractive. The annexation of Crimea, which needs to be completely supported by budget transfers, added a major fiscal liability in addition to the ongoing war that Russia supports in Ukraine. It seems that, at least so far, the sole impact of the Greek financial crisis has not been significant on the Russian real economy, which already seems to be in trouble from the reasons cited above. But this could further worsen the situation.

3.3 India

The Argentine crisis did not affect India much. India's performance before 2008 was amazing with the growth rate jumping up to 9.6 %. The damage from the US Subprime crisis has been substantial for India despite having no direct contact with the sub-prime mortgage assets. The crisis reached the Indian subcontinent mainly via two channels—liquidity crunch and the slowdown of trade. Firstly, the index of industrial production (IIP) between April 2008 and February 2009 grew to a mere 2.8 % as compared to a robust 8.8 % growth in the corresponding period of the previous year. Secondly, the reversal of capital flows as part of the global deleveraging process put the FOREX market under severe pressure. Thirdly, Reserve Bank of India (RBI's) intervention in the FOREX market to manage the volatility in the Rupee fostered liquidity tightening.

Post 2008, the volume of trade diminished as the United States, the European Union and the Middle East came under the contagious effects of the crisis. Starting from October 2008, exports posted negative growth for consecutive 5 months. During the first three quarters of 2008–2009 (April−December 2008) the trade

Table 2 Share of current account surplus (+)/deficit (−) to GDP (%)

	2000	2006	2007	2008	2009	2010	2011	2012
Brazil	−3.8	1.3	0.1	−1.7	−1.5	−2.2	−2.1	−2.4
Russia	18.0	9.3	5.5	6.3	4.1	4.4	5.1	3.7
India	−0.6	−1.0	−1.3	−2.3	−2.8	−2.8	−4.2	−4.7
China	1.7	8.5	10.1	9.3	4.9	4.0	1.9	2.3
South Africa	−0.1	−3.5	−5.3	−7.2	−7.1	−4.1	−3.4	−5.9

deficit increased significantly to US$105.3 billion from US$69.3 billion in the previous year. Meanwhile, the current account balance increased from US$15.5 billion (1.8 % of GDP during 2007–2008) to US$36.5 billion (4.1 % of GDP) during 2008–2009. Table 2 lists current account balance as a percentage of GDP for the BRICS economies (IBGE 2014). The capital account balance declined drastically to US$16.09 billion (1.8 % of GDP) as compared to US$82.68 billion (9.8 % of GDP) during the corresponding period in 2007–2008 (Karmakar 2014).

The fiscal stimulus was slowly and steadily bringing the economy back on the right track when the Eurozone crisis hit the Indian economy. The domino effect resulted in a sharp deceleration in exports and a slowdown in GDP growth. India's growth declined from an average of 8.3 % per annum between 2004–2005 and 2011–2012 to an average of 4.6 % in 2012–2014. The slowdown in manufacturing growth that averaged 0.2 % per annum during 2012–2013 and 2013–2014 made matters worse. The high value of gold imports, ambitiously driven by the 'safe haven' demand for gold has led to a abrupt rise in the price level, which in turn resulted in a high import bill and widening of the trade deficit. The widening of trade deficit to 10.2 % of GDP in 2011–2012 disturbed the supply-demand balance in the local foreign exchange market, inserting downward pressure on the rupee. The trade deficit remained high at 10.8 % of GDP in the first 6 months of 2012, with current account deficit widening to a record 4.2 % of GDP. In the midst of this entire ruckus, an optimistic development was the financing of large current account deficits by sudden capital inflows, which in due course of time arrested the downward movement of the rupee, witnessed till July 2012.

To answer this question as to whether India is susceptible to the impending Greek crisis, we need to analyze the impact Greek financial crisis had on India's domestic market. Most pundits agree that India cannot be directly affected by the crisis in Greece because the two countries' trade volume is comparatively low. But there is an obvious reason to worry if the crisis spreads across Europe. India, with its $355 billion in FOREX reserves, current account deficits at less than 1.5 % and inflation remaining under control, is better placed to handle any emerging situation. However, if the Eurozone is hit by the crisis then almost certainly India will have to bear the repercussion effects as well. Europe is India's largest trading partner with US$129 billion of merchandise engagement in the year 2014–2015. India's merchandise exports have not been at its peak last year and the crisis in Europe will only deteriorate the prospects.

3.4 China

The slump in the United States had badly hurt the Asian giants. According to Malik (2012), the year-on-year growth rate of GDP from 9 % in the fourth quarter of 2008 collapsed to 6.1 % in the first quarter of 2009. The fiscal stimulus hinted at a resurgence, making the 2009 annual growth reach 8.7 %, exceeding the 8 % target set by the government at the beginning of the year. The impact of the financial crisis on China took the form of a sharp drop in external demand from the US, which in turn led to an economic slowdown, difficulties for business houses, and rising unemployment. Structural problems also became more evident. The outbreak and spread of the global financial crisis had a severe impact on China's financial and real estate markets.

When China was on its path of recovery, the Eurozone debt crisis dealt a body blow since the European Union serves as China's largest export market. The contagious effects reached via the trade and financial linkages on the markets of China. The demand for exports from the Euro Area dampened and China had been more affected than India due to its higher share of exports in the GDP. Besides, FDI, FII and remittances started tumbling. The recent descendancy observed in the Chinese stock markets, maybe, an indication that a financial crisis graver than Greece is on the cards with slower growth, poorer corporate earnings and severe recession.

3.5 South Africa

Foreign portfolio inflows were the major source of financing South Africa's mounting current account deficits in the years leading up to the crisis. On the eve of the global meltdown, these portfolio inflows suddenly turned into large net outflows, but on the whole net private flows remained positive as South African banks ran down foreign assets. Both the export and import volumes crashed down, while the prices of most of South Africa's main export commodities weakened, resulting in an improvement in the terms of trade. Besides this, net outflows on the part of non-residents and significant corrections in the equity prices elsewhere, saw the stock market witnessing sharp declines between September and November 2008 in line with equity prices in other emerging markets. An estimated 500,000 workers lost their jobs in 2009 and the growth slowed after the second half of 2008 (Karmakar 2014).

South Africa has almost no direct financial exposure to institutions in Europe, in part because of the limited direct institutional linkages and in part due to the existing macroeconomic policy framework. So, neither the Eurozone crisis nor the Greek economic crisis is expected to have an impact on the South African economy.

4 Data and Methodology

4.1 Data Source

One of the biggest challenges in carrying out an econometric analysis of the BRICS countries is data availability and reliability. This challenge becomes even more significant for quarterly data that has been used. In a few words, we will talk about the data set used for this particular econometric analysis. Quarterly data accessible from different sources like such as Handbook of Statistics on Indian Economy, published by the Reserve Bank of India (RBI), IMF database, EUROSTAT, World Bank Data Bank have been compiled accordingly to suit our requirements. The data that we have used is from the first quarter of 2000 to the fourth quarter of 2014 to examine how the global financial crises in the recent past affected BRICS.

The panel data estimation is employed in this study to capture the dynamic behaviour of the parameters and to provide more efficient estimation and information of the parameters. Panel data techniques are used because of their advantages over cross-section and time series in using all the information available, which are not detectable in pure cross-sections or in case of pure time series (Baltagi and Kao 2000). Baltagi (1995) argued that panel data sets possess several major advantages. Panel data suggest individual heterogeneity and reduces the risk of obtaining biased results and also provide a large number of data points (observations) to increase the degrees of freedom and variability and to be able to study the dynamics of adjustment.

4.2 Model Specifications

During the crisis period, how several explanatory variables contributed to the fall in economic growth across BRICS is what we want to show. The explanatory variables used in our model are: levels of consolidated public debt, unemployment rate, net exports, rate of inflation, gross capital formation level. In case of Brazil and South Africa, the data on GDP growth rate at market prices and inflation rate was not available for every quarter. So using Gregory Newton's Forward Interpolation formula[1] for equal intervals we have derived the quarterly data from first quarter of 2000 to the fourth quarter of 2014. To define the Growth rate of GDP (g) and Inflation rate (*Inf*)—

The GDP Growth Rate, $g_t = \frac{GDP_t - GDP_{(t-1)}}{GDP_{(t-1)}} * 100$ where, t indicates the particular time point;

[1]Newton's Forward Interpolation is given by $U_{a+xh} = U_a + xc_1 \Delta U_a + xc_2 \Delta^2 U_a + \ldots\ldots + xc_r \Delta^r U_a + \ldots\ldots..$

The Inflation rate, $Inf_t = \frac{Price_t - Price_{(t-1)}}{Price_{(t-1)}} * 100$ where, t indicates the particular time point;

The model we are using here is:

$$\boldsymbol{g_{it}} = \boldsymbol{\alpha} + \boldsymbol{\beta}_1(\boldsymbol{Debt_{it}}) + \boldsymbol{\beta}_2\left(\boldsymbol{Debt_{it}}^2\right) + \boldsymbol{\beta}_3(\boldsymbol{Unemp_{it-1}}) + \boldsymbol{\beta}_4(\boldsymbol{NX_{it}}) + \boldsymbol{\beta}_5(\boldsymbol{Inf_{it}}) + \boldsymbol{\beta}_6(\boldsymbol{LGCF_{it}}) + \boldsymbol{e_{it}}$$

This model is based on decomposing the error term e_{it} to its components items, i.e. individual and time effects. In the model i indicate the countries, t indicates the time. When the error term gets decomposed, $e_{it} = \mu_i + \gamma_t + \vartheta_{it}$ is obtained. This final equation is known as the error component model. Here, μ_i indicates the individual effects, γ_t indicates the time effects. It is supposed μ_i, $\gamma_t$and $\vartheta_{it} \sim iid(0, \sigma^2)$; in other words, they possess all the desired properties of the white noise process.

Here, growth rate of GDP at market prices, designated by g_{it}, is the dependent variable. The independent variables include—$Debt_{it}$ is the consolidated public debt, expressed in terms of US$ at time point t. This variable expresses the impact of Debt on the GDP growth. $Unemp_{it\text{-}1}$ is the quarterly rate of unemployment with a lag of 1. NX_{it} is the excess of sum of exports of goods and services at time t over the sum of imports at time t for country i. Also, it reflects the balance on the current account at time t. We include this variable as an additional independent control variable to examine its impact on GDP growth because the current account transactions are considered as good fiscal policy indicators, since they provide a measure of the operational expenses of the economy. The data available on the inflation rate, Inf_{it} for the BRICS countries is the quarterly consumer price index (CPI) having different base periods. So, we have applied the process of "Splicing". Splicing is the technique of combining two or more overlapping series of index numbers having different base periods to obtain a single continuous series having a common base period. In effect, this is equivalent to shifting the bases of different series to one fixed base period. Here, we have considered the third quarter of 2005 as our base period. $LGCF_{it}$ gives the logarithmic value of the gross capital formation for country i at time point t. Also, e denotes the unexplained factors that capture the variation in the growth rate of GDP.

In Panel data analysis, initially the stationarity of a series is explored through panel unit root tests. An endogeneity test should be conducted among the variables when we suspect that there is a variable which has a close relation with another variable in the model. Then the type of individual and time effects should be identified, that is, whether we should opt for fixed or random effects estimation. Subsequently, a model needs to be estimated and the problems of heteroskedasticity and autocorrelation in the model should also be taken into account.

4.3 Panel Unit Root Analysis

Before starting off with the panel unit root tests, the heteroskedasticity in the model needs to be examined. The results reported in Table 3 clearly shows the absence of heteroskedasticity as the null hypothesis of constant variance is accepted. The concept of Panel unit root testing surfaced from the concept of unit root testing in the context of time series analysis. The major difference lies in the fact that from time series unit root testing is that in case of a panel, we need to take into account the asymptotic behavior of the time-series dimension T and the cross-sectional dimension N. The results in this section have been obtained using Stata 12.

The manner in which N and T converges to infinity is critical if one wants to ascertain the asymptotic behavior of the estimators and tests used for non-stationary panels. Levin, Lin and Chu (LLC) unit root tests have been used in this study. The test is based on their model given below:

$$\Delta Y_{it} = \alpha_i Y_{it-1} + \sum_{j=1}^{P_j} \beta_{ij} \Delta Y_{it-j} + X'_{it}\delta + \varepsilon_{it}$$

Here, α_i is the error correction term and when $\alpha_i < 0$ happens, we understand that the series is trend stationary, on the other hand when $\alpha_i \geq 0$ happens, it has a unit root, and therefore it is non-stationary.

Tests hypotheses:

H_0: $\alpha_i = 0$ for all the cross section units, so the series is non-stationary.
H_1: $\alpha_i < 0$ for at least one cross section unit, so the series is trend stationary.

When the probability value obtained from the test results is smaller than 0.05, H_0 is rejected and the stationarity of the series gets determined. LLC panel unit root test results that we have got are reported in Table 4. As Levin et al. (2002) have pointed

Table 3 Heteroskedasticity results

	Likelihood-ratio test	
H_0: Constant variance	LR chi-square value (χ^2)	Probability > chi-square (χ^2)
	5.22	1.00

Table 4 Panel unit root test results

	LLC unit root test	
Variables	Test statistic value	Probability value
g	−2.64	0.00**
Debt	−4.38	0.00**
$Unemp_{-1}$	−6.03	0.00**
NX	−5.33	0.00**
Inf	−3.36	0.00**
LGCF	−5.29	0.00**

Note: ** denotes the rejection of the null hypothesis of non-stationarity.

out, this test-statistic performs well when N lies between 10 and 250 and when T lies between 5 and 250.

The results in Table 4 show that all the macroeconomic variables used are stationary at their level value. So, the possibility of any sort of 'spurious regression' has been ruled out. Note that the Schwarz criterion has been used in the process of compilation. This is quite probable given the time period we have considered. At this point, Hausman Specification Test was conducted to decide whether we should go for the fixed effects or the random effects model. The χ^2 value turned out to be 14.62; the probability value we got was 0.008 and since this value is smaller than 0.05, H_0 has been rejected and it was decided that we should go for fixed effects. The next section aims to test whether the variability of the growth rate is explained by the variability of the control variables.

4.4 Findings

The results of estimation of our model for BRICS *en bloc* has been presented in Table 5. ** denotes the significance of the explanatory variables and rejection of the hypothesis at 5 % level of significance. The explainability of the model is significant bearing in mind that independent variables explain a significant portion of the variability of the dependent variable (pointed out by $R^2 = 67\,\%$). The results show that key explanatory variables for example government debt, unemployment rate, transaction on the current account are important determinants of g_t (the quarterly growth rate of the GDP). One of the main questions of our analysis that whether there exists a non-linear relationship between g_t and consolidated levels of public debt (*Debt*), also gets validated from the above analysis. This is very much feasible given the current state of affairs we are into. For every unit increase in the level of accumulated public debt, the GDP growth rate falls. This assessment advocates that GDP growth rate is affected by the different levels of public debt. The results also confirm that other independent variables like net exports, quarterly rate of unemployment have a significant impact on the determination of the dependent variable, g_t.

In addition to this, the empirical findings reveal that the balance of current account transactions (i,e. NX_t) explain a large portion of the variability of the

Table 5 Estimation results

	Analysis results		
Variables	Coefficients	Test statistic value	Probability value
Debt	−0.01	−4.32	0.00**
$Debt^2$	−1.35	−2.69	0.00**
$Unemp_{-1}$	−0.40	−3.81	0.00**
NX	−0.02	−3.92	0.00**
Inf	2.39	6.57	0.00**
LGCF	1.01	3.36	0.01**

dependent variable. Now, from this relationship we have examined the "Twin Deficits Hypothesis" for BRICS.

From the National Income Identity we know:

$$(S - I) + (T - G) = (X - M)$$

$$\Rightarrow (\text{Savings} - \text{Investment}) + (\text{Imports} - \text{Exports}) = (\text{Government Expenditure} - \text{Taxes})$$

$$\Rightarrow (\text{Savings} - \text{Investment}) + \text{Trade Deficit} = \text{Budget Deficit}$$

Taking BRICS together, investments as a percentage of GDP have started falling rapidly post the 2010 Eurozone crisis coupled with low level of savings. The austerity measures worsened the budget deficit which eventually led to mounting current account deficits. Thus, our results show evidence supporting the twin deficits hypothesis. The quarterly rate of unemployment is significant and a negative relationship exists. Both the inflation rate and logarithmic value of gross capital formation have a positive impact on the growth rate which is expected given the growth agenda propagated by the BRICS economies.

5 Recent Implications for BRICS

The contagious nature increases the probability of the crisis being transmitted from one country to another. In the preceding segment, we have witnessed how the macroeconomic factors have significantly influenced the fall in the growth rate of the BRICS economies. This section will illustrate the implications of these financial crises for BRICS. The World Bank estimated that the East Asian crisis forced 20 million people into the poverty bracket and 1 million children had to drop out from school. The global nature of the 2007–2009 and the euro crisis of 2010–2011 that culminated into the Greek financial crisis in mid 2015 have severe costs not only for India but also for other emerging economies. According to Karmakar (2014), the low—and middle—income countries lost 3–8 % of potential output as compared to the pre-crises path while an additional 64 million landed up being in absolute poverty. The United Nations Food and Agriculture Organization (FAO) estimated that starting with the US Subprime crisis, till now the number of undernourished people in the world have increased by tens of millions. These numbers deserve serious attention given the position of BRICS on the global stage. But there is another side of the story too.

During the initial phases of the global economic meltdown in 2009, the picture was not that gloomy with China alone lifting nearly 500 million people out of the clutches of poverty and India demonstrating its economic buoyancy to defend the crisis. Post the 2010–2011 recession, things started to change as the situation became highly unstable. Putting into effect prudential regulations to safeguard emerging and developing countries like BRICS from the topsy turvy ride of global

finance capital is going to be a problematic task because even with advanced financial structure, the developed economies have collapsed.

The failure of the monetary authority to stabilize the exchange rate, the rate of interest and the inability to ensure a threshold level of FOREX reserves triggers a financial crisis. Sometimes, non-functioning of the free market system operates as a catalyst in initiating a crisis. Even large current account deficits pose significant threats to macroeconomic stability. Global meltdown dissuades capital inflows which in turn make the task of sponsoring mounting current account deficits even more demanding. Coming to the present state of affairs, Greek economic crisis is literally the chronicle of a death foretold. As the debt crisis in Greece continues to build up, markets and businesses are preparing for the ripple effects or to put it formally the concept of financial contagion looms large. Evidences already show how this crisis has already pierced the markets. If one observes the case of emerging market economies, it is clear that a majority of the countries have not yet fully recovered from the effects of the US Subprime Crisis and the ongoing Eurozone crisis. On top of that, the 2015 Greek crisis has dealt a meaty blow to the aspirations of BRICS economies. This is fashioning serious headwinds for the recovery of the BRICS economies and posing major challenges for BRICS as a whole. But economic agents at present know what they did not know in the 1990s; so, time will only tell what lies ahead.

6 Conclusion

The financial crisis in 2008 left world trade (both merchandise and services) traumatized with a steep fall to a negative 19.8 % in 2009. During 2003–2007, world trade value grew at a robust 16.6 % (compound annual growth rate—CAGR) but for 5 years after the crisis, that is, from 2009 to 2013 it grew at a subdued 9.9 %. And as it happened, the Eurozone crisis added a new dimension. The econometric analysis in Sect. 4 will give the readers an idea on the extent to which the major macroeconomic variables were influential in reducing the growth rate of the BRICS economies. Our results show evidence in favour of the falling part of the inverted U kind of a relation between that exists in the literature between levels of public debt and growth rate of GDP. Thus, levels of public debt, rate of unemployment and current account deficits are inversely affecting the growth rate of GDP which is a matter of serious concern for the BRICS economies.

Although the perspective has improved, the situation is still fragile for BRICS economies with the deep scars left by the 2008 crisis still visible. The East Asian currency and banking crises and the three recent flamboyant financial collapses offer BRICS to gain knowledge of some hard economic policy lessons. There is simply no risk-free, shortcut way to sustained growth by opening up too quickly to capital flows and to allowing exchange rate to appreciate. They also clearly exhibit the need for strengthening the domestic banking structure for its stability, creating financial safety nets and the necessary institutional framework to resolve the

problems of poor policy response, moral hazards and information asymmetry (Karmakar 2014). Also, a major task of a development-friendly international financial architecture is to mitigate pro-cyclical effects of capital flows and to promote counter-cyclical macroeconomic policies in the developing world. In addition to this, without reforming BRICS' fundamental institutions, the structural problems in each country will remain irresolvable. Thus, the development of BRICS economies depends on institutional reforms and their proper governance in conjunction with technological progress.

These empirical crises models developed for emerging and developing countries can be further extended to give an explanation to the crises in developed countries as well. That would add another dimension to it. We have taken a modest step in introducing this new approach to the field of economics.

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Assessment of Financial Stability in Emerging Economies: Evidence from Nigeria

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Abstract The financial system stability portends the ability of the financial system to resist any unexpected adverse shocks from internal and external contexts and at the same time enable continuous unhindered functioning of the intermediation process. This paper appraises the stability of the financial system in an emerging economy using Nigeria as a base country. Financial stability and macro-prudential quarterly data from 2007 to June 2015 were used to assess the stability of the financial system arising from the effect of the global financial crisis and the recent decline in commodity prices in the international market with its attendant negative effect on the Nigerian mono-cultural economy. The assessment result shows that despite the shocks, Nigeria's financial system remains resilient and able to absolve all unexpected surprises' coming from the external context in the study period as the government battles with many intervening variables to get the economy back on track. There is an urgent need to diversify the economy and generate more non-oil revenue as well as maintain continuous consistent monitoring of the financial system to ensure its enduring stability.

1 Introduction

Emerging economy describe a nation with rapidly growing economy, transitional in nature, with constant and continuous development and reforms aimed at evolving stronger and responsive economic system and efficiency in capital market operations. Although level of risk is higher in emerging economies the higher rate of return often compensate for the risk (Reem Heakal 2015). Emerging market economies (EMEs) are countries experiencing rapid economic growth and undergoing substantial changes in their financial systems.

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Financial systems in EMEs is often characterize with inefficient market, sub-standard accounting system, small size with less diversified and limited financial instruments and products, high level of banking sector intermediation while the capital markets and other non-bank financial institutions remain relatively less capitalized and under-developed, weak institutional framework, limited market infrastructures, limited regulatory and supervisory capacity, high dependence on foreign capital and greater use of international currencies for domestic financial transactions (BIS 1997; FSB 2011; Anand 2012). Although the above characteristics do not cut across everyone one of them neither are the factors in the same proportion. Financial and economic crisis in such economies come with higher cost because of the developmental stage, therefore fostering financial stability will alleviate consequence of instability such as macroeconomic instability, inefficient allocation of resources and stangnant economic growth.

Schinasi (2004) define financial stability as the ability of the financial system to facilitate efficient allocation of economic resources to the extent of enhancing wealth accumulation and social prosperity leading to economic growth. It also describe a situation where the financial system is resilient enough to assess, price, allocate, and manage financial risks; as well as maintain its ability to perform its primary functions even when hit by external shocks and still able to return to a state of equilibrium through self-corrective mechanisms put in place. Instability portends a state of increased volatility. According to Mishkin (1999), financial instability describe inability of the financial system to withstand external shocks thereby causing distortion, malfunctioning, and obstructing financial intermediation process leading to misallocation of funds and loss of investment opportunities (Saccomanni 2008). Nelson and Peril (2005) explained that stability of the financial system portends the ability of the financial system to withstand any unexpected adverse shocks from internal and external context and at the same time enable continuous unhindered functioning of the intermediation process. A stable financial system provides platform for households and firms to hold or transfer financial assets with confidence and this contributes immensely to broader economic growth and standard of living of the citizen. Instability in the financial system inhibits economic activities and strain economic welfare of the citizen. A dysfunctional financial market with overwrought key institutions portend great danger for the economy as pressure transferred to businesses and households produce negative effect thereby preventing capital from flowing to worthy investment and engendering credit constraints in the economy. A stable financial system on the other hand is resilient and able to withstand the flux in asset prices resulting from dynamic demand and supply conditions as well as uncertainty in the system.

Evidence from past experience as established in economic literature shows causal effect between macroeconomic instability and unsound financial sector in emerging economies (Lindgren et al. 1996; BIS 1997; Ekmekçioğlu 2012). Macroeconomic instability weakens financial institutions ability to perform its financial intermediation role effectively in an economy, under developed financial sector on the other hand debilitate macroeconomic performance and in turn amplifies distortion in the financial system beyond proportion in an emerging economy.

Emerging market economies are less diversified and lack depth that is required to absorb shock which they have been exposed to thereby exacerbating the effect of macroeconomic instability. These countries experience higher volatility in exchange and interest rate, thereby exposing the country's financial system to greater risks. Their financial systems are also vulnerable to structural changes and shifts in policy regimes, such as liberalization or disinflation, particularly if institutional failures, structural rigidities or regulatory impediments prevent financial institutions from adjusting to the new environment (BIS 1997).

Emerging market economies financial system comprises bank and non-bank financial institutions, but the banks are heavily regulated because they play more dominant role in financial intermediation and more highly susceptible to financial fragility arising from risk in credit supply as a result of moral hazard and adverse selection as well as inefficiency in resource allocation. Financial instability can also arise from undercapitalized other financial institutions.

Recent developments in the world economic outlook suggest the need to pay close attention to emerging nations financial system. The US dollar has continued to appreciate against most emerging market currencies particularly since the second quarter of 2014. The appreciation of the US dollar has been attributed to various factors, including mainly the declining commodity prices in the international market, the tumult in most emerging economies' financial markets, the sluggish improvement in the economic situation of some advanced economies and the impact of normalized US monetary policy. The appreciation of the US dollar as a result of increased capital flow volatility signalled weakness in the emerging and developing markets financial system (CBN – FSR 2014).

In Nigeria, by the first half of 2015, interim data showed an 8.74 % fall in output growth. This was as a result of the pressure on the naira following exchange rate volatility and huge government spending during the 2015 general election; inflation increased from 8.0 % to 9.2 % by June 2015 despite the Central Bank's restrictive monetary policy. The monetary policy rate was pegged at 13.0 % and the regulatory authority liquidity management paid off because the average interest rate was relatively stable over the period. Available data further show that aggregate money supply fell in the first and second quarter of 2015. Broad money supply (M2) fell by 0.5 %, which is a reflection of the decline in net foreign asset arising from the fall in foreign exchange earnings and other assets (net) of the banking sector. This portends great danger for the financial system and may trigger instability if not properly managed. Narrow money supply (M1) fell by 5.3 % at the end of June 2015 due to the decline in currency outside banks and in demand deposits, which are signs of weak demand and consumption in the economy.

Apart from financial sector related risks, insecurity in the North-East and South-South geopolitical zones also portends a threat to the stability of the financial sector. Also, rising inflation as a result of exchange rate volatility, slow output growth, declining government revenue and the growing non-performing loans (NPLs) signify challenges for the financial system. Financial system failures do not occur over night, they are usually due to a prolonged period of financial distress. Hence, it is desirable to have an early warning signal that identifies potential. Financial

vulnerability signals could be used to formulate and implement an appropriate response to prevent financial crisis or mitigate its impact on the economy. Fortunately, the 2007/2008 global financial crisis was a game changer for everyone, and suggests the need to study the robustness of the financial system before adverse events occur (Essien and Doguwa 2014).

This paper assesses the financial stability in emerging economies using Nigeria as the base country. It examines the core set indicators and establishes the soundness and stability of the Nigerian financial system in the face of declining crude oil prices. Nigeria is the largest economy in Africa following the 2010 rebasing of the GDP, 70 % of her 180 million people population are below age 40, with consistent GDP growth rate of 6–7 % in the last decade. The paper is structured into five sections. After the background section, Sect. 2 highlights the literature reviewed. The data and method of analysis are discussed in Sect. 3, while Sect. 4 presents the results and discussion. The paper is concluded in Sect. 5.

2 Literature Review

Multiple approaches were observed in literature in an attempt to define financial stability, this paper examine financial stability within the context of emerging market economies where the fundamentals are still evolving therefore, financial stability is considered along a continuum rather than a static condition as emerging market economies are also evolving, adaptive and innovative. Schinasi (2004), opined that the concept of a continuum in explaining financial stability is relevant because finance fundamentally involves a lot of uncertainty and it is dynamic; though it can be measured. The process of decision making involve considering all interlinked elements such as infrastructure, institutions, and markets as any of them can trigger instability. Therefore, financial stability is expectations-based, dynamic, and dependent on many parts of the financial system functioning well at all times because what might represent stability at one point in time might be a source of instability at some other time, depending on the market environment and global environment interaction.

To this end, financial stability within the context of emerging market economies requires a robust financial system that is adaptive, stable and efficient irrespective of the prevailing market conditions and situation. It must continue to function efficiently in allocating resources within the economy even in a rapidly changing volatile economic environment taking into cognizance fundamental economic principle and practice and able to adapt even in a rapidly changing volatile economic environment without malfunctioning. More so, despite economic disturbance the financial system must be resilient enough to reliably perform payment settlement and transaction without adverse effect on other economic agent (BIS 1997).

Isărescu (2009) describe financial stability as a situation in which the financial system is capable of drawing and placing pecuniary funds effectively and to hold up

to shocks without impairing the real economy. The definition quoted above points out two major aspects that bring their contribution decisively to improve the business environment such as: ensuring financing intermediation and not influencing the real economy. Schinasi (2004) define financial stability as a state where the financial system is able to facilitate efficient allocation of economic resources to the extent of enhancing wealth accumulation and social prosperity leading to economic growth. Instability on the other hand occurs when shocks to the financial system prevent the system from channeling funds to the productive sector of the economy. Financial instability aggravates existing information asymmetric in the financial system and this can hamper the process of financial intermediation in the economy. Davis (2001), argued that systemic risk often show up in the form of market liquidity failure and malfunctioning market infrastructure. He emphasise the role of the financial system in supporting the real sector through the provision of credit and payment services.

Ferguson (2003) explained that we can conclude that financial instability has occurred when: i) there is a divergent in financial asset prices from the norms; and/or ii) there is a significant distortion in credit availability and market functioning either in the domestic market or the international market, iii) there is a significant deviation in aggregate spending either below or above what the economy can produce. The definition highlights the impact of price distortion on the economy. Chant (2003) defined financial instability as conditions in financial markets that threaten economic growth and performance as a result of their impact on the functioning of the financial system. Although the impact differ and the severity depend on the stage of development of component of financial system be it bank or capital market. Mishkin (2000) distinguished between financial instability and other forms of instability such as macroeconomic instability. He argued that financial instability has its immediate source in financial markets (broadly defined) while macroeconomic instability is often due to aggregate demand or supply shocks. Financial markets are characterized by constant changes in prices and conditions which does not necessarily translate into financial instability, he therefore proposes that financial instability should be viewed in terms of its potential impact on changes in financial conditions on the real economy.

In the light of the above, there is a need to gather continuous market intelligence on a broad range of financial indicators—indicators measuring the financial strength and resilience of individual institution in providing support to business firms and households to withstand shocks without significant negative impacts on their spending. Other measures focus on assessment and the appetite for risk of market participants. The overall stability of the financial system is obtained by aggregating individual indicators, which shows the true picture of the financial condition of the entire system at a given period in time. Appreciable efforts have been made to develop appropriate indicators that can be used to predict adverse development in advance in the academic literature as well as at other institutions. All indicators are used as tools to predict current conditions and are contemporary in nature (Nelson and Peril 2005; Adegbite 2012).

3 Methods and Analysis

Core financial soundness indicator data were sourced from the period of the first quarter of 2007 to the second quarter of 2015 from various issues of the Central Bank of Nigeria Financial Stability Report, the IMF e-library database and various banking supervision reports. Descriptive statistics was used to present the results on financial stability implications for the Nigerian financial system.

The financial soundness indicators are compiled from the banks' statutory return to the CBN, which comprises the banks' income and expenses statement and statement of financial position. The Central Bank is responsible for the compilation using the IMF 2006 technical guide updated version, which provides definitions and variables to consider for the compilation. The CBN makes use of an electronic financial analysis and surveillance system (e-FASS) to extract relevant data for computing the FSIs.

Currently in Nigeria the data available are sufficient to compile 11 cores out of 12 and 4 encouraged out of 28. Plans are ongoing to increase the number of core and encourage variables in the near future as the current framework for reporting does not support the compilation of the outstanding indicators. The purpose of the compilation of the macro-prudential indicators is to initiate systematic monitoring of financial soundness and to enable objective evaluation of the financial system using aggregate macro-prudential indicators and related macroeconomic variables to measure the strength and stability of the financial system.

4 Data Presentation and Discussion

Twelve FSIs are presented for discussion; 11 out of the 12 are core indicators while one is categorized as an encourage indicator. The indicators assembled cut across four major components of the indicators, namely: capital adequacy, asset quality, earnings and profitability, and liquidity. The capital adequacy indicator includes: regulatory capital to risk-weighted assets, regulatory Tier 1 capital to risk-weighted assets, non-performing loans net of provisions to capital and capital to asset ratios. Under asset quality is non-performing loan to total gross loan. Liquidity indicators include: liquid asset to total assets, and liquid asset to short-term liability, while earnings and profitability base indicators are interest margin to gross margin, non-interest expenses to gross income, return on assets and return on equity. Finally, the only encourage indicator compiled is the personnel expenses to non-interest expenses.

4.1 Capital Adequacy Indicators

The capital adequacy ratio measures the adequacy of the banks' capital proportionate to the total weighted risk profile of the bank. There are three core indicators of capital adequacy that are vital in measuring the robustness of the financial sector's ability to withstand internal and external shocks to their balance sheets. A decline in the ratio signifies increased risk exposure and possible capital adequacy problems, while an increase in the ratio implies the stability and resilience of the financial system.

Regulatory capital to total risk-weighted assets ratio measures the capital adequacy of the banking sector. The numerator represents the industry position of the regulatory capital of all DMBs in the country, while the denominator is their risk-weighted assets (RWA), which includes credit risk, market risk and operational risk weighted average within a given period. The total risk is calculated as risk-weighted on-balance sheet and off-balance sheet assets computed according to the standardized approach for credit risk, 12.5 times the sum of the capital charges determined for market risk and operational risk. Qualifying capital is broadly classified as Tier 1 and Tier 2 capital. The international acceptable standard is a regulatory capital not less than 8.0 % of banks' total risk-weighted assets, the required minimum in Nigeria is pegged at 10 % for regional and national banks and 15 % for international banks.

Regulatory Tier 1 capital to risk-weighted assets ratio measures the capital adequacy of the banking sector. The numerator represents the banking sector position of the Tier 1 capital of all deposit money banks in the country, while the denominator is the banks' risk-weighted assets (RWA) within the given period. Tier 1 capital comprises only permanent shareholders' equity (issued and fully paid ordinary shares/common stock and perpetual non-cumulative preference shares) and disclosed reserves (created or increased by appropriations of retained earnings or other surpluses).Other surpluses such as share premiums, general reserves and legal reserves, SMEEIS reserves and others as may be determined by the CBN.

Non-performing loans net of provisions to capital is calculated by taking the value of non-performing loans (NPLs) less the value of specific loan provisions as the numerator and capital as the denominator. Capital is measured as total capital and reserves in the sectoral balance sheet; for cross-border consolidated data, total regulatory capital can also be used. This FSI is an important indicator of the capacity of bank capital to withstand losses from NPLs. Non-performing loans are principal and interest that are overdue by 3 months or more.

Capital to Assets ratio (CA) shows the extent to which bank assets are funded by other funds other than depositors' funds. Capital and reserves include funds contributed by owners, retained earnings, general and special reserves, provisions and valuation adjustments. Total assets include all non-financial and financial assets. Both capital and assets are measured as in the core FSIs.

Table 1 below shows the trend in capital adequacy-based indicators for Nigeria from 1Q2007 to 2Q2015. The regulatory capital to risk-weighted assets ratio

Table 1 Financial soundness indicator of the Nigeria banking institutions

FSI items	2007 Q1	2007 Q2	2007 Q3	2007 Q4	2008 Q1	2008 Q2	2008 Q3	2008 Q4	2009 Q1	2009 Q2	2009 Q3	2009 Q4
Capital adequacy-based indicators												
Regulatory capital to risk-weighted assets	19.3	18.6	20.8	20.9	19.8	23.7	22.0	21.9	22.5	22.4	15.5	4.1
Regulatory Tier 1 capital to risk-weighted asset	18.4	17.5	19.8	20.2	19.4	23.2	21.4	21.5	22.1	21.9	15.6	4.9
Non-performing loan net of provision to capital	15.0	11.9	12.4	11.1	11.4	3.5	5.5	9.1	9.5	12.5	38.9	106.8
Capital to asset	12.8	12.3	14.1	15.5	16.6	17.9	16.9	17.7	18.8	19.4	12.9	4.0
Asset quality												
Non-performing loans to total gross loan	8.9	7.7	7.6	8.4	7.1	4.0	4.6	6.3	6.5	8.5	20.8	27.6
Liquidity-based indicators												
Liquid asset to total asset	26.6	24.7	25.7	21.2	23.6	20.7	17.7	14.7	13.8	12.9	7.6	10.5
Liquid assets to short-term liabilities	31.7	29.2	32.3	26.7	29.6	27.2	23.1	19.1	18.3	17.1	10.2	13.6
Earning and profitability												
Interest margin to gross income	52.6	62.3	60.7	52.3	56.6	52.4	62.7	61.2	60.2	60.0	51.1	59.1
Non-interest expenses to gross income	61.6	51.1	50.7	29.1	58.4	57.1	59.8	62.6	61.7	68.0	78.2	137.4
Return on assets	6.2	7.6	7.0	9.1	5.2	4.4	3.9	3.7	4.2	3.5	(1.5)	(8.8)
Return on equity	48.5	55.0	44.2	57.2	32.0	23.0	22.0	20.7	22.7	17.7	(11.1)	(19.5)
Encouraged set												
Personnel expenses to non-interest expenses	40.1	41.2	43.1	47.4	43.8	43.2	43.7	41.0	43.3	41.9	39.4	47.7

FSI Items	2010 Q1	2010 Q2	2010 Q3	2010 Q4	2011 Q1	2011 Q2	2011 Q3	2011 Q4	2012 Q1	2012 Q2	2012 Q3	2012 Q4
Capital adequacy-based indicators												
Regulatory capital to risk weighted assets	3.4	1.5	0.2	1.8	6.1	4.2	7.8	17.9	18.9	17.7	17.9	18.3
Regulatory Tier 1 capital to risk weighted assets	4.3	2.4	0.9	2.2	6.4	4.5	7.7	18.1	18.9	17.8	18.0	18.0
Non-performing loan net of provision to capital	268.0	289.8	241.3	192.7	47.0	74.3	32.2	10.1	4.5	6.8	6.7	6.1
Capital to asset	3.4	1.9	0.8	1.5	4.3	3.0	4.7	10.5	11.0	11.2	10.9	10.7
Asset quality												
Non-performing loans to total gross loan	34.8	28.8	35.6	15.7	12.0	10.8	9.1	5.3	4.2	4.3	4.1	3.5
Liquidity-based indicators												
Liquid asset to total asset	13.0	12.3	10.3	12.0	18.1	17.4	20.8	25.4	24.6	22.5	20.9	24.6
Liquid assets to short-term liabilities	15.0	13.6	11.3	13.3	20.1	19.4	24.8	30.1	29.2	26.5	24.6	28.4
Earning and profitability												
Interest margin to gross income	54.0	51.9	54.7	53.6	56.4	49.4	66.4	31.0	63.8	67.7	66.6	62.0
Non-interest expenses to gross income	88.3	65.7	70.3	50.2	74.0	70.6	47.5	24.4	68.4	59.2	68.5	64.8
Return on assets	1.4	2.1	2.2	3.9	1.6	1.7	(1.3)	0.2	1.6	2.8	2.3	2.3
Return on equity	39.9	110.0	285.6	266.0	35.5	55.1	(27.1)	2.2	14.5	25.0	20.0	21.1
Encouraged set												
Personnel expenses to non-interest expenses	41.8	40.1	39.4	36.8	39.6	41.1	18.6	67.8	43.6	39.3	40.4	42.5

(continued)

Table 1 (continued)

FSI Items	2013 Q1	2013 Q2	2013 Q3	2013 Q4	2014 Q1	2014 Q2	2014 Q3	2014 Q4	2015 Q1	2015 Q2
Capital adequacy-based indicators										
Regulatory capital to risk-weighted assets	19.6	18.9	18.0	17.1	17.1	16.4	17.5	17.2	19.0	17.5
Regulatory Tier 1 capital to risk-weighted assets	19.3	18.5	17.6	17.1	17.1	16.1	16.3	15.5	17.3	16.3
Non-performing loan net of provision to capital	6.0	7.2	7.1	7.4	5.1	5.6	5.91	4.1	5.75	11.9
Capital to asset	11.7	11.2	10.8	10.3	11.6	11.0	10.8	10.4	11.8	10.4
Asset quality										
Non-performing loans to total gross loan	3.8	3.7	3.9	3.4	3.8	3.7	3.65	2.9	3.8	4.65
Liquidity-based indicators										
Liquid asset to total asset	27.9	20.9	18.1	16.8	13.5	11.7	11.20	11.4	10.7	10.7
Liquid assets to short-term liabilities	32.3	19.0	21.0	23.1	19.0	16.6	16.09	16.7	16.1	15.8
Earning and profitability										
Interest margin to gross income	62.6	65.2	65.8	63.9	63.9	62.7	61.12	51.3	64.8	43.3
Non-interest expenses to gross income	63.4	62.7	69.7	68.1	65.2	65.5	62.43	56.9	60.2	46.1
Return on assets	2.8	2.8	2.5	2.1	2.47	2.46	2.48	2.47	2.66	2.4
Return on equity	23.2	24.8	22.4	20.1	21.0	20.7	21.1	21.2	22.7	20.6
Encouraged set										
Personnel expenses to non-interest expenses	40.0	39.5	36.1	36.9	37.9	38.5	38.4	36.6	37.4	37.3

Sources: CBN-Financial Stability Report, Various issues, IMF elibrary data set, CBN, Banking Supervision Report 2007

(commonly known as capital adequacy ratio) fluctuated widely over the study period. It peaked at 23.7 % in the second quarter of 2008 and declined rapidly in the period from the fourth quarter of 2009 to the third quarter of 2011. This period signifies the trickle-down effect of the 2007/2008 global financial recession on the Nigerian financial system. The period witnessed serious erosion of the DMB capital and the financial sector was on the verge of distress but for the quick intervention of the Central Bank. The CBN sacked eight executive directors and the management of eight DMBs, and injected N620 billion fresh funds (approximately $4.1 billion from the CBN, when the exchange rate was N151.21 to US$1) into the affected banks to prevent systemic failure in the industry. It took 2 years for the bank to stabilize and by the fourth quarter of 2011 the CAR ratio had risen to 17.9 % and maintained an average of 17–18 % from then up to June 2015. The position is well above the CBN minimum CAR of 10.0 % and the 8.0 % benchmark recommended by the Basel Committee.

The ratio of Tier 1 capital to risk-weighted assets also followed the same trend as the CAR resilience of the Nigerian banks to shocks on their balance sheet items. The stability of the financial sector in the last 3 years is attributed to the intervention of the CBN decision to set up AMCON in 2010 to absorb the prevalent toxic assets in the banking system. As a result of this measure, non-performing loans net of provision to capital, which was over 100 % in the fourth quarter of 2009 and over 200 % in the first quarter of 2010, had reduced drastically to 4.5 % by the first quarter of 2012 and maintained an average of 7 % up to June 2015 when it rose sharply to 11.6 % due to the impact of declining oil revenue from declining oil prices on Nigeria's financial system. The capital to asset ratio showed a similar trend to the other capital adequacy-based indicators.

Figure 1 gives a graphical illustration of the core FSI ratios. It shows non-performing loans net of provision to capital rising sharply from 4.5 % to 11.6 % in the second quarter of 2015.

4.2 Assets Quality

Only one asset quality indicator was considered in this study, which is non-performing loans to gross loans.

This FSI is used to assess the quality of assets created by the banks with the aim of identifying problems with asset quality in the loan portfolio. It is calculated by dividing the value of NPLs by the total value of the loan portfolio (including NPLs, and before the deduction of specific loan loss provisions). Loans are financial assets created through the direct lending of funds by a creditor to a debtor through an arrangement in which the lender either receives no security evidencing the transactions or receives a non-negotiable document or instrument. The lower the rate, the more stable the financial sector.

The trend from 2007 to June 2015 shows a single digit averaging between 8.9 in the first quarter of 2007 to as low as 4 % in the second quarter of 2008 and then

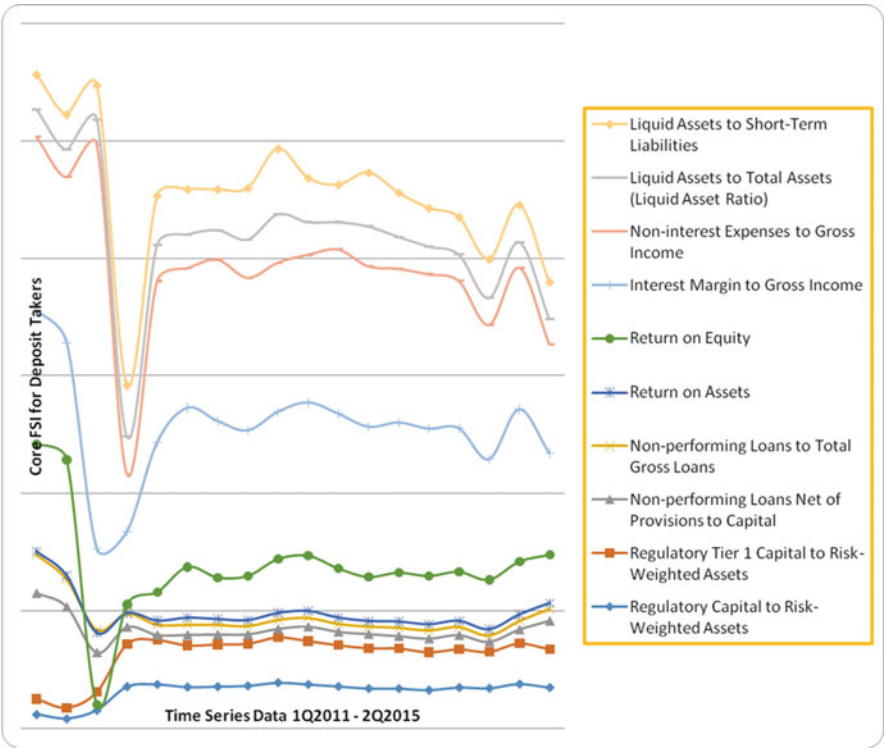

Fig. 1 Core FSI for deposit takers (Source: Authors' compilation)

suddenly to 27.7 % by the fourth quarter of 2009 during the global financial crisis effect in Nigeria. It peaked at 35.6 % in the third quarter of 2010, but with various measures and intervening regulation with strict adherence to credit risk management, it was stabilized at 3–4 % between the first quarter of 2012 and the fourth quarter of 2014. The impact of declining oil prices shows a gradual increase to 5 % in June, which is still tolerable by the international benchmark.

4.3 Liquidity-Based Indicators

Two core indicators are assessed for this indicator. These are: liquid assets to total assets and liquid assets to short-term liabilities. The *liquid assets to total assets* ratio indicates the level of liquidity available to meet expected and unexpected demands for cash. It indicates the ability of the deposit-taking sector to withstand shocks to their balance sheet. It is calculated by dividing the core liquid assets by the total assets of the banking sector. Core liquid assets include cash and cash equivalent, deposits and other financial assets that are available either on demand or within

3 months or less. Broad liquid assets equal the core assets plus securities that are traded in liquid markets and can be easily converted into cash with little or no change in value. Liquid assets to short-term liabilities on the other hand is used to determine the liquidity mismatch of assets and liabilities and show the extent to which deposit-taking institutions can meet short-term unexpected withdrawal without facing liquidity problems.

The financial system liquidity position deteriorated steadily from 26.6 % in the first quarter of 2007 to 13.8 % in the first quarter of 2009 and deteriorated further to its lowest position in the study period at 7.6 % in the third quarter of 2009. The deteriorating liquidity position during this period was caused by huge non-performing loans in the oil and gas sector, the recall of foreign credit lines by correspondent banks, the withdrawal of foreign portfolio investment from the system and the lack of a liquidity management framework in the country. In order to correct these anomalies, the CBN removed the executive management from eight deposit money banks who were adjudged to be involved in unsafe and unethical banking practices and injected $4.1 billion into the eight banks as Tier 2 capital through AMCON, reduced the liquidity ratio from 30.0 % to 25.0 % and the cash reserve requirement from 2.0 to 1.0 with effect from April 2009, and guaranteed the foreign credit line to banks and interbank market transactions. With the implementation of these actions the liquidity position of the banks picked up steadily and by the fourth quarter of 2011 it stood at 25.4 % and was steady until the first quarter of 2014 when the effect of the declining oil prices impacted on the Nigerian financial system. The ratio stood at 10.7 % by June 2015 according to available provisional data. In a similar trend, the liquidity to short-term liabilities followed a similar trend. It was at its lowest position in the third quarter of 2009 at 10.2 % but later picked up and stood at 15.8 % in June 2015.

4.4 Earning and Profitability Based Indicators

In this analysis, four FSIs are assessed, namely: interest margin to gross income, non-interest expense to gross income, return on assets and return on equity.

Interest margin to gross income measures interest earned less interest expenses as a percentage of gross income; it is calculated by dividing net interest income by gross income. Net interest income is interest income (gross interest income minus provisions for accrued interest on NPLs) minus interest expense. Gross income equals net interest income plus non-interest income such as fees and commissions receivable, gains and losses on financial instruments, pro-rated earnings from other deposit takers and other income. It is a profitability ratio. The data set in Table 1 shows that the interest margin ratio remains within the range of 31.04 %, which was the lowest point in the fourth quarter of 2011, and then peaked at 67.7 % in the second quarter of 2012. The second quarter of 2015 shows that the ratio fell to 43.2 %, which was the effect of the plunge in commodity prices resulting in weakened fiscal revenue, and slowed down economic activities in most emerging

and developing economies. The fall in commodity prices affected not only crude oil but also cocoa, gold, diamond and other commodities in the international market.

Non-interest expenses to gross income measures the extent of administrative expenses in financial institution operations to gross income. The ratio is calculated by dividing non-interest expenses by gross income. Non-interest expenses include all expenses other than interest expenses, but without provisions and extraordinary items. The trend in the ratio over the study period shows a range of 29.1 % in the fourth quarter of 2007, wherein it was at its lowest point, it peaked at 137.4 % in the fourth quarter of 2009. This is not unconnected to the 2007/2008 economic melt-down and subsequent banking sector crisis where many banks lost substantial percentage of their asset in the stock market crisis. The event altered the way monetary authorities perform their functions and shifted focus to macro-prudential framework which emphasized all inclusive monitoring of the stability of the financial systems by observing macroeconomic and market-based data, as well as qualitative and structural information (Sere-Ejembi et al. 2014). The financial sector later stabilized until a recent fall in commodity prices, and the ratio stood at 46.1 % in the second quarter June 2015.

Return on assets measures the efficiency of a firm in the use of its own assets. Net income before extraordinary items and taxes is the numerator according to new guidelines, while total assets, which are financial and non-financial assets, are the denominator. The ratio measures the profitability of the firm. Throughout the study period, the banking sector experienced negative return on assets thrice; in the third and fourth quarters of 2009 and in the third quarter of 2011. It was as low as 0.2 % in the fourth quarter of 2011. In 2011, the banks were just recovering from the aftermath of the global financial crisis. The recovery was slow, coupled with other challenges the financial sector was confronted with such as weak corporate governance, undercapitalization of some banks and low credit supply to the private sector, all of which compounded by the global financial crisis. At other times, return on assets in the banking sector peaked at 9.1 % in the fourth quarter of 2007 and 2.4 % in the second quarter of 2015.

Another measure of the efficiency of a firm is the return on equity, which is calculated by dividing the firm's net income by the capital. Throughout the study period, return on equity followed the same trend as return on assets. It peaked at 57.2 % in the fourth quarter of 2007 and at 20.6 % in the second quarter of 2015. Overall, the earnings and profitability indicators revealed that the financial sector income and cost structure were relatively stable, and the banks recorded sustainable profit over the period even in the wake of declining commodity prices.

The only encouraged FSI compiled for this study is the Personnel Expenses to Non-interest Expenses, which evaluates the rate of personnel costs in total administrative expenses. The numerator is the personnel costs and non-interest expenses are used as the denominator. Personnel costs cover the total remuneration payable by the organization in return for services rendered by the employees. Non-interest expenses include all expenses other than interest expenses, but without provisions and extraordinary items. The ratio of personnel expenses to non-interest expenses stood at 36.1 % at the end of the third quarter of 2013 and increases to 37.3 % by the end of June 2015.

5 Conclusion

Overall, the Nigerian economy presents potential opportunities to investors in view of the expected benefits of ongoing reforms, and the activities of the CBN in mitigating against emerging issues.

Despite improvement in global output, the slow recovery from the global economic meltdown of 2007/2008 persisted even in 2015, and the appreciation of the US dollar and the weakening of the euro and yen against other currencies prevailed in advanced economies. Most oil-producing nations experienced currency devaluation and foreign reserve fluctuation as a result of the decline in commodity prices in the international market, particularly the crude oil as low oil revenue drove many nations into huge fiscal deficit. In emerging and developing markets, high interest and exchange rates remained the main issue of contention from 2014 and throughout 2015, which resulted in lower growth rates in the world economy.

In an emerging economy like Nigeria, where oil revenue constitutes the main source of foreign exchange earnings, the issue of how to respond to the prevailing situation and put the economy on track with the right choice of policy intervention has put the government under pressure. For the financial system, the main stability issue faced from 2014 and throughout 2015 was the continued pressure on the naira in the foreign exchange market; this led to significant depletion of the external reserves, and the devaluation of the naira by 8.42 % in 2015. Although the inflationary rate remained a single digit, inflationary pressures persisted. The government intervention programme focused on exchange rate stabilization through economic diversification and enhanced non-oil revenue, as well as reviewing the foreign exchange market windows and discouraging non-essential item importation.

Given the continued oil exports from Iran, lower global demand for oil and the continuous production of US share oil, oil prices will continue to fall, thereby portending continued decline in oil revenue accruing to Nigeria. There is, therefore, a need to expand non-oil revenue by implementing fiscal policy measures that will drive non-oil revenue as observed in the 2014 and 2015 contribution to GDP, which will enhance the development and diversification of the Nigerian economy thereby ensuring stability of the nation's financial system.

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Emerging Market Economies and International Business Cycle Fluctuations

Serpil Kuzucu

Abstract This chapter defines business cycles and discusses the causes of business cycle fluctuations in emerging market economies. Both external and domestic factors are sources of business cycle fluctuations in emerging market economies. Business cycle fluctuations are more volatile and recessions are much deeper in emerging markets than in advanced economies. Globalization, increased trade, and financial integration raise business cycle synchronization across countries. However, there is a debate about the decoupling of business cycle fluctuations in emerging markets from advanced countries. There are both supporting and opposing studies to the decoupling hypothesis. The global financial crisis pulled the advanced economies into recession, while on the other hand, emerging market economies were less affected by the crisis because of their increased resilience after the year 2000. Business cycle fluctuations in emerging market economies became less closely tied to cycles in advanced economies.

1 Introduction

Emerging market economies became important players in the global economy after the year 2000. They have grown faster than advanced economies and global economic growth is strongly influenced by emerging market economies. Although the global financial crisis affected the growth rates of emerging market economies, most of them returned to their pre-crisis growth rates quickly. On the other hand, volatility in emerging markets is still high. The faster growth and greater volatility in emerging market economies increases the emphasis on the relationship between global macroeconomic conditions and business cycle fluctuations in these countries.

Increased trade and financial linkages across countries affect the correlation of international business cycles. There are ongoing debates on the comovement of

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international business cycles and the decoupling of emerging markets from advanced economies. This chapter aims to evaluate the features of business cycle fluctuations in emerging market economies and the effects of the global financial crisis on emerging market economies. Improvement in economic performance and the resilience of emerging market economies are also examined.

The chapter is structured as follows. The next section reviews the economic performance of emerging market economies during the 2000s. Section 3 describes business cycles and presents a literature review on driving factors and features of business cycles in emerging market economies. Section 4 examines the comovement of international business cycles. Section 5 continues with the decoupling debate which became popular with the rising importance of emerging market economies. Section 6 evaluates the global financial crisis of 2007–2008 and its impacts on the emerging market economies, and is followed by a conclusion.

2 Reviewing the Economic Performance of Emerging Market Economies

Emerging market economies are newly industrialized developing countries with higher growth. They are characterized by significant and rapid economic growth with rising gross domestic product (GDP) and trade volumes. Initially, the term "emerging markets" was used for fast-growing economies in Asia. Then, Eastern European countries (after the fall of communism) and Latin American countries became known as emerging market economies. China is the biggest emerging market in today's economy. The four largest emerging market economies are Brazil, Russia, India and China, known as "BRIC".

After opening their markets and expanding financial integration with the global economy, emerging market economies have suffered from external risks. They experienced economic and financial crises during the 1990s. The major financial crises in emerging markets are the 1994 Mexican crisis, the 1997 Asian crisis and the 1999 Russian crisis. Crisis in one emerging market did not influence only the home country. There was also contagion from one emerging country to another. Emerging market countries learned many lessons from the crises. They understood the negative consequences of high inflation and poor macroeconomic management. Government policy has become more responsive to implementing economic and structural reforms. Fiscal and monetary policies have improved; deficit financing has been reduced. Inflation and external shocks have decreased and economic stability has grown. These markets therefore showed better economic performance after the year 2000. Risk and volatilities in emerging markets reduced and the credit-worthiness of many emerging markets became stronger than in the 1990s (Booth 2014, p. 44).

Most emerging market economies experienced robust, export-led growth that was associated with increased gross saving and attracted large capital inflows after

Table 1 Comparison of advanced economies and emerging market economies

	2000	2002	2004	2006	2008	2010	2012	2014
GDP (annual percentage changes)								
World	4.8	2.9	5.4	5.5	3.1	5.4	3.4	3.4
Advanced economies	4.1	1.7	3.2	3.1	0.1	3.1	1.2	1.8
Euro area	3.8	0.9	2.2	3.2	0.4	2.0	−0.8	0.8
Major advanced economies (G7)	3.7	1.3	2.9	2.6	−0.2	2.9	1.4	1.7
Emerging market economies	5.8	4.5	7.9	8.2	5.8	7.4	5.2	4.6
Inflation (annual percentage changes)								
World	4.9	3.9	3.8	4.1	6.4	3.8	4.2	3.5
Advanced economies	2.3	1.6	2.0	2.4	3.4	1.5	2.0	1.4
Euro area	2.2	2.3	2.2	2.2	3.3	1.6	2.5	0.4
Major advanced economies (G7)	2.2	1.3	2.0	2.4	3.2	1.4	1.9	1.5
Emerging market economies	8.6	6.9	6.0	6.1	9.4	5.9	6.1	5.1
Exports (annual percentage changes)								
World	11.5	4.0	10.8	9.3	2.9	12.7	2.9	3.3
Advanced economies	11.4	3.2	10.0	8.7	2.2	12.3	2.0	3.3
Euro area	12.8	2.6	8.1	8.5	0.5	11.1	2.2	4.2
Major advanced economies (G7)	10.9	1.6	8.8	9.1	1.7	12.7	2.1	3.7
Emerging market economies	11.9	6.8	13.0	10.6	4.4	13.6	4.4	3.4

Source: IMF, World Economic Outlook Database 2015

the year 2000. Before the global financial crisis, GDP growth increased gradually from 5.2 % in the year 2000 to 8.2 % in 2006 for emerging market economies as a group. Acceleration in growth was fed by increased exports associated with improvements in production efficiency, technological improvements, and increased competition. Economic and financial integration with advanced economies progressed rapidly. Through these developments, emerging market economies became much more important in global trade (BIS 2009, p. 74).

The role of emerging market economies in the global economy has increased year by year. According to the IMF World Economic Outlook Database, the share of emerging markets and other developing economies in world GDP rose from 21 % in 1990 to 39 % in 2014. Emerging market economies have experienced higher growth than advanced countries since the 2000s (see Table 1). Emerging market economies have become the engines of world growth. Growth rates in emerging market economies continued to be strong after the global financial crisis. However, current account balances are negative in most countries except China, Korea and Russia. Inflation rates in emerging markets are still higher than advanced economies. Foreign private portfolio investment has increased to huge amounts in emerging markets through rapid integration of financial sectors with the advanced economies (see Table 2). They have become more dependent on advanced economies as a source of investment opportunities.

Table 2 Gross private capital flows to and from emerging markets

	Annual average				
	1992–1996	2003–2007	2003	2007	2008
Total inflows (percentage of total GDP)	5.1	6.6	3.9	10.7	3.5
Direct investment	1.6	2.7	1.9	3.4	3.3
Portfolio investment	2.9	1.8	1.1	2.6	−0.3
Other investment	0.6	2.0	1.0	4.8	0.5
Total outflows (percentage of total GDP)	2.0	4.8	2.3	7.3	3.7
Direct investment	0.3	0.9	0.3	1.5	1.2
Portfolio investment	1.2	2.0	1.0	2.6	0.8
Other investment	0.6	1.8	1.1	3.2	1.7

Source: Bank for International Settlements BIS (2009, p. 76)

Foreign exchange reserves have accumulated in emerging markets. Foreign exchange reserves in emerging markets increased from US$0.46 trillion in 1995 to US$7.26 trillion in 2012. Asian countries built foreign exchange reserves to keep exchange rates low and support export-led growth. These reserves were largely invested in United States (US) Treasury bills and bonds. Foreign exchange reserves accumulation and greater fiscal and monetary discipline significantly reduced country default risks of emerging markets (Booth 2014, p. 45).

3 Features of Business Cycles in Emerging Market Economies

The business cycle is the short-term fluctuation of total output long-term growth path. GDP is usually used as an indicator to define expansions and contractions (recessions) in the level of output on this path. There are also other indicators to specify business cycles. The National Bureau of Economic Research (NBER) that maintains a chronology of the US business cycles using different indicators to determine turning points. Indicators are real GDP measured on the product and income sides, economy-wide employment, and real income. Real sales and the Federal Reserve's index of industrial production are also considered if necessary.

Schumpeter (1939) specifies that business cycles have four phases: expansion, peak (boom), contraction, and trough (bottom). The trough is the bottom point of a business cycle where the economy is at its lowest level of output and employment. In the expansion phase, the economy enters the recovery phase of the cycle; expansion is characterized by an increase in employment, production, sales, and incomes. As recovery proceeds, output climbs above its long-term level and reaches its peak. The peak is the highest point of the business cycle and the economy is producing at maximum level of output. In contraction period, employment, production, sales and income are decreasing. After hitting bottom, the cycle starts again.

The economy grows in real terms during expansions which are measured from the trough to the peak. On the other hand, the economy contracts during recession which is measured from the peak to the trough. Output grows most quickly during an expansion and falls quickly during a contraction.

Causes of expansions and contradictions in business cycles can be driven from many factors. Driving forces can be country-specific factors like domestic macroeconomic conditions, change in consumption and investment patterns, structural conditions or political instability. However factors that create business cycles for a country are not limited to domestic causes in today's economy. As financial integration and globalization expand over time, business cycles in a country tend to be affected by external shocks like commodity price shocks, oil price shocks, fiscal and monetary shocks, or global macroeconomic conditions. Increased trade and financial linkages across countries also mean that economic conditions in one country have effects on others. So, international business cycles are affected by economic connections across countries.

There are many pieces of research that study the causes of expansions and contradictions of business cycles in the literature. For emerging market economies, external factors are assumed to be the main causes for business cycle fluctuations. Izquierdo et al. (2008), Maćkowiak (2007), Franken et al. (2005) and Sosa (2008) find that external factors have substantial impacts on business cycle fluctuations in emerging market economies. On the contrary, the studies of Boschi and Girardi (2011) and Ahmed (2003) reveal that external shocks have a limited role in driving business cycle fluctuations for Latin American emerging markets. Hoffmaister and Roldós (1997) also suggest that the main source of output fluctuations in emerging markets is domestic supply shocks. Trade shocks play a small role in output and real exchange rate fluctuations.

Izquierdo et al. (2008) analyze the role of external factors on business cycles for the seven Latin American countries between 1990 and 2006. Their study reveals that external factors are significant sources of the differences in GDP growth in Latin American countries. Maćkowiak (2007) examines the impacts of US monetary policy shocks on eight Asian and Latin American emerging markets. The findings support the view that fluctuations in exchange rates, consumer prices, output, and short-term interest rates in emerging markets are significantly affected by external shocks. US monetary tightening causes exchange rate depreciation, inflation and decrease in output in emerging markets.

Franken et al. (2005) analyze the response of business cycle fluctuations in Chile to domestic and external shocks. The main results of the paper confirm that external shocks (terms of trade, net capital flows, and international interest rates) play an important role in driving domestic output fluctuations in Chile. Regarding domestic shocks, monetary policy shocks and fiscal policy shocks have an influence on the output fluctuations. However, their effects are relatively small in comparison with external shocks. They also claim that, although the Chilean economy is highly susceptible to external shocks, the resilience of the economy to external shocks has increased during the 1990s.

Sosa (2008) studies the impacts of external shocks from the US on domestic output fluctuations in Mexico. Although the Mexican economy has grown faster since entering NAFTA (North American Free Trade Agreement) and increased integration with the global economy, it has become more sensitive to external shocks. The study reveals that US industrial production and demand shocks are the main reasons for the fluctuations in domestic output and exports in Mexico.

Boschi and Girardi (2011) examine the effects of domestic, regional and international factors on domestic output fluctuations in six Latin American countries over the period between 1980 and 2003. Their study focuses on economic interdependence between the Latin American countries and the economic relationship between the three largest industrial economies, the US, the Euro area and Japan. In opposition to the findings of other studies, Boschi and Girardi (2011) demonstrate that the impact of industrial countries on business fluctuations in Latin American countries is small. However, domestic factors play a key role in driving domestic output variability. Regional factors also affect the fluctuations in Latin American countries but the impact of regional factors is less important than the impact of domestic factors.

Ahmed (2003) studies the sources of short-term fluctuations in output, inflation, and the real exchange rate in three Latin American emerging countries—Argentina, Brazil, and Mexico—between 1981 and 1998. Using a dynamic panel model, he finds that external shocks explain a small share of output fluctuations in these Latin American countries. He also suggests that exchange rate flexibility is an important tool for emerging market economies against economic fluctuations.

Business cycle features of emerging market economies and advanced economies are also compared in the literature. Agénor et al. (2000) find similarities between business cycle fluctuations of advanced economies and emerging market economies. On the other hand, Calderón and Fuentes (2010) emphasize that output fluctuations in emerging markets are more volatile than those of advanced economies. Lane (2003) states that business cycle fluctuations are more extreme for the emerging market economies than advanced economies. It is also claimed that emerging market economies are more exposed to business cycles and output is more volatile in emerging market economies than in industrial economies. Claessens et al. (2010) also support Lane in finding that economic recessions are deeper and financial market failures are more severe in emerging markets than in advanced economies. The magnitude of a recession in an emerging country is about three times larger than that of a developed country. Kaminsky et al. (2005) assess the cyclical properties of capital flows and fiscal and monetary policies for developed and emerging countries. Their findings support the view that net capital inflows are procyclical in both developed and emerging countries. Fiscal and monetary policies are procyclical for most emerging countries and countercyclical for developed countries. The aim of macroeconomic policies in developed countries is to offset business cycles, while on the other hand macroeconomic policies generally reinforce business cycles in emerging economies.

The features of business cycle fluctuations in Asian and Latin American emerging markets are compared in the literature. Calderón and Fuentes (2010) observe

that economic recessions in Latin American emerging countries are deeper and more frequent. On the other hand, economic recessions in East Asian emerging countries are more sizable and longer. It is also found that East Asian countries are more affected by external shocks than other emerging market economies. Hoffmaister and Roldós (1997) compare the features of business cycle fluctuations in Asian and Latin American emerging markets. Their study reveals that external shocks, especially world interest rate shocks, and demand shocks affect the output fluctuations in Latin America more than those in Asia. Claessens et al. (2010) examine the main features of the recessions and financial market failures in terms of duration and severity for 23 emerging market economies over the period between 1978 and 2007. The results of the study reveal that recessions in Latin American emerging economies are 50 percent longer than in Asian emerging markets. In addition, a recession in Latin American emerging markets is two times more costly than in Asian emerging markets. They also claim that recessions are highly synchronized across emerging markets.

4 Comovement of International Business Cycles

According to the convergence hypothesis, business cycles become more synchronized across countries over time with closer economic integration. The hypothesis claims that globalization has increased cross-border economic interdependence and convergence in business cycle fluctuations. Economies are more exposed to external shocks due to increased trade and financial linkages among countries. Increased sensitivity to external shocks causes comovement of business cycles (Kose et al. 2008, pp. 4–5). Synchronization of business cycles is often defined by a phrase in the literature: "When America sneezes, the rest of the world catches a cold." The comovement of business cycles is investigated by many researchers. Kose and Yi (2006), Rose and Frankel (1996), Clark and Van Wincoop (2001), Otto et al. (2001), Calderon et al. (2007), and Baxter and Kouparitsas (2005) find positive relationships between trade and business cycles comovement.

Kose and Yi (2006) develop an international business cycle model in order to investigate the relationship between trade and GDP comovement. Their model extends the basic two-country, free trade, and complete market framework, by having three countries, transportation costs, and allowing for international financial autarky. They simulate the effects of increased goods market integration by using the data of 21 OECD countries over the period from 1970 to 2000. The findings of the study show that there is a positive relation between trade and business cycle comovement.

Rose and Frankel (1996) investigate the cross-country correlation of business cycles in the case of currency union. They note that entry into a currency union will increase international trade linkages. Closer international trade could result in increased correlations of national business cycles and they become more similar across countries. They test this view empirically by using the data of

21 industrialized countries. Results of the study indicate that there is a positive relationship between the degree of bilateral trade intensity and the cross-country bilateral correlation of business cycle activity. Therefore, closer international trade links result in more closely correlated business cycles across countries.

Clark and Van Wincoop (2001) claim that increased integration across national economies through removal of barriers to trade, capital flow, migration, and technology affect synchronization of business cycles across regions and countries. They compare intra-country and cross-country correlations by using the data of the US, Canada and European Union countries. They find that the US–Canada border has a weak effect on business cycle correlations between states and provinces. On the other hand, there is a strong and statistically significant European border effect.

Otto et al. (2001) examine the bilateral correlations of GDP growth for 17 OECD countries from 1960 to 2000. They find that the most correlated economies are Canada and the US, Australia and the US, and pairs of European countries. They conclude that economic transmission channels and common shocks led to a positive correlation between some pairs of countries. Bilateral trade, good accounting standards, similar legal systems, common language, and openness to new technology are important factors for higher correlation.

Empirical studies for the industrial countries provide evidence that countries with closer trade linkages exhibit correlated business cycles. Calderon et al. (2007) aim to analyze the impact of trade integration on business cycle correlations among industrial and developing countries. The results of the study reveal that business cycle synchronization increases with bilateral trade. Business cycle synchronization between countries decreases with asymmetric structures of production. Trade integration plays an important role in business cycle correlation in industrial countries.

Baxter and Kouparitsas (2005) investigate the business cycle comovement by using both developed and developing countries. They find that higher bilateral trade between two countries is associated with higher business cycle synchronization. However, factors of industrial structure similarities and currency unions are not correlated with business cycle synchronization. Business cycle comovement exists between industrial country pairs or between developing country pairs. Distance between countries is found to be negatively related to business cycle synchronization.

5 Business Cycle Decoupling of Emerging Market Economies

Increased economic relationships between emerging market economies and advanced economies have the potential for the synchronization of their business cycles. The forces of globalization would be expected to lead to a convergence of business cycle fluctuations. Contrary to convergence hypothesis, it is debated that

emerging markets are decoupling from industrial economies because their business cycle dynamics are no longer tightly linked to the business cycles of industrial countries. The contribution of emerging markets to global growth increased substantially after the year 2000. While the economic growth rates of advanced economies are modest, the growth rates of emerging market economies are strong. This highlights a discussion about whether emerging market economies have been "decoupling" from advanced economies. Fluctuations in advanced economies can have smaller spillover effects on emerging market economies. Therefore, business cycles in emerging markets can diverge from advanced economies.

The International Monetary Fund (IMF) (1998) reports that business cycles are closely synchronized across the major industrial countries from 1970s to 1990s. However business cycles are less synchronized among industrial countries after the 1990s. While global shocks play a dominant role in driving economic fluctuations between 1970 and 1990, country-specific factors have become more dominant since the 1990s. Business cycles in developing countries have relatively close synchronization with business cycles in the industrial countries from 1970 to the late 1980s. However, there is desynchronization of business cycles between developing and industrial countries after the late 1980s. This reflects the decoupling of economic fluctuations.

Kose et al. (2008) analyze global business cycle comovement by using the data of 106 countries which are categorized as industrial countries, emerging markets, and other developing economies. According to the results of the study, there is a convergence of business cycle fluctuations among the group of industrial economies and among the group of emerging market economies during the period between 1985 and 2005. Although there is business cycle convergence among industrial countries and among emerging market countries, there is divergence or decoupling between these two groups of countries. The convergence hypothesis is valid for the same group of countries, but there is not any support for the convergence hypothesis between different groups of countries.

Contrary to the IMF (1998) and Kose et al. (2008), Wälti (2012) rejects the decoupling hypothesis. His study provides empirical evidence about business cycle synchronization between emerging market economies and advanced economies. Business cycle fluctuations of emerging market economies are compared with four groups: advanced economies, the G7 group, the US alone and the European group. It is concluded that business cycle synchronization has not decreased over time. Thus, emerging markets have not decoupled from advanced economies.

Fidrmuc and Korhonen (2010) and Kim et al. (2011) both claim that there is no decoupling in Asian emerging markets. Fidrmuc and Korhonen (2010) compare the business cycles of OECD countries and China and India. They find that the business cycles in the OECD countries and in China and India have been quite different during the past two decades. However, they also claim that the global financial crisis has had similar effects on the OECD countries of China and India. Trade linkages between China, India and the OECD countries has increased business cycle correlations between them. Kim et al. (2011) observe the output shocks in Asian emerging countries during the pre-Asian crisis (1990–1996) and post-Asian

crisis (2000–2007) periods. Empirical findings show that the effects of global shocks on emerging Asian economies increased after the 2000s. Global shocks explain a large share of fluctuations in Asian emerging markets. However, China and other Asian emerging markets also have an effect on global market fluctuations. Economic interdependence between Asian emerging markets and industrial countries increased after the post-crisis period and it has led to convergence in business fluctuations.

Yeyati and Williams (2012) investigate the decoupling of emerging markets from a broad perspective. They study business cycle synchronization between emerging market economies and G7 economies from both real and financial aspects during the 2000s. They conclude that there is a real decoupling but a financial recoupling between emerging markets and advanced economies. Business cycles in emerging markets have gradually decoupled from business cycles in advanced economies due to trade diversification, commodity strength and China's strong economic performance. On the other hand, the comovement between emerging markets and global assets has risen in the late 2000s. See Table 3 for an overview of the literature.

6 Global Financial Crisis 2007–2008 and Resilience of Emerging Markets

The financial turmoil in the US in 2007 and 2008 turned out to be a global financial crisis. Followed the "Great Moderation" (years of low inflation and stable growth), it was the most serious financial crisis in the United Stated since the 1980s. The economy had been less volatile in the past two decades than in prior periods in the US. Because great moderation led to perceptions that systemic risk had lowered, lenders and investors increased their leverage and risk-taking activities. Credit derivatives and securitization increased the leverage in the financial system. However, this leverage was damaged by subprime mortgage losses.

The housing bubble in the US was the starting point for the crisis. Housing prices continuously increased until 2006. Nationwide house prices peaked in 2006 and started to decline after then. Besides, there was a drastic increase in the number of defaults and foreclosures on subprime mortgages beginning in 2006. The crisis started with problems in the subprime mortgage sector and it quickly spread to other markets through financial innovations. Financial derivative products which are collateralized debt obligations (CDOs) and credit default swaps (CDSs) deepened the crisis. Increases in subprime mortgage defaults stimulated the liquidity crisis. Spreads on mortgage products dramatically widened following the rating downgrades on subprime mortgage-backed securities. The price of mortgage-related products deteriorated. The US Federal Reserve (Fed) coped with the liquidity crisis by lowering the interest rates and bailout programs.

Table 3 Literature review

Author (year)	Data	Methods	Findings
Izquierdo et al. (2008)	7 largest Latin American countries (1990–2006)	VAR model	External factors the dominant sources of business fluctuations
Maćkowiak (2007)	8 Asian and Latin American countries	Structural VAR model	External factors affect business cycle fluctuations
Franken et al. (2005)	Chile (1950–2003)	VAR model	External shocks play important role in driving output fluctuations in Chile. Domestic shocks have little effect
Sosa (2008)	Mexico (1995–2007)	VAR model	External shocks from US are the main reasons of the fluctuations in Mexico
Boschi and Girardi (2011)	6 Latin American countries, USA, Euro area and Japan (1980–2003)	Global VAR methodology	External factors have little impact on business fluctutaions in Latin America. Domestic factors are more important
Ahmed (2003)	3 Latin American countries (1981–1998)	Dynamic panel model	External factors explain a small share of output fluctuations
Hoffmaister and Roldós (1997)	15 Asian and 17 Latin American countries (1970–1993)	Structural VAR model	Main source of output fluctuations in emerging markets is domestic supply shocks. External shocks have more effect on output fluctuations in Latin America than in Asia
Agénor et al. (2000)	12 emerging market economies (1978–1995)	Univariate detrending techniques	There are similarities between business cycle fluctuations of advanced economies and emerging market economies
Calderón and Fuentes (2010)	23 emerging market economies and 12 developed countries (1980–2006)	Dating algorithm by Harding and Pagan	Emerging markets have more volatile output fluctuations than advanced economies. Recessions in Latin America are deeper and more frequent. Recessions in East Asia are more sizable and longer
Lane (2003)	22 industrial countries, 5 East Asian countries, and 19 Latin American and Caribbean countries (1975–2000)	Panel regressions	Business cycle fluctuations are more extreme for the emerging market economies than advanced economies
Claessens et al. (2010)	23 emerging market countries and 21 OECD countries (1978–2007)	Standard business cycle dating algorithm	Economic recessions are deeper and financial market failures are more severe in emerging markets. Recessions in Latin America are longer than Asia

(continued)

Table 3 (continued)

Author (year)	Data	Methods	Findings
Kaminsky et al. (2005)	104 countries (1960–2003)	Data analysis	Net capital inflows are procyclical in both developed and emerging countries. Fiscal and monetary policy are procyclical for emerging countries and countercyclical for developed countries
Kose and Yi (2006)	21 OECD countries 1970–2000)	Three country business cycle model	There is a positive relationship between trade and business cycles comovement
Rose and Frankel (1996)	21 industrialized countries (1959–1993)	Regression analysis	There is a positive relationship between international trade and business cycles comovement
Clark and Van Wincoop (2001)	18 industrialized countries (1961–1998)	GMM method	There is a weak border effect between Canada and the US. Border effect in Europe is strong
Otto et al. (2001)	17 OECD countries (1960–2000)	Regression analysis	Bilateral trade increses business cycle comovement
Calderon et al. (2007)	147 industrial and developing countries (1960–1999)	De-trending techniques	Bilateral trade increses business cycle comovement
Baxter and Kouparitsas (2005)	Over 100 countries	Extreme-bounds analysis	Bilateral trade increses business cycle comovement
Kose et al. (2008)	106 countries (1960–2005)	Dynamic factor models	There is business cycle decoupling between emerging markets and advanced economies
Wälti (2012)	34 emerging market countries and 28 advanced countries (1980 and 2007)	Regression analysis	Emerging markets are not decoupling from advanced economies
Fidrmuc and Korhonen (2010)	China, India and 23 OECD countries (1990–2008)	Dynamic correlation analysis	There is no decoupling in Asian emerging markets
Kim et al. (2011)	9 Asian emerging countries and G7 countries (1990–1996)	Panel VAR model	There is no decoupling in Asian emerging markets
Yeyati and Williams (2012)	23 emerging countries and G7 countries (1993–2009)	Regression analysis	There is real decoupling and financial recoupling between emerging markets and advanced economies

The crisis led banks to write off substantial amounts of money as bad debts caused by mortgage delinquencies. The major financial institutions either failed, were bailed-out by governments, or merged during the crisis. Investment banks were seriously affected by the crisis, because they were heavily involved in

securitization and issued large amounts of asset-backed securities. Bear Stearns failed and it was sold to J. P. Morgan with the assistance of the Fed in March 2008. Lehman Brothers went bankrupt in September 2008. The collapse of Lehman Brothers increased the uncertainty in the financial markets. Merrill Lynch was taken over by Bank of America. Goldman Sachs and Morgan Stanley were bailed out by the Fed and they were converted to bank holding companies. American International Group (AIG), a giant multinational insurance company, was also affected seriously by the crisis. The Fed provided a credit facility under the bailout program. The Federal Home Loan Mortgage Corporation (Fannie Mae) and The Federal Home Loan Mortgage Corporation (Freddie Mac), which are government-sponsored enterprises with the purpose of expanding the secondary market for mortgages, were directly affected by the crisis in the subprime mortgage market. The Fed took over these companies.

In an interconnected world, the subprime mortgage crisis had large impact on the global financial system. The other advanced economies, especially European countries, were seriously affected by the crisis. The European banks involved in mortgage backed securities reported large losses. Following the crisis, the US and European economies went into recession.

With the help of their strong economic performance prior to the global financial crisis, emerging market economies have been affected by the crisis less than the advanced economies. During the 1990s, emerging market economies were more prone to macroeconomic fluctuations due to crises. However, they are less vulnerable than in the past.

Excess leverage caused the credit crunch in advanced economies. Risk perceptions in advanced economies were low and leverage became excessive. On the other hand, risk perceptions in emerging markets were high and leverage did not become excessive as advanced economies. Therefore, deleveraging was not a problem in the emerging market. Banking systems in Latin America, Russia and Asia did not face systemic failures in 2008. However, emerging markets were affected by the global financial crisis through their economic relations with advanced economies. Firstly, cross-border capital decreased. Emerging markets were faced with a reduction in international liquidity after September 2008. This temporary reduction in international finance led governments in emerging markets to substitute finance from domestic resources. Accumulation of foreign exchange reserves protected the emerging markets from liquidity tightening. Secondly, export demand from developed countries was slowed. Decreased export demand caused temporary reduction in industrial production, unemployment, and consumption in emerging markets. And increased uncertainty due to the credit crunch in advanced economies affected consumers and investors temporarily in emerging markets. Economic decisions were delayed in emerging markets because of uncertainty over how policymakers in the advanced economies were going to react to the crisis. However, the business cycle associated with the external shock from the global financial crisis that emerging markets faced was short-lived (Booth 2014, pp. 67–69).

Emerging market economies with efficient macroeconomic policies, high domestic savings and less dependence on foreign finance coped better with the

crisis. A high level of foreign exchange reserves and underdeveloped financial markets also increased the resilience of the emerging market economies. However, there is significant variation in the degree of resilience in different groups of emerging markets. Asian emerging markets were less affected by the crisis than European emerging markets because European emerging countries had more dependence on external finance for their current account deficits (Kose and Prasad 2010, p. 4). Emerging countries mostly had trade and investment links with advanced economies, not with other emerging countries. However, trade among themselves grew rapidly. According to the 2013 United Nations Development Report, trade between emerging developing countries is over 30 % of global trade (Booth 2014, p. 48). The domestic markets of emerging countries also developed. Emerging markets became less dependent on advanced economies due to these improvements. They also became less vulnerable to shocks from advanced economies.

7 Conclusion

Business cycle fluctuations can be driven by domestic factors such as macroeconomic conditions, change in consumption and investment patterns, structural conditions or political instability. However, business cycles are also affected by external factors due to increased trade, financial liberalization, and globalization. Many studies state that external factors are the main reasons for business cycle fluctuations in emerging market economies. On the other hand, some studies claim that external shock has a limited role in driving business cycle fluctuations in emerging market economies. The main source of business cycle fluctuations in emerging markets is domestic supply shocks. When the business cycles of emerging market economies and advanced economies are compared, business cycle fluctuations in emerging markets are more volatile and extreme than those in advanced countries. Recessions in emerging markets are much deeper than those in advanced countries.

Increased economic integration across countries leads business cycle synchronization. The comovement of business cycle studies find positive relations between trade and business cycle synchronization. Therefore, increased trade and economic relationship between the emerging market economies and advanced economies have the potential for the convergence of their business cycles. However, the economic performance divergence of emerging market economies from advanced economies after the 2000s started the decoupling debate. Decoupling debates in the literature discuss whether the business cycle fluctuations of emerging markets converge to, or diverge from, the business cycles of advanced economies. Although some empirical studies support the decoupling hypothesis, there are also contrary studies that reject the decoupling of emerging market economies from advanced economies.

The global financial crisis that started in the US and spilled over the world also affected the emerging market economies. However, emerging market economies suffered from the crisis less than advanced economies. Banking systems in emerging markets did not face systemic failures due to the crisis. Emerging markets were affected by global liquidity tightening and decreased export demand from advanced countries. However, they coped with the negative effects of the global crisis because of several factors. The resilience of emerging market economies increased by improving macroeconomic policies, having less dependence on foreign finance, the accumulation of foreign exchange reserves prior to the global crisis, increased trade linkages between themselves, and increased domestic demand. Dependence on advanced economies was reduced with increased trade between emerging markets and increased domestic demand. Emerging markets became less vulnerable to external shocks with their increased resilience and business cycle fluctuations in emerging market economies became less closely tied to business cycles in advanced economies.

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Financial Conditions Index as a Leading Indicator of Business Cycles in Turkey

Umit Bulut

Abstract A financial conditions index (FCI) is an instrument that is developed using some financial variables in order to predict future output and/or inflation. Therefore, some studies in the literature examine the relationship between FCI and output gap/growth to determine whether the FCI is a leading indicator of business cycles. This study aims at investigating the relationship between output gap and FCI for Turkey by utilizing quarterly data covering the period 2005:1–2015:3. In other words, the study examines whether the FCI can be a leading indicator of business cycles in Turkey. For this purpose, the study, first, presents an FCI that has been recently developed for Turkey and reveals that the FCI is able to present the developments in the Turkish economy and in the world. Second, the study employs unit root tests and cointegration tests. The study finally performs vector autoregressive (VAR) analysis and the bootstrap Granger causality test to examine the relationship between FCI and output gap in Turkey. Both VAR analysis and the bootstrap Granger causality test indicate that the FCI has predictive power in forecasting future output gap in Turkey. Based on these findings, this study yields that the FCI in this study can be used as a leading indicator of business cycles in Turkey.

1 Introduction

Financial conditions can be defined as current values of financial variables which can influence economic actors' consumption, investment, and saving decisions (Hatzius et al. 2010). Hence a financial conditions index (FCI) that is developed using some financial variables is an instrument that presents information about developments in financial markets and can help policy makers and researchers predict the future situation of an economy (Hatzius et al. 2010; Osario et al. 2011; Vonen 2011; Kara et al. 2012). Thus one can determine periods when financial conditions improve or worsen and can predict economic developments

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by employing an FCI (Koop and Korobilis 2014). Because, an FCI can contain information about not only financial markets but also economic activities and inflationary pressures in the future since the FCI reflects the stance of monetary policy and aggregate demand (Castro 2011). Therefore, one may expect that the variables which are used to construct an FCI are able to have effects on future output and inflation by way of transmission mechanisms of monetary policy (Mayes and Virén 2001; Chow 2013). Some variables which can be used to develop an FCI are total credits, exchange rates, stock and house prices, and interest rates (Chow 2013). The global crisis which began in 2007–2008 in the US financial markets displayed that financial conditions could reveal negative effects on economies and proved that following and evaluating financial conditions could be crucial for policy makers to conduct robust macroeconomic policies (Chow 2013; Kara et al. 2012; Koop and Korobilis 2014). Therefore, many studies have been made to generate an FCI principally since the global crisis.

The Turkish economy was seriously affected by the global financial crisis and the Turkish economy shrank during four quarters from 2008:4 to 2009:3. After the effects of the crisis were declined, the Turkish economy began to recover, but the growth rates of the Turkish economy have decreased in recent years. On the other hand, as Bulut (2015) and Kara et al. (2012, 2015) indicate, the Central Bank of the Republic of Turkey (CBRT) designed a new monetary policy framework/new policy mix in the last quarter of 2010 to achieve both price stability and financial stability. Kara et al. (2012) point out that, in this new framework, it is required to produce a yardstick to gauge the degree of looseness and tightness of monetary policy as the CBRT employs liquidity, credit, and interest rate policies simultaneously. This yardstick is an FCI that is constructed using some financial variables and can present the evaluation of the financial conditions in Turkey. To the best of the author's knowledge, an FCI for the Turkish economy has been constructed in three studies until today (Kara et al. 2012, 2015; Bulut 2016).

In Bulut (2016), I have produced an FCI for Turkey, have showed that this FCI can markedly exhibit the developments in Turkey and in the world, and have empirically revealed that this FCI has predictive power in forecasting inflation. In other words, the empirical findings in Bulut (2016) have indicated that policy makers can forecast future inflation by observing past data of the FCI that has been developed. In this study, I ask a question about the relationship between GDP and FCI as the following: Can the FCI help policy makers forecast future economic activities as a leading indicator of business cycles in Turkey? Then, this study tries to find an answer for this question. In other words, this study aims at investigating the relationship between output gap and FCI for Turkey using quarterly data from 2005:1 to 2015:3. That is to say, the study examines whether the FCI can be employed to predict future output gap in Turkey. Therefore, this study tests the performance of the FCI in predicting output gap in Turkey. To the best of my knowledge, this is the first study that investigates output gap-FCI nexus for Turkey.

The rest of the study is designed as the following: Section 2 presents the literature on FCIs. Section 3 reveals an FCI for Turkey in summary. Section 4 exhibits data and methodology. Estimation results are presented and discussed in

Sect. 5. Section 6 concludes the study with a summary of findings and some implications.

2 Literature Review

As denoted in Section 1, the number of the studies on FCIs has increased principally since the global financial crisis (see e.g., Gauthier et al. 2003; Guichard and Turner 2008; Rosenberg 2009; Castro 2011; Vonen 2011; Osario et al. 2011; Chow 2013; Milas and Naraidoo 2012; Gumata et al. 2012; Matheson 2012; Ho and Lu 2013; Angelopoulou et al. 2014; Koop and Korobilis 2014; Kara et al. 2015; Gaglianone and Areosa 2016; Melolinna and Tóth 2016). Some of these studies not only develop an FCI to follow financial conditions but also examine the forecasting power of the FCI on output gap/output growth. Table 1 summarizes these studies.

As seen from Table 1, the FCIs constructed in these studies have predictive power in forecasting GDP gap/growth. In other words, all these studies yield that the FCI is a leading indicator of business cycles and thus can be used in order to forecast future GDP growth/gap.

3 Production and Exhibition of the FCI for Turkey

I present the FCI produced in Bulut (2016) in summary in this section.[1] I have employed six financial variables to develop the FCI for the Turkish economy. These variables are real domestic credits gap (RDC^{gap}), real effective exchange rate gap ($REXC^{gap}$), real stock market index gap ($RSMI^{gap}$), real short-term interest rate (RSIR), real commercial loan rate (RCLR), and real shadow rate (RSR). The last variable is used as the right measure of the stance of monetary policy in the US instead of federal funds rate due to FED's forward guidance policy and quantitative easing (asset purchase) programs.[2] I have performed principal components analysis (PCA) to compute the coefficient of each variable. The number of principal components that one obtains by performing PCA is equal to the number of variables and each principal component shows the possible coefficients of the variables. The new variable is a linear function of these variables (Angelopoulou et al. 2014; Thompson et al. 2015). Table 2 presents the results of the PCA.

Table 2 reports the results of the PCA. When one examines these principal components, he/she observes that the coefficients of the variables differ respecting the principal components. Hence it is considerable to determine the acceptable principal component. As the coefficients of the variables obtained through the

[1] See Bulut (2016) for the detailed construction and interpretation of the FCI.

[2] See Wu and Xia (2014) for the calculation of shadow rates.

Table 1 Empirical literature on the FCI-output gap (growth) nexus

Author(s)	Country(ies)	Variables to construct the FCI	Does the FCI have predictive power in forecasting GDP growth/gap?
Gauthier et al. (2003)	Canada	Real 90-day commercial paper rate, real 10-year government bond rate, real exchange rate, real housing price index, real S&P 500 stock index, US high-yield risk spread	Yes (gap)
Osario et al. (2011)	Australia and 12 Asian countries	Some interest rates (overnight, on treasury bonds, on deposits), nominal effective exchange rate, credits, stock market index	Yes (growth)
Gumata et al. (2012)	South Africa	Domestic factors (total loans, the South African sovereign spread, nonperforming loans, negotiable certificates of deposit rate, nominal effective exchange rate, Johannesburg Stock Exchange Index, house price index) Global factors (S&P 500 volatility index (VIX), S&P 500 stock price index, JP Morgan EMBI total return index, the spread between the three-month LIBOR and the yield on a three-month US Treasury bill)	Yes (growth)
Matheson (2012)	USA and Euro Area	30 financial indicators for the USA and 17 financial indicators for the Euro Area (some interest rates, some spreads, bank credits, some commercial papers, VIX, money stock, etc.)	Yes (gap)
Ho and Lu (2013)	Poland	Domestic variables (lending standards, 3-month WIBOR rate, corporate loan spread, real effective exchange rate) External variables (EURIBOR-OIS spread, VIX)	Yes (growth)
Koop and Korobilis (2014)	USA	18 financial variables (asset prices, volatility indicators, credits, liquidity indicators)	Yes (growth)
Vonen (2011)	Norway	13 financial variables (real exchange rate, stock market index, house price index, money supply, some spreads, etc.)	Yes (growth)
Melolinna and Tóth (2016)	United Kingdom	22 financial variables (some spreads, exchange rates, house price index, credits, etc.)	Yes (gap)
Gaglianone and Areosa (2016)	Brazil	28 financial variables (interest rates, credits, monetary aggregates, capital market indicators, exchange rates, etc.)	Yes (gap)

Table 2 Results of the PCA

Eigenvalues						
Number	Value	Difference	Proportion	Cumulative value	Cumulative proportion	
1	2.787	1.104	0.464	2.787	0.464	
2	1.683	0.761	0.280	4.471	0.745	
3	0.922	0.510	0.153	5.393	0.898	
4	0.411	0.296	0.068	5.805	0.967	
5	0.115	0.035	0.019	5.920	0.986	
6	0.079	–	0.013	6.000	1.000	
Eigenvectors						
Variable	PC 1	PC 2	PC 3	PC 4	PC 5	PC 6
RDC^{gap}	0.251	0.170	0.912	−0.017	−0.159	0.221
$REXC^{gap}$	0.097	0.662	−0.173	0.706	−0.139	0.053
$RSMI^{gap}$	0.157	0.673	−0.085	−0.586	0.400	−0.102
RSIR	0.574	−0.119	0.043	0.085	−0.094	−0.798
RCLR	0.535	−0.254	−0.067	0.253	0.667	0.367
RSR	0.535	−0.015	−0.351	−0.291	−0.583	0.405
Correlation matrix						
	RDC^{gap}	$REXC^{gap}$	$RSMI^{gap}$	RSIR	RCLR	RSR
RDC^{gap}	1.000					
$REXC^{gap}$	0.109	1.000				
$RSMI^{gap}$	0.226	0.629	1.000			
RSIR	0.391	0.038	0.094	1.000		
RCLR	0.237	−0.063	−0.081	0.883	1.000	
RSR	0.095	0.110	0.284	0.816	0.763	1.000
$FCI = 0.170*RDC^{gap} + 0.662*REXC^{gap} + 0.673*RSMI^{gap} - 0.119*RSIR - 0.254*RCLR - 0.015*RSR$						

second principal component seem to be in accordance with the expectations, the second PC has been used in order to construct the FCI. Because, a decrease in the FCI indicates a tightening in financial conditions while an increase in the FCI indicates a loosening in financial conditions. Accordingly, financial conditions loose if real domestic credits gap, real effective exchange rate gap, and real stock market index gap increase and/or real short-term interest rates, real commercial loan rates, and real shadow rates decrease.

Figure 1 presents the FCI produced by way of the second principal component. A downward movement of the FCI implies the tightening in financial conditions while an upward movement of the FCI implies the loosening in financial conditions.

As seen, the FCI can markedly reflect the developments in Turkey and in the world. Accordingly, the FCI declined severely because of the global crisis, and then rapidly recovered after the effects of the crisis had decreased. The new monetary policy framework of the CBRT in the last quarter of 2010 and the debt crisis in the Euro Area caused financial conditions to tighten during 2011. The decreases in asset purchases of the FED and the end of asset purchases led to tighter financial conditions in late 2013 and late 2014, respectively in Turkey.

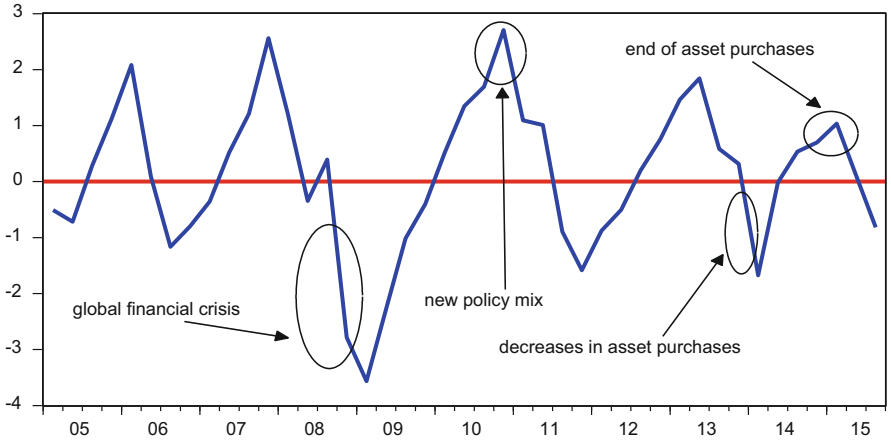

Fig. 1 The financial conditions index for the Turkish economy

4 Data and Estimation Methodology

4.1 Data

This study conducts time series analysis for Turkey using quarterly data covering the period 2005:1–2015:3. The variables are seasonally adjusted real output gap and FCI. Output gap is the difference between GDP (billion TL) and potential GDP that is calculated by filtering real GDP using the method developed by Hodrick and Prescott (1997). The development of the FCI and data for FCI are exhibited in Bulut (2016) and in this study while data for GDP are extracted from the CBRT. While FCI denotes the financial conditions index, GDP^{gap} represents output gap.

Table 3 depicts descriptive statistics and correlation matrix. It is noted that all descriptive statistics of FCI except for minimum are greater than those of GDP^{gap}. Additionally, it is noted that there is a positive correlation between GDP^{gap} and FCI. Descriptive statistics provide one with preliminary inspection about GDP^{gap} and FCI. However, one should consider some statistical methodologies, such as unit root, cointegration, and causality tests, to obtain efficient output.

4.2 Methodology

4.2.1 Unit Root Tests

Unit root tests propounded by Dickey and Fuller (1981, henceforth ADF) and Phillips and Perron (1988, henceforth PP) are prevalently used in the econometric analysis, but these tests do not consider possible structural break(s) in series.

Table 3 Descriptive statistics and correlation matrix for variables

	GDP^{gap}	FCI
Descriptive statistics		
Mean	1.79E-12	0.117
Median	0.093	0.282
Maximum	2.120	2.706
Minimum	−2.543	−3.564
Std. deviation	0.835	1.341
Observations	43	43
Correlation matrix		
GDP^{gap}		0.485
FCI	0.485	

However, before a relationship between variables is examined, one should consider that series may have structural break(s).

A unit root test considering two structural breaks is suggested by Narayan and Popp (2010, henceforth NP). They propose two models. The first model, M1, considers two breaks in intercept while the second model, M2, considers two breaks in intercept and trend.

The test regressions are demonstrated as follows:

$$y_t^{M1} = \rho y_{t-1} + \alpha_1 + \beta^* t + \theta_1 D\left(T'_B\right)_{1,t} + \theta_2 D\left(T'_B\right)_{2,t} + \delta_1 DU'_{1,t-1} + \delta_2 DU'_{2,t-1} + \sum_{j=1}^{k} \beta_j \Delta y_{t-j} + e_t \quad (1)$$

$$y_t^{M2} = \rho y_{t-1} + \alpha^* + \beta^* t + \Omega_1 D\left(T'_B\right)_{1,t} + \Omega_2 D\left(T'_B\right)_{2,t} + \delta_1^* DU'_{1,t-1} + \delta_2^* DU'_{2,t-1} + \gamma_1^* DT'_{1,t-1} + \gamma_2^* DT'_{2,t-1} \sum_{j=1}^{k} \beta_j \Delta y_{t-j} + e_t \quad (2)$$

where $DU'_{i,t} = 1\left(t > T'_{B,i}\right)$, $DT'_{i,t} = 1\left(t > T'_{B,i}\right)\left(t - T'_{B,i}\right)$, i = 1,2.

where T'_B denotes the break dates, and the parameters θ_i and γ_i symbolize the magnitude of the intercept and trend breaks, respectively. The null hypothesis of a unit root (H_0: $\rho = 1$) is tested against the alternative hypothesis (H_1: $\rho < 1$), and t-statistics for $\widehat{\rho}$ in Eqs. (1) and (2) are utilized. Critical values for the test are calculated by way of Monte Carlo simulations. If the critical values are lower than the test statistics, then the null hypothesis of a unit root is rejected.

4.2.2 Cointegration Test

Standard cointegration tests, such as Engle and Granger (1987) and Johansen (1988, 1991), do not consider structural break(s) in the relationships between series. However, when there are one or more structural breaks, standard cointegration

tests may not be acceptable and a cointegration test with structural break(s) should be performed (Westerlund and Edgerton 2007). Gregory and Hansen (1996) and Westerlund and Edgerton (2007) propound cointegration tests that allow for structural break in the relationship between series. While these tests assume a single break, Hatemi-J (2008a) produces a cointegration test considering two breaks. Maki (2012) suggests a relatively new cointegration test that lets structural breaks until five different points in time.

Maki (2012) contemplates the following models in order to test whether there is a cointegration relationship between variables:

Model 0 (Break in levels):

$$y_t = \mu + \sum_{i=1}^{k} \mu_i D_{i,t} + \beta' x_t + u_t \tag{3}$$

Model 1 (Breaks in levels and regressors):

$$y_t = \mu + \sum_{i=1}^{k} \mu_i D_{i,t} + \beta' x_t + \sum_{i=1}^{k} \beta_i' x_t D_{i,t} + u_t \tag{4}$$

Model 2 (Model 1 with trend)

$$y_t = \mu + \sum_{i=1}^{k} \mu_i D_{i,t} + \gamma t + \beta' x_t + \sum_{i=1}^{k} \beta_i' x_t D_{i,t} + u_t \tag{5}$$

Model 3 (Breaks in levels, trends, and regressors)

$$y_t = \mu + \sum_{i=1}^{k} \mu_i D_{i,t} + \gamma t + \sum_{i=1}^{k} \gamma_i t D_{i,t} + \beta' x_t + \sum_{i=1}^{k} \beta_i' x_t D_{i,t} + u_t \tag{6}$$

where $t = 1,2,\ldots,T$. y_t and $x_t = (x_{1t}, \ldots, x_{mt})'$ stand for variables that are stationary at first differences, and u_t denotes the error term. y_t is a scalar, and $x_t = (x_{1t}, \ldots, x_{mt})'$ is an mx1 vector. $D_{i,t}$ denotes dummy variables and is 1 if $t > T_{Bi}$ (i=1,...,k) and is 0 otherwise, k is the number of breaks, and T_{Bi} stands for the break dates.

The critical values are produced by way of Monte Carlo simulation and are presented in Maki (2012). If the critical values are lower than the calculated tests statistics, the null hypothesis of no cointegration is rejected.

4.2.3 Vector Autoregressive Analysis

Vector autoregressive (VAR) models suggested by Sims (1980) are commonly employed to forecast systems of interrelated time series and to analyze the dynamic

impact of random disturbances on variables. Every endogenous variable in the system is a function of the lagged values of all endogenous variables.

A VAR model can be expressed in matrix notations as the following (Maddala 1992):

$$y_t = A_1 y_{t-1} + \ldots + A_p y_{t-p} + m + \varepsilon_t \tag{7}$$

where y_t is a kx1 vector of endogenous variables, m is a kx1 vector of constants, $A_1,\ldots,A_p$ are kxk matrices of coefficients to be estimated, and ε_t is a kx1 vector of white noise process.

If it is assumed that $k = 2$ and $p = 1$, the VAR model is expressed as follows (Johnston and Dinardo 1997):

$$y_t = \begin{bmatrix} y_{1t} \\ y_{2t} \end{bmatrix} = \begin{bmatrix} m_1 \\ m_2 \end{bmatrix} + \begin{bmatrix} a_{11} & a_{12} \\ a_{21} & a_{22} \end{bmatrix} \begin{bmatrix} y_{1,t-1} \\ y_{2,t-1} \end{bmatrix} + \begin{bmatrix} \varepsilon_{1t} \\ \varepsilon_{2t} \end{bmatrix} = m + Ay_{t-1} + \varepsilon_t \tag{8}$$

This model can be expressed via equations as below:

$$y_{1t} = m_1 + a_{11} y_{1,t-1} + a_{12} y_{2,t-1} + \varepsilon_{1t} \tag{9}$$

$$y_{2t} = m_2 + a_{21} y_{1,t-1} + a_{22} y_{2,t-1} + \varepsilon_{2t} \tag{10}$$

Hence, in all VAR models, each variable is stated as a linear combination of lagged values of itself and lagged values of all other variables in the system.

Johnston and Dinardo (1997) explain impulse-response functions obtained through the estimation of the VAR models. Accordingly, a shock in ε_{1t} has an instant effect on y_{1t}, but no effect on y_{2t}. In period t+1, this shock in y_{1t} affects $y_{1,t+1}$ via the first equation and also affects $y_{2,t+1}$ via the second equation. These effects continue to period t+2, and so forth. Thus a shock in the VAR model starts a chain reaction over time in all variables in the VAR system. Hence these chain reactions are calculated by impulse-response functions.

4.2.4 Hacker and Hatemi-J (2012) Bootstrap Granger Causality Test

In his original paper, Granger (1969) defines causality as "We say that Y_t is causing X_t if we are better able to predict X_t using all available information than if the information apart from Y_t had been used." Hence if Y_t causes X_t, it implies that Y_t has predictive power in forecasting X_t with regard to Granger causality. To investigate Granger causality, Hacker and Hatemi-J (2012) consider the following VAR model of order k:

$$y_t = A_0 + A_1 y_{t-1} + \ldots + A_k y_{t-k} + u_t \tag{11}$$

where y_t, A_0, and u_t are nx1 vectors and A_i, $i \geq 1$, is an nxn matrices of parameters. There is non-Granger causality of the rth element of y_t on the jth element of y_t only if the following expression is correct:

$$H0: \text{the element in Ai's row j, column r is zero for i} = 1, \ldots, k \tag{12}$$

The lag order k is determined by minimizing an information criterion. Hatemi-J (2003, 2008b) develops an information criterion that is an alternative to other criteria, such as Schwarz Bayesian criterion (SBC) and Akaike Information Criterion (AIC). The Hatemi-J Criterion (HJC) is stable to ARCH effects and it executes well when the goal of the VAR model is to obtain ex ante inference (Hatemi-J and Uddin 2014).

It is possible to define the VAR model as the following:

$$Y = DZ + \delta \tag{13}$$

The subsequent step is to estimate δ_U, the nxT matrix of residuals from Eq. (13) when the null hypothesis is not imposed. The variance-covariance of these residuals is calculated as $S_u = \left(\delta_U \delta S'_U\right)/(T - (1 + nk))$, where 1+nk is the number of the estimated parameters. It is possible to define $\beta = \text{vec}(A_0, A_1, \ldots, A_k)$ or $\beta = \text{vec}(D)$, where vec denotes the column-stacking operator, and to regard $\widehat{\beta}$ as the OLS estimate of β. The Wald test statistic to test the null hypothesis of non-Granger causality is written as below:

$$\text{Wald} = \left(Q\widehat{\beta}\right)' \left[Q\left((Z'Z)^{-1} \otimes S_U\right)Q'\right]^{-1} \left(Q\widehat{\beta}\right) \sim \chi^2_k \tag{14}$$

where ⊗ is the Kronecker product representing elements by all elements multiplication of matrixes, and Q is a kxn(1+nk) matrix.

Under the conditional of normal distribution, the Wald statistic in Eq. (14) has a χ^2 distribution asymptotically with k degrees of freedom. On the other hand, if the sample size is small and normality assumption is impaired by time-varying volatility, the asymptotic critical values for the Wald test are not precise. To deal with this problem, Hacker and Hatemi-J (2012) suggest a bootstrap test with leverage adjustment and emphasizes that this test also performs well when the lag order is selected endogenously. If the critical values obtained through the bootstrap technique are lower than the Wald statistic, then the null hypothesis of no causality is rejected.

5 Results and Discussion

ADF and PP unit root tests' results are depicted in Table 4. As seen, the PP test indicates that GDP^{gap} is stationary at first difference while the results of the ADF test for GDP^{gap} are mixed. Besides, the ADF test indicates that FCI is stationary at

Table 4 ADF and PP unit root tests

Variable		ADF test statistic		PP test statistic	
		Intercept	Intercept and trend	Intercept	Intercept and trend
GDP^{gap}	Level	−2.854***	−2.825	−2.378	−2.351
	First difference	−5.158*	−5.116*	−5.163*	−5.122*
FCI	Level	−4.708*	−4.660*	−3.116**	−3.06
	First difference	−5.511*	−5.461*	−5.514*	−5.466*
Critical values	1 %	−3.596	−4.198	−3.596	−4.198
	5 %	−2.933	−3.523	−2.933	−3.523
	10 %	−2.604	−3.192	−2.604	−3.192

Notes: *, **, *** indicate the rejection of the null hypothesis at 1, 5, and 10 % levels of significance, respectively

level while the results of the PP test for FCI are mixed. For this reason, the results of the NP unit root test are depicted in Table 5 to obtain more reliable findings.

As seen from Table 5, the null hypothesis that the series have a unit root can be rejected at first differences for the variables. In other words, the variables are integrated of order one with regard to the NP unit root test.

Table 6 presents the results of the Maki (2012) cointegration test. According to the results of the test, the null hypothesis of no cointegration between variables is rejected for 3 out of 4 models. Therefore, it can be approved there is a cointegration relationship between GDP^{gap} and FCI.

When one evaluates the breaking dates that the NP unit root test and the Maki (2012) cointegration test indicate, he/she will observe that there are breaks during the period 2006–2013. The global crisis, the new policy framework of the CBRT, the debt crisis in the Euro Area, and FED's forward guidance policy and asset purchase programs may account for the breaks detected in these years.

When there is a cointegration relationship between variables, the estimation of VAR models at levels presents consistent estimations (Berument et al. 2012). Hence the relationship between GDP^{gap} and FCI can be estimated by employing VAR analysis in this study. Figure 2 reveals the impulse-response functions' graphical observations acquired from the VAR analysis.

As depicted in Fig. 1, a positive one-unit standard deviation shock to FCI leads to an increase in GDP^{gap} in the first seven periods while the effect of the shock is highest in the second period. After six periods, the effect of the shock turns negative until the 12th period. Then, the effect of the shock disappears in time. Additionally, Fig. 1 portrays that a positive one-unit standard deviation shock to GDP^{gap} causes FCI to increase in the first four periods and then to fluctuate until 14th period. Then, the effect of the shock decreases and disappears in time.

Table 7 reports the findings obtained from the Hacker and Hatemi-J (2012) bootstrap causality test. Accordingly, the null hypothesis of no causality from FCI

Table 5 NP unit root test

Variable		Test statistics and break dates	
		M1	M2
GDP^{gap}	Level	−2.281 (2008:1, 2008:3)	−2.989 (2008:1, 2009:1)
	First difference	−5.032**	−5.430**
FCI	Level	−3.763 (2008:3, 2011:2)	−4.428 (2008:3, 2011:2)
	First difference	−5.719*	−6.139*
Critical values	1 %	−5.259	−5.949
	5 %	−4.514	−5.181
	10 %	−4.143	−4.789

Notes: Break dates are showed in parentheses. Critical values are received from Narayan and Popp (2010). * and ** indicate the rejection of the null hypothesis at 1 and 5 % levels of significance, respectively

Table 6 Maki (2012) cointegration test

Model	Test statistic	Critical values			Break dates
		1 %	5 %	10 %	
0	−5.573*	−5.563	−5.083	−4.784	2006:4, 2007:4, 2010:1
1	−5.488**	−5.833	−5.373	−5.106	2007:3, 2008:2, 2013:3
2	−5.708**	−6.251	−5.703	−5.402	2010:2, 2011:4, 2012:2
3	−5.720	−7.082	−6.524	−6.267	2006:2, 2010:2, 2012:2

Notes: The number of the breaks is selected as 3 because of the sample size. Critical values are acquired from Maki (2012). * and ** indicate the rejection of the null hypothesis at 1 and 5 % levels of significance, respectively

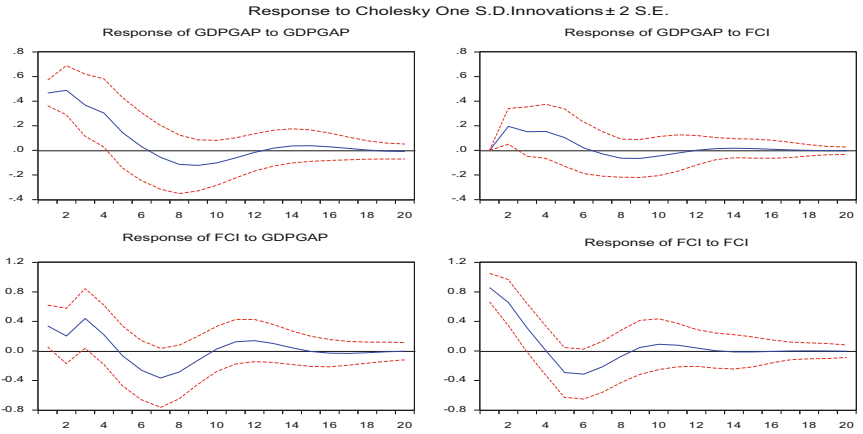

Fig. 2 Impulse-response analysis. Notes: AIC indicates the optimal lag length is 3. There are not serial correlation and heteroscedasticity problems for this lag length

Table 7 Hacker and Hatemi-J (2012) bootstrap Granger causality test

Null hypothesis	Test statistic	Critical values		
		1 %	5 %	10 %
FCI does not Granger cause GDP^{gap}	6.828*	7.759	4.165	2.869
GDP^{gap} does not Granger cause FCI	0.093	7.572	4.224	2.865

Notes: The HJC is utilized to determine the optimal lag length. Critical values are acquired through 10000 bootstrap replications. * indicates 5 % statistical significance

to GDP^{gap} is rejected at 5 % significance level while the null hypothesis of no causality from GDP^{gap} to FCI can not be rejected. Hence the results indicate that there is unidirectional causality running from FCI to GDP^{gap}.

The findings obtained from VAR analysis and the Hacker and Hatemi-J (2012) causality test indicate that the FCI is a leading indicator for business cycles in Turkey since it has predictive power in forecasting GDP gap. These findings correspond to those of previously made studies that are presented in Table 1.

6 Conclusion

The global financial crisis in 2007–2008 proved that the developments in financial markets could have great negative effects on economies and revealed the importance of following and evaluating financial conditions. These developments have affected the financial economics literature and several studies developing an FCI have been performed principally since the global financial crisis. An FCI is an instrument that is developed using some financial variables in order to predict future output and/or inflation. Some studies in the literature examine the relationship between FCI and output gap/growth to determine whether the FCI is a leading indicator of business cycles.

This study investigates the relationship between output gap and FCI by exploiting quarterly data from 2005:1 to 2015:3. In other words, the study examines whether the FCI can be a leading indicator of business cycles in Turkey. The study, first, presents an FCI that has been recently developed for Turkey and reveals that the FCI can markedly exhibit the developments in the Turkish economy and in the world. The study then employs unit root tests and cointegration tests. The study lastly performs VAR analysis and the bootstrap Granger causality test to examine the relationship between FCI and output gap in Turkey. Both VAR analysis and the bootstrap Granger causality test indicate that the FCI has predictive power in forecasting future output gap in Turkey. Based on these findings, this study yields that the FCI in this study can be used as a leading indicator of business cycles in Turkey.

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Feasibility of Financial Inclusion Mission in India Under Reform and Global Financial Crisis

Ramesh Chandra Das and Kamal Ray

Abstract For last one and half of a decade the Indian financial system has been trying to boost up the link between the real and financial sectors by means of the financial inclusion mission. The mission, among others, needs a rising branch expansion supported by rising number of employees in all categories. The present chapter, thus, seeks to test three hypotheses. Hypothesis I seeks to measure the concentration ratios of different classes of employees over the period, 1985–2012 which covers pre and post financial sector reforms in India and pre and post phases of global financial crisis. Hypothesis II seeks to test whether there are any significant changes in the average values of number of employees in all categories and Hypothesis III seeks to link the financial inclusion by means of branch expansion with different categories of bank employees across the branches and population. It is observed that concentration of bank employees in India has gone down after the reform process started affecting the clerical and subordinates staffs. With respect to the second hypothesis, it is inferred that the reform programme, in over all sense, has not benefitted to the bank employees; rather produced a disparity among Clerical and Subordinate Classes with the Officers' Class. Again financial crisis has badly affected the non officer classes with similar kind of good effect upon the Officers' Class. Lastly, third hypothesis concludes that branch growth is cointegrated in pair way to three series which are growth of officer per branch, growth of subordinates per branch and growth of population per officer. Hence, financial inclusion mission cannot be made feasible mainly by a corresponding growth in the officer class among the bank employees.

1 Introduction

Indian financial system, particularly the banking system, controlled and managed by the central bank of the country, Reserve Bank of India (RBI), has got its first major break in the year 1969 when the majority of entire commercial banks were nationalized. The main objective was to channelize more banking funds to the

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priority sectors' lending at concessional interest rates and to use the huge banking funds for meeting central government's deficits at the interest rates below the market rates. To lubricate the process the government had raised different variable reserve ratios like CRR and SLR that would compel the banks to secure a certain per cent of their demand and time deposits with the central bank of the country. Another major break, can be termed as structural break, appeared in 1991–1992 when the then central government went for liberalizing Indian economy in all fronts including the banking and financial sectors the objective behind it was to survive the economy from huge balance of payments deficits, high unemployment and inflation rates, almost negligible foreign exchange reserves, among others, in one hand and to pacify the global leading countries and policy making bodies so that India could be treated as one of the strong business avenues like China and South East Asian nations.

The banking sector reform was aimed at reducing the magnitudes of operating losses generated from concessional interest structures and releasing funds from CRR and SLR Clauses available for more bank credit to the real sectors so that credit-deposit ratio rises and economic growth rises as a resultant. In another side of the coin, the banking system was shifting towards capital using and labour saving service technology to reduce operating expenses and to provide customers the flavor of e-banking system in the new millennium. Although, the reform programme has led to more branch banking system, a lot of the country's population is still out of the banking network. The Indian governments in the last decade were trying to develop a inclusive financial system through expansion of branches so that each household should have at least one bank account the ultimate outcome of which will lead the savings and investment ratios to rise that will again lead to GDP rise through a proper link between the real and financial sectors. The NDA Government led by Mr. Narendra Modi as Prime Minister of the country is giving further incentives to the potential account holders in the Jan Dhan Yojna by means of firsthand account creation with a large sum of insurance coverage. To activate such an inclusive policy the bank system should have a feasible man power (employees/staff) in all categories and with a valuable productivity.

1.1 Financial Inclusion in India

Financial inclusion or inclusive financing is the delivery of financial services at affordable costs to sections of disadvantaged and low-income segments of society, in contrast to financial exclusion where those services are not available or affordable. An estimated 2.5 billion working-age adults globally have no access to the types of formal financial services delivered by regulated financial institutions. For example in Sub-Saharan Africa only 24 % of adults have a bank account even though Africa's formal financial sector has grown in recent years. It is argued that as banking services are in the nature of public good; the availability of banking and payment services to the entire population without discrimination is the prime

objective of financial inclusion public policy. The term "financial inclusion" has gained importance since the early 2000s, a result of findings about financial exclusion and its direct correlation to poverty. The United Nations defines the goals of financial inclusion as follows:

- access at a reasonable cost for all households to a full range of financial services, including savings or deposit services, payment and transfer services, credit and insurance;
- sound and safe institutions governed by clear regulation and industry performance standards;
- financial and institutional sustainability, to ensure continuity and certainty of investment; and
- competition to ensure choice and affordability for clients.

Former United Nations Secretary-General Kofi Annan, on 29 December 2003, said, "The stark reality is that most poor people in the world still lack access to sustainable financial services, whether it is savings, credit or insurance. The great challenge before us is to address the constraints that exclude people from full participation in the financial sector. Together, we can and must build inclusive financial sectors that help people improve their lives." More recently, Alliance for Financial Inclusion (AFI) Executive Director Alfred Hannig highlighted on 24 April 2013 progress in financial inclusion during the IMF-World Bank 2013 Spring Meetings: "Financial inclusion is no longer a fringe subject". It is now recognized as an important part of the mainstream thinking on economic development based on country leadership.

The Reserve Bank of India set up the Khan Commission in 2004 to look into financial inclusion and the recommendations of the commission were incorporated into the mid-term review of the policy (2005–2006). In the report RBI exhorted the banks with a view to achieving greater financial inclusion through rapid branch expansion, especially to the rural belts, to make available a basic "no-frills" banking account with nil or very low minimum balance as well as charges that make such accounts accessible to vast sections of the population also with the provisions of small overdrafts in such accounts.

2 Review of Literature

While working on the present chapter we have followed the research works carried out in this field as far as possible to find an additional avenue of research. We cite some of the relevant literatures in this chapter. The paper by Singh et al. (2014), based on primary survey, aims to focus on utilizing the existing resources such as Mobile phones, Banking Technologies, India Post Office, Fair Price Shops and Business Correspondents (BCs) for better financial inclusion for the interest of the rural population as well as the formal sector. With nearly half the households remain unbanked, and nearly 90 % villages not having bank branches, the paper

suggests that preference should be given for a physical branch with a need to have granular schemes, preferably different schemes for rural and urban areas. Also it suggests that methods of financial literacy need to be changed from distributing printed literature to audio and visual media such as radio and TV programs, especially in local languages and the campaign should be spread to the schools also. Chauhan (2013), in her paper, attempts to study the overview of financial inclusion in India. A comparison has been made between India and some other selected countries regarding number of branches, ATMs, bank credit etc to identify India's position regarding financial inclusion as compared to other selected countries. The paper suggests that India is at moderate level regarding financial inclusion as compared to other countries regarding number of branches, ATMs, bank credit and bank deposits. To cope up with the challenges to spread financial inclusion, the paper proposes the necessity of viable and sustainable business models with focus on accessible and affordable products and processes, synergistic partnerships with technology service providers for efficient handling of low value that ensure financial inclusion. The paper by Sharma and Kukreja (2013) highlights the basic features of financial inclusion, and its need for social and economic development of the society of the developing countries. Using secondary data of RBI and NABARD it concludes that undoubtedly financial inclusion is playing a catalytic role for the economic and social development of society but still there is a long road ahead to achieve the desired outcomes. The study by Kumar is an attempt to evaluate the progress of financial inclusion initiatives undertaken in terms of branch and credit penetration, diffusion of financial services with encouraging people to create demand, and financial literacy programs. The study depicted that in spite of several measures taken to develop financial inclusion, a whopping 40 % of India's population is still devoid of even the plain financial services. Financial inclusion is, therefore, more than just an economic imperative for India.

There is a plethora of literatures on the issue of financial inclusion in different countries in general and India in particular. The World Bank Group led by Demirguc-Kunt et al. (2014) generated The Global Financial Inclusion (Global Findex) database, which provides comparable indicators showing how people around the world save, borrow, make payments, and manage their risks. The 2014 edition of the database reveals that 62 % of adults worldwide have an account at a bank or another type of financial institution or with a mobile money provider. Between 2011 and 2014, 700 million adults became account holders while the number of those without an account—the unbanked—dropped by 20 % to 2 billion. In addition to that the report divulges a growth in account penetration of 13 percentage points in developing economies and innovations in technology in Sub-Saharan Africa. Along with these gains, the data also show that big opportunities remain to increase financial inclusion, especially among women and poor people. Cámara and Tuesta (2014) in their working paper tried to built an index of financial inclusion by means of incorporating Access, Barrier and Usage of financial systems and concluded that access is one of the most important financial variable to have an inclusive financial system and ranked South Korea as the top country in the list of 82 countries in the head of Access, Australia in the head of

Barrier and New Zealand in the head of Usage followed by Spain, Finland and Sweden in the respective heads. India ranks 56, 49 and 60 in the respective heads showing relatively lesser magnitudes of financial inclusion in the country. Sarma (2012), on the other hand, developed a general multidimensional framework of indexing financial inclusion by means of a set of indicators. The proposed IFI captures information on various dimensions of financial inclusion in a single number lying between 0 and 1, where 0 denotes complete financial exclusion and 1indicates complete financial inclusion in an economy. The proposed index is easy to compute and is comparable across countries and over time. The IFI values computed for various countries for the years 2004–2010 indicate that countries around the world are at various levels of financial inclusion over the years. UK stands first with the index value at 0.95 whereas USA is with 0.366 which is just above the Indian value of 0.306.

The work of Dangi and Kumar (2013) focuses on the RBI and Government of India initiatives and policy measures, current status and future prospects of financial inclusion in India on the basis of facts and data provided by various secondary sources. It concludes that financial inclusion shows positive and valuable changes because of change in strength and banking technology. It also suggests training of the banks' forefront staff and managers as well as business correspondents on the human side of banking to facilitate further the mission. In another study, Pal and Pal (2012) analyze income related inequality in financial inclusion in India using a representative household level survey data, linked to State-level factors. It reveals among others that the extent of financial exclusion is quite severe among households across all income groups which disprove the performance of the mission. The study of Kumar and Mishra (2011) attempts to measure financial inclusion in Indian states and union territories by means of supply of banking outreach indicators such as number of deposit and credit accounts, number of bank branches, and demand for indicators of household level access such as the proportion of households having saving, credit facilities from formal as also informal sources financial services by forming separate composite Financial Inclusion Indices for the year 2002–2003. It observes that in both the cases, there is a wide variation across states, for rural and urban regions. Even within a state, differences are clearly evident between rural and urban areas for the different indicators considered. In a similar type of study, the working paper by Kumar et al. (2012) addresses 'Technology' as an media for financial inclusion; it has the power to reduce cost substantially and can reach out to the unbanked in the most effective manner. The study observes that MFIs are so widely spread in India that they seem the best connected to the clients for understanding their needs both in terms of financial services as well as non-financial services. In another study with different flavor Kumar and Venkatesha (2014) cited the newly introduced Pradhan Mantri Jan-Dhan Yojana in India as an effective policy of lubricating the financial inclusion mission of the country. The study also points out that the policy not only magnifies the rolling of the financial inclusion mission but also can work as a check valve of corruption arises out of this asset generating process.

Besides the above literatures, there is another series of studies related to credit delivery, the ratio of nonperforming assets (NPA) to deposit of the banks, among others, may be treated as relevant to the present research work as the efficiency of the working of these variables will definitely influence the overall financial inclusion mission viable and that will ultimately lead to improve the level of the country's national output. Demetriades and Hussein (1996) established that there was causality between financial development and economic growth in different economies. In India, banking and financial sector reforms were done on the expectation of allocation of more commercial banks' credit in particular to the existing real sectors vis-a-vis reducing operating costs of banks and statutory reserve and cash reserve ratios as a move towards inclusiveness of the financial system to the people of the country. Empirical researches in this area have shown that there are phenomenal growth of levels of credits and deposits of the commercial banks of the major states in India after the reform process initiated compared to the pre-reform phase but the level of credit deposit ratio have unquestionably gone down in the first decade of the reform era and then tend to rise (Das and Maiti 1998; Misra 2003; Das and Ray 2009; Das 2011). In a study specific to Indian states Das and Dinda (2014) further tried to examine the direction of causalities between credit-deposit ratio and credit share for the major 16 states of India for the period 1972–2008. Using the time series econometrics technique, this study found four states where the causality works for the entire period and less than half of the state where causality works in either pre-reform or post-reform periods. Das et al. (2014), in another study, has examined the profile of all Scheduled Commercial Banks in all ranges of CRAR over time in aggregate and bank group specific and to measure degree of correlation of NPA-Deposit ratio with CRAR trends and Credit-Deposit Ratio in all ranges of CRAR and their significance levels for the time period 1995–1996 to 2009–2010. It observes that there has been variation across banks in following the guidelines of the reform committee. SBI group and foreign banks have been performing well in this respect. There has been rising trend of the proportions of banks in the above 10 % range of CRAR. The essence of the study also suggests that the Indian financial system is going towards becoming healthy which again may be helping in the facilitation of the process of financial inclusion.

2.1 Deficiency in the Existing Literature and Relevance of the Present Study

To restore fluency in the financial inclusion mission as supported by recent policies of the Government of India, it is not just the way to reach the masses of the country by means of branch expansion and opening of bank accounts. The natural question now arises, who will manage this expanded branches and new bank accounts. The existing literatures so far surveyed do not highlight in this regard the issue of employees' structures/profiles of different commercial banks in India. The present study has attempted to fill up this gap in the accessible literature.

3 Objectives of the Study

The present paper seeks to concentrate upon the profiles of different categories of bank employees in Indian Scheduled Commercial Banks during 1985–2012 including the phase of financial sector's reform and to test three hypotheses in this regard. Hypothesis I seeks to measure the concentration ratios of different classes of employees over the period of study, Hypothesis II seeks to test whether there are any significant changes in the mean values of number of employees in all categories in post reform period vis-à-vis the pre-reform period and Hypothesis III seeks to link the financial inclusion by means of branch expansion with different categories of bank employees across the branches and population.

4 Data and Methodology

We use only the aggregated data for India out of the Scheduled Commercial Banks (SCBs) published in Basic Statistical Returns of RBI for the period 1985–2012. The population figures have been borrowed from the Institute of Population Policy in India. There are three categories of employees working in the Indian banking system which are namely, The Officers, The Clerks and The Subordinates. Different ratios are derived in respect of branch expansion, shares of different classes of employees, the employees' concentration over the years, population per branch and different employees per branch, etc. Primarily the graphical technique has been followed to present the over view of the data. Different statistical tools like mean have been applied for quantification of basic statistical measures. The measurement of concentration of employees has been done by the *Herfindahl Hirschman Index (HHI)* and is compared over the years. HHI is popularly applied in industrial organization for measuring firms' concentration in the industry. The mathematical expression of the index is presented as the sum of squares of the shares of all the categories of employees in India, i.e.

$$HHI = \Sigma s_i^2 = s_1^2 + s_2^2 + s_3^2 for\ i = 1, 2, 3$$

Statistically the mean differences have been tested in several heads by means of the following formula:

$$t = (x_2 - x_1)/\sqrt{\left(s_1^2/n_1 + s_2^2/n_2\right)}$$

with d.f. $n_1 + n_2 - 2$ under the Null Hypothesis: H_0: $\mu_1 = \mu_2$ against the Alternative Hypothesis: H_1: $\mu_1 \# \mu_2$, where x_2 and x_1 respectively stand for the mean values of the concerned variable in post reform period (1993–2012) and pre reform period (1985–1992), s_1^2 and s_2^2 represent the respective sample variances of the concerned variables in pre reform period and post reform period. The viability

of the financial inclusion mission has been tested by Johansen Co integration test of branch growth with the other concerned variables. Before to go for the co integration test it is required that all the series are first difference stationary or they are integrated of order 1 (i.e. I(1)). The test of stationary is done in line with the Augmented Dickey-Fuller Test (1979) by estimating the coefficients of the following equations:

$$\Delta y_t = \alpha + \beta y_{t-1} + \sum_{j=1}^{p} \gamma j \Delta y_{t-j} + u_t \quad (1)$$

for the without time trend case and

$$\Delta y_t = \alpha + \delta t + \beta y_{t-1} + \sum_{j=1}^{p} \gamma j \Delta y_{t-j} + u_t \quad (2)$$

for the with time trend case, where 'y' is the concerned variable.

5 Results and Discussions

Before to quantify the concerned variables and test the framed hypotheses we need to first take a look at a glance the trends of series of all the concerned variables. It is to recall that the primary variable we have considered as the representative of financial inclusion mission is the branch expansion and its associated growth rates over time. Besides, the other concerned variables are different categories of employees of the entire banking industry of India, namely, the Officers, the Clerks and the Subordinates. The feasibility of the financial inclusion mission has been addressed by means of the trends of Branch Growth (BRGR), Growth of Officers per Branch (GRTOFFBR), Growth of Clerks per Branch (GRTCLBR), Growth of Subordinates per Branch (GRTSUBBR), Growth of Population per Officer (GRTPOPOFF), Growth of Population per Clerk (GRTPOPCL) and Growth of Population per Subordinate (GRTPOPSUB).

5.1 Testing Hypothesis I

Hypothesis I of the present study seeks to measure the concentration of different classes of bank employees in India and it is tested by the difference in the mean values of the computed HHI for these two different time periods. Figures 1, 2, and 3 present the trends of the concerned variables and measures covered under Hypothesis I.

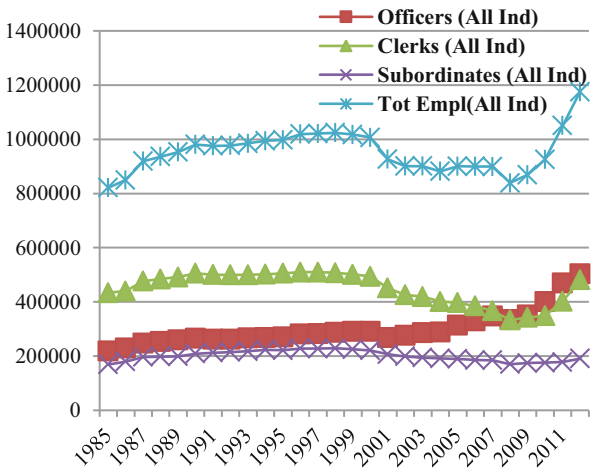

Fig. 1 Trends of different categories of employees

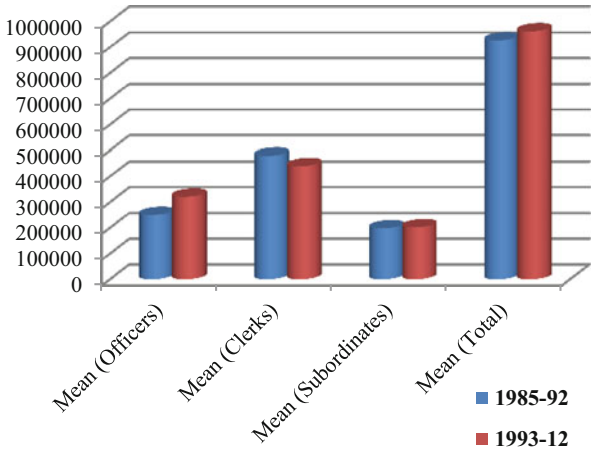

Fig. 2 Pre and post reforms mean values of employees in Indian banks

The respective figures present the trends of all three categories of bank employees in total and individual numbers and shares of each of them over time for the period of study. It is observed from Fig. 1 that there are upward trends of number of total employees and all three classes of employees up to the year 1998 and then take a steady decline except the employees in the Officer class. The Officer class maintained a steady rising trend over the years. The series for the Officer class takes a dip during 2007–2008 which may be due to the impact of the global financial crisis. The other series also follow higher magnitudes of trailing in their decreasing trends during the same crisis phase. The falling trend of the series except the Officer class after 1998 may be due to the East Asian Crisis.

Figure 2, on the other hand, depicts that the relative share or position of the Clerical and Subordinates Categories are declining over time but that of the Officer Category is rising. The effect of the banking sector reforms has worsened the

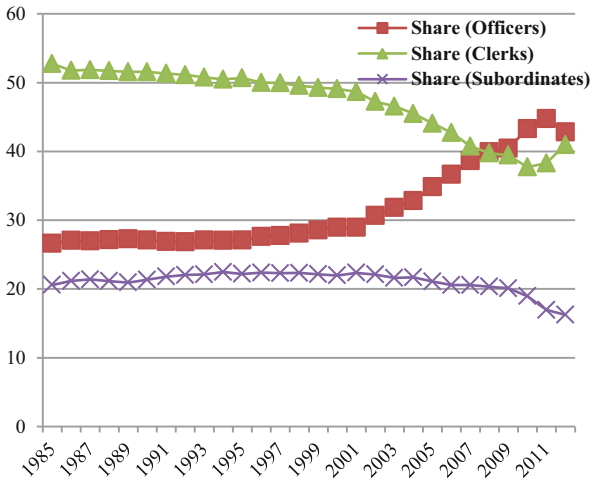

Fig. 3 Trends of shares of bank employees in India

Table 1 Average values of the variables in different phases

Determinants	Mean (HHI)	Mean (Officers)	Mean (Clerks)	Mean (Subordinates)	Mean (Total)
Pre reform(1985–1992)	3856.7	250132	479035	197562	926729
Post reform(1993–1912)	3695.3	320723	439330	201762	961815
Pre crisis (1993–2006)	3711	286138	465018	211461	962617
Post crisis (2007–2012)	3659	401421	379391	179129	959942
t (pre & post reform)	**−7.82**	**7.38**	**−2.29**	0.57	1.25
t (pre & post crisis)	−1.29	**3.95**	**−3.26**	**−6.10**	−0.049

Note: Bold figures indicate significance at 5 % levels

Clerical and Subordinates Class and the magnitudes of their deteriorations have been fuelled during the phase of EURO Zone crisis and global financial crisis. The banking sector reform process helped the Officer Class to improve their position in terms of their total number and relative shares in the total strength of employees. This particular situation impulses us to quantify the employees concentration of the Indian commercial banks which is the part of our first hypothesis.

Table 1 depicts the computed results of average values of all classes of bank employees in two different phases including the average values of HHI. The second column of Table 1 shows that the mean value of HHI is falling during the post reform phase compared to that of the pre reform phase. This is also clear from the year wise data of HHI as presented in Fig. 4.

The sixth row of the table gives the computed value of student's t statistics which is observed to be significant at 5 % level of significance. The negative sign also implies that the post reform value of the HHI exceeds the value of HHI of the pre reform period in a significant manner. This helps us to infer that the concentration of bank employees in India has gone down after the reform process started. Falling

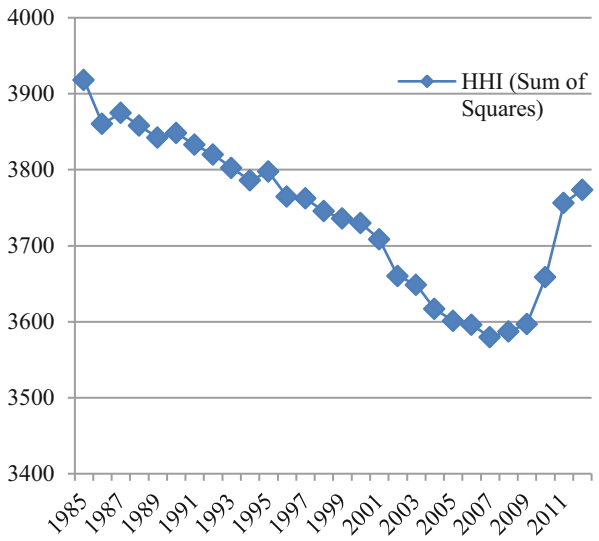

Fig. 4 HHI of employees distribution

concentration is a good sign if we try to relate this to the firm's concentration in the industry in the theories of industrial organizations. But, in our present study, it is the arithmetic that gives us the result by balancing the employees' patterns over years. The importances of the clerical and subordinate groups are suffering a lot and are dominated by the rising importance of the officer group. Hence, the falling trend of HHI looks good in overall banking scenario but is not a really good sign to those who are dominated and controlled by the officer group. If we break the post reform series (1993–2012) into pre financial crisis (1993–2006) and post financial crisis (2007–2012) then it is evident that the average value of HHI of the post crisis period is outweighed by the average value of HHI of the pre crisis period. Table 1 shows that there is no significant fall in the value of the HHI during the post crisis era. That means, so far as the trend of HHI is concerned, the global financial crisis puts destabilizing effect upon the employees' pattern in Indian banking industry, but in terms of mean values of the HHI, there is no such impact of the global financial crisis upon the profiles of Indian bank employees in overall sense.

5.2 Testing Hypothesis II

As addressed earlier, Hypothesis II tries to test whether there have been significant changes in the average values of the number of all categories of employees in the post reform period vis-à-vis the pre-reform one. Figure 2 depicts the average values of all categories of bank employees for both the pre and post reform periods. It is observed that there is a clear increase in the mean value of Officers Class and a clear decrease in the Clerical Class during the post reform phase compared to that of the

pre reform phase. In respect to the aggregate number, there is a mild increase. The same is also observed for the Subordinate Class. Table 1 depicts the quantitative results of the average values of all four categories, the statistical significance test results of which are given in the sixth row of the table. The results show that there are significant rise in the Officers' Category and fall in the Clerical Category with no significant rise in the Subordinates' Category and total number of employees. This infers that the reform programme, in over all sense, has not benefitted to the bank employees; rather produced a disparity among Clerical and Subordinate Classes with the Officers' Class. The results have serious policy implications so far as the financial inclusion mission is concerned in Indian soil.

Segregating the entire reform phase into pre crisis and post crisis phases, it is again observed from the same table (seventh row) that the financial crisis has badly affected the Clerical as well as the Subordinates Class with similar kind of good effect upon the Officers' Class. Hence, we conclude that the severity of the non officers' category in the Indian banking system was magnified by the global financial crisis which destitute this class from their opportunities.

5.3 Testing Hypothesis III

Let us discuss with the issues related to our third hypothesis. As stated earlier, it requires testing whether the series of growth of branch (BRGR) is cointegrated to different indicators which are, Growth of Officers per Branch (GRTOFFBR), Growth of Clerks per Branch (GRTCLBR), Growth of Subordinates per Branch (GRTSUBBR), Growth of Population per Officer (GRTPOPOFF), Growth of Population per Clerk (GRTPOPCL) and Growth of Population per Subordinate (GRTPOPSU). BRGR is assumed to be influenced by all the considered indicators, besides other which exist in the literatures (Demirguc-Kunt et al. 2014; Cámara and Tuesta 2014; Sarma 2012). It is our objective now to go for testing of cointegration in a pair wise manner after testing the stationarity of all the series. Figures 5 and 6 provide us a look at a glance about the series of the ratios. Total employees per branch, total clerks per branch and total subordinates per branch are gradually falling and total officer per branch is rising over time (Fig. 5). On the other hand, there are rising trends of population per officer and subordinates and falling trend of population per branch and population per clerk (Fig. 6). On the other hand, population per branch is falling (that is branch growth rate is more than population growth rate) that means high rate of branch expansion than population of the country should at least in any way ensure the possibility of greater magnitudes of financial inclusion. But the fallacy or the dilemma is that such a high rate of branch expansion should be accompanied by the similar rates of growths of different categories of employees per branch to have feasibility in financial inclusion mission. Only opening bank offices at different corners of the country will not solve the problem of banking networks unless there is sufficient rise in all categories of employees of different banks. Hence, the success of the greater financial inclusion

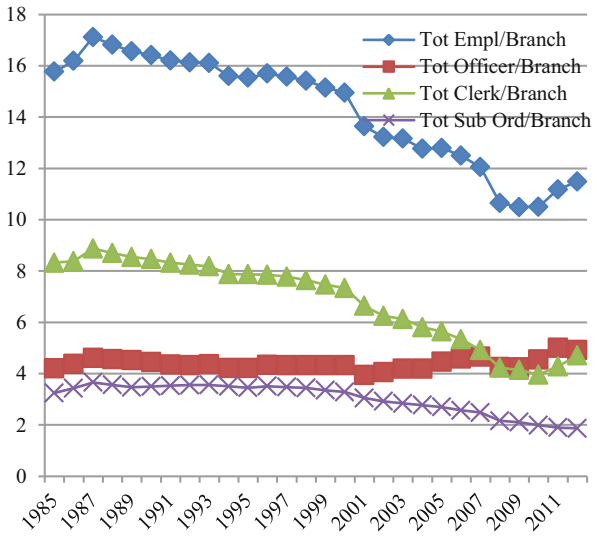

Fig. 5 Different categories of employees per branch

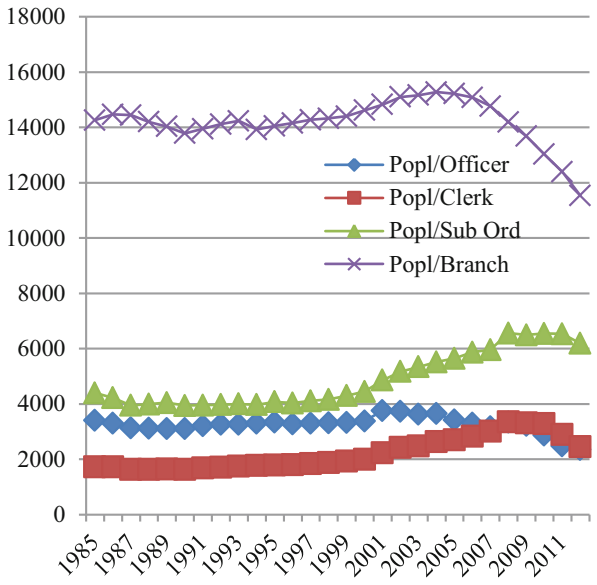

Fig. 6 Population per employee in different categories

mission is under a hard scanner and needs composite policy framing by the government and the central banks.

Figures 7 and 8; on the other hand, present the growth rates of all the above indicators over time. We observe that the growth rate of branch and growth rates of officers per branch and population per officer are rising over time. It indicates that the rising magnitudes of financial inclusion in the name of branch expansion are not

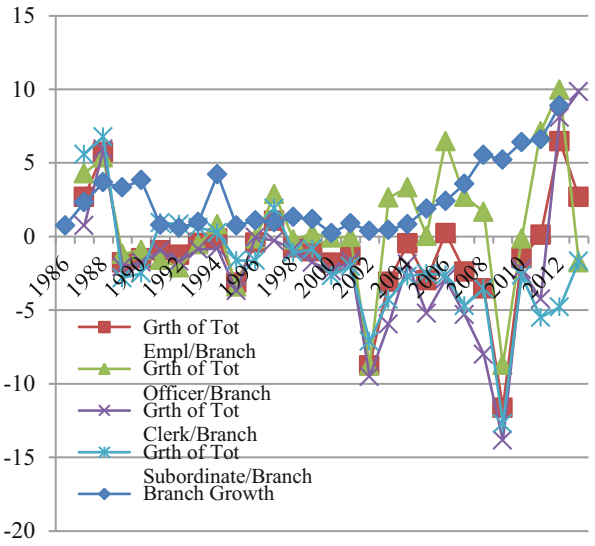

Fig. 7 Growth trends of employees per branch

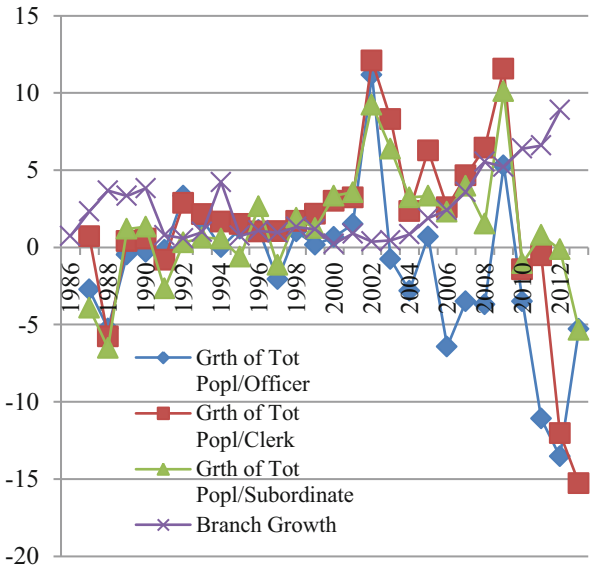

Fig. 8 Growth trends of population per employee

synchronized to that of population and different categories of bank employees. The cointegration test result may offer us a concrete shape of this argument. We apply here the Johansen Cointegration Test for all the pairs with BRGR as the dependent variable. Table 2 depicts the results of unit root and cointegration tests.

It is observed from the first part of the table that the series of BRGR, GRTCLBR, GRTPOPOFF, GRTPOPCL and GRTPOPSUB suffer from the unit root problems

Table 2 Results of unit root and Johansen cointegration tests

Unit root results					Cointegration results			
Variable	ADF (Level)	Remarks	ADF (1st Diff)	Remarks	Co-variables	LR (lag)	Prob.	Remarks
BRGR	0.23, $p > 0.10$	NS	−3.41, $p = 0.05$	S	BRGR and GRTEMPBR	13.25 (2,2)	>0.05	No
GRTEMPBR	−3.27, $p = 0.05$	S	−4.00, $p = 0.01$	S	BRGR and GRTOFFBR	19.54 (1,1)	0.05	Yes
GRTOFFBR	−4.31, $p = 0.01$	S	−5.03, $p = 0.01$	S	BRGR and GRTCLBR	13.05	>0.05	No
GRTCLBR	−1.79, $p > 0.10$	NS	−2.65, $p = 0.09$	S	BRGR and GRTSUBBR	17.06 (1,1)	0.05	Yes
GRTSUBBR	−3.46, $p = 0.05$	S	−5.33, $p = 0.01$	S	BRGR and GRTPOPOFF	18.77 (1,1)	0.05	Yes
GRTPOPOFF	−2.59, $p > 0.10$	NS	−4.93, $p = 0.01$	S	BRGR and GRTPOPCL	12.11 (1,1)	>0.05	No
GRTPOPCL	−0.74, $p > 0.10$	NS	−2.64, $p = 0.10$	S	BRGR and GRTPOPSUB	15.18 (1,1)	>0.05	No
GRTPOPSUB	−2.61, $p > 0.10$	NS	−4.81, $p = 0.01$	S				

Notes: All lags in unit root tests are 1

while GRTEMPBR, GRTOFFBR and GRTSUBBR are free from such problems. Converting all the series into their first differences we get the results that all of them are stationary. That means the 'change of growth' series of all the indicators are stationary or are integrated of order one (I(1)). From cointegration theory we know that if two or more series are integrated of order one then their linear combination or the error term is stationary and then we can move for testing of their cointegrating relation that exists for the long run.

From the second part of Table 2 it is observed that branch growth (BRGR) is cointegrated in pair way to three series which are GRTOFFBR, GRTSUBBR and GRTPOPOFF, but not cointegrated to GRTEMPBR, GRTCLBR, GRTPOPCL and GRTPOPSUB. These results assert that growth of branch expansion is chronologically associated to the growth of officer per branch, growth of subordinates per branch and growth of population per officer. No long run equilibrium relation between branch growth and clerical staff per branch, population per clerk and population per subordinate exist. If cointegration would appear in all three cases like that of the officer class then the financial inclusion mission measured by the growth of branch expansion would be viable in the Indian economic and financial systems. The financial inclusion mission cannot be made feasible only by a corresponding growth in the officer class among the bank employees. This is a serious concern to all the policy makers in India who are thinking of the inclusive financial system by means of branch expansion, without looking at the profiles of the bank employees.

6 Conclusion

The study so far we have made is now in a position to conclude. Regarding our first hypothesis we infer that the concentration of bank employees in India has gone down after the initiation of the reform process. The falling trend of HHI looks good in overall banking scenario but is not a really good sign to those who are dominated and controlled by the officer group. It is inferred from second hypothesis that the reform programme, in over all sense, has not benefitted to the bank employees; rather produced a disparity among Clerical and Subordinate Classes with the Officers' Class. Segregating the entire reform phase into pre crisis and post crisis phases, it is again observed from the same table (seventh row) that the financial crisis has badly affected the Clerical as well as the Subordinates Classes with similar kind of good effect upon the Officers' Class. Hence, we conclude that the severity of the non officers' category in the India banking system was magnified by the global financial crisis which destitute this class from their potentialities. Lastly with regard to the third hypothesis it is concluded that branch growth (BRGR) is cointegrated in pair way to three series which are GRTOFFBR, GRTSUBBR and GRTPOPOFF, but not cointegrated to GRTEMPBR, GRTCLBR, GRTPOPCL and GRTPOPSUB. The financial inclusion mission cannot be made feasible only by a corresponding growth in the officer class among the bank employees. The derived

results bear a serious policy concern in India framed by those who are thinking of the inclusive financial system by means of branch expansion, without looking at the profiles of the bank employees.

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Renewable Energy Financing with a Sustainable Financial System Following the 2008 Financial Crisis in Developing Countries

Gülcan Çağıl and Sibel Yilmaz Turkmen

Abstract Unusual financial market conditions have affected the flow of capital and debt investment into renewable energy projects all over the world as a result of the 2008 financial crisis. The crisis collapsed trade and financial systems, decreased the movement of capital flows, and caused lower growth and inflation as well as tighter credit, lower profitability, and declining demand. The crisis spilled over from advanced economies to emerging and developing countries and the financial system in the world has deteriorated after the crisis.

Financial sector development and sustainability have an important role at the renewable energy financing. Although a well-developed financial sector was said to support economic growth and stability, the crisis reminded that advanced financial systems could pose a threat to all the economy. Policy makers and international regulators have worked to assure financial sustainability, prevent global crises and encourage fair global competition in the markets during and after the crisis.

The main purpose of this chapter is to define the meaning of the sustainable financial system and to analyse how the renewable energy investments were affected since the beginning of the crisis in developing countries. In the light of the literature survey, this chapter discusses renewable energy financing with a sustainable financial system following the crisis in developing countries.

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1 Introduction

Renewable energy financing is one of the most important challenges because of its importance for the future of the world. Although in the long term, renewable energy sources will be less expensive, in the short term people need to figure out how to finance renewable energy.

Unusual financial market conditions have affected the flow of capital and debt investment into renewable energy projects all over the world as a result of the 2008 financial crisis. The crisis collapsed trade and financial systems, decreased the movement of capital flows, and caused lower growth and inflation as well as tighter credit, lower profitability, and declining demand. The crisis spilled over from advanced economies to emerging and developing countries and the financial system in the world has deteriorated after the crisis.

Financial sector development have an important role at the renewable energy financing. Renewable energy markets have some problems such as financing, legislature and maturity. Although a well-developed financial sector was said to support economic growth and stability, the crisis reminded that advanced financial systems could pose a threat to all the economy. Policy makers and international regulators have worked to assure financial sustainability, prevent global crises and encourage fair global competition in the markets.

Although energy markets were not the main reason for the crisis, most people believed that energy market changes such as the high oil prices played a significant role to create the crisis. Increased oil prices damaged current accounts, inflation rates and economic growth in the world. A consistent policy is important to support renewable energy investments. The renewable energy sector continued to grow against the increase of global energy consumption and reduction in oil prices in developed and developing countries during the last few years.

The outline of the section is as follows. Following the introduction, the literature review is given in the second section. The third section explains the sustainable financial system and impacts of the 2008 financial crisis in developing countries. The fourth section searches renewable energy financing in developing countries after the crisis. Last section presents conclusion.

2 Review of the Literature

In the past three decades, many scholars expressed concern about the specific impact of the financial sector and the crises in the renewable energy sector development in developing countries. A literature about financial sustainability following the 2008 financial crisis and the renewable energy sector in developing countries can be summarized as follows:

Comert and Uğurlu (2015) focused on 15 developing countries, including Turkey, that were affected most severely by the crisis. In the study, the trade

channel was the most important mechanism in the transmission of the crisis from advanced economies to developing countries. Although nearly all these countries had important growth performances in the 2002–2008 period, they were weakened, such as the domination of foreign exchange debt and the increase of current account deficits. Griffith and Ocampo (2009) examined the transmission mechanisms of the financial crisis from developed countries to developing countries. In the paper, the authors identified three mechanisms which play a key role in spreading the consequences of the financial crisis to the developing world: remittances, capital flows and trade. In addition, it was given broad policy recommendations at the national, global and regional level with the paper.

Berkmen et al. (2009) studied about the differences in the crisis impact across developing countries and emerging markets using cross-country regressions to explain the factors driving growth forecast revisions after the eruption of the global crisis. One of the results of this paper shows that trade linkages played a role in the transmission of the crisis for developing countries. In addition, Meyn and Kennan (2009) found that the global financial crisis affects developing countries' trade structure and markets through price and volume effects. Fritz-Morgenthal et al. (2009) studied the impact of the 2008 crisis on the renewable energy financing. The survey showed that financing for renewable energy projects to the developing countries will decrease because of reduced liquidity and investment flow. It is expected that in spite of financing of renewable energy increases, the market volume of private equity, venture capital, project finance and capital markets will decrease in the future.

Painuly and Wohlgemuth (2006) studied about the problems related to financing of renewable energy technologies in developing countries and transition countries. The study shows that the implementation process of renewable energy projects is particularly encountered some private financial support issues. Head (2010) examined ten hydropower projects with private participation in five developing countries. The study stated that there were profound demand gaps between financial support and renewable energy projects in the five developing countries include Turkey. Babbar and Schuster (1998) reached the result that achieving a significant growth in private power finance in developing countries requires some contributions from private power stakeholders and governments, lenders, and developers must find new solutions for the projects' sustainability. Churchill and Saunders (1989) found that the appropriate policy framework could effectively provide support to private financial firms to invest in the energy sector in developing countries.

3 A Sustainable Financial System and Impacts of the 2008 Financial Crisis in Developing Countries

3.1 The Financial System Sustainability

The word *sustainability* is derived from the Latin *sustinere*. Sustain has meanings such as "maintain," "support," and "endure" (https://en.wikipedia.org/wiki/Sustainability, retrieved on: 2015).

Sustainability is a part of the concept *sustainable development* which was defined at the Brundtland Commission of the United Nations in 1987: "Sustainable development implies meeting the needs of the present without compromising the ability of future generations to meet their own needs" (Drexhage and Murphy 2010).

The 2005 World Summit on Social Development identified three components are necessary for sustainable development: economic development, social development and environmental development (United Nations General Assembly 2015).

It is well-known that sustainability factors can contribute positively to financial performance. The United Nations Environment Programme (UNEP) defined a sustainable financial system in the following way: "A sustainable financial system is then taken to be a financial system that performs its central functions, such as the provision of savings possibilities and the allocation of capital, taking into account the demands and needs of the economy, society and the environment" (UNEP, October 2015).

A sustainable financial system is very important for countries because it aims not only to increase financing but also to improve flexibility and the competitiveness of financial institutions. Sustainability in the financial sector requires the involvement of many actors such as financial institutions, supervisors, regulators and sector associations. It is impossible to protect a society from other financial systems which are weak and unstable.

Banking system stability is very important to achieve financial system sustainability. Bank failures in a financial system cause a spillover effect in the country and even in the world. Banks especially have a special role in the financial system, because they have the role of money creation (Pisano et al. 2012). Because of the lack of money, banks cut back on lending to preserve their liquidity during crises. In addition, financial system sustainability is being damaged by the quite high cost of financial intermediation in the banking sector during crises.

The definition of financial system sustainability has changed after the crisis, and recently the financial system has a great effect on the economy. The crisis decreased lending for individuals, businesses and governments. In particular, the significant reduction in consumer spending, government expenditures and business investments had an negative impact on global economic activity and economic growth in the economy.

3.2 A Sustainable Financial System and Impacts of the 2008 Financial Crisis

After the burst of the 'dotcom' bubble and the 2001 terror attacks in the U.S., most advanced economies include the U.S. started to apply sustained expansionary economic policies to prevent recession (Naudé 2009). Large amounts of savings entered the United States economy because of a loose monetary policy for many years. International investors purchased the U.S. Treasury Bonds and moved their funds to the U.S. Stimulated rapid growth in credit produced the housing and credit boom which led to the sub-prime mortgage crisis (Nissanke 2010).

The crisis which actually began to be felt in mid-2007 with increasing defaults on subprime mortgages and growing numbers of foreclosures in the U.S. Furthermore, housing prices and financial stock prices started to decline suddenly and steeply. The crisis started with the liquidity shortfall of many banks in the United States. Then many large financial institutions collapsed and governments carried out bailout plans to banks.

The collapse of Lehman Brothers showed that interbank linkages have a strong effect on systemic risks. There is a strong connection between credit and interbank markets after credit market liberalization, and thus the default of one large agent may produce financial contagion throughout the system (Young 2014).

The crisis has shaken the fundamentals of the market economies in the developing economy as well as the developed economy. The crisis spilled over from sector to sector, first from housing into banking and other financial markets, and then to the real economy. European Banks were affected because of their exposure to the U.S. financial markets.

After the crisis hit the banking sector, the governments had to carry out financial rescue schemes which involved capital injections, guarantees and the issuance of banking securities, bank asset purchases, swaps and other guarantees. These necessary measures amounted to a total government commitment of 22 % of GDP for the European Union and 29 % of GDP for the United States by the end of February 2009 (Young 2014).

Before the crisis, the global average Gross Domestic Product (GDP) growth rate was 5 % over 2003–2007 and the global economy nearly halted during the second half of 2008 and 2009 (Global Monitoring Report 2009). After some stimulus, incentives and other precautions were carried out, the world GDP was 5.4 % in 2010. The world growth rate continued to decrease from 5.4 to 3 % in the period of 2010–2015 (www.imf.org, 2015). It is expected that the world growth rate will decrease in 2016 because of China's slowdown, low commodity prices and the expected increase in the U.S. interest rates.

Many policies, regulations, standards and new institutions have been introduced to stabilize the financial system the onset of the crisis. In addition, it is well-known that the short term policies attempted to minimize the impact of the crisis and the longer term policies attempted to increase the robustness of the global economy and to solve the problem of global imbalances.

The crisis has proved how the financial system contributes to long-term sustainable and economic growth. During the crisis, the world experienced a global recession, a banking and a sovereign debt crisis, and a Euro Zone crisis (Young 2014).

The crisis has highlighted the need for policy regulations and instruments both at domestic and international levels to achieve economic growth for countries in order to preserve financial sustainability.

Financial stability is identified as a key preliminary condition for economic growth and stability by policy makers and academics. The crisis affected the financial system's stability and therefore, post-crisis financial policy has concentrated on improving financial stability and economic sustainability (UNEP, October 2015).

Strengthening financial stability and supporting economic growth are more important priorities than sustainability in financial sector policy. Although well-developed financial sectors support economic growth and stability, advanced financial systems could pose a threat to the economy before and during financial crises such as the crisis (UNEP, October 2015). After the crisis, it was understood that a new financial system was needed to create more stability and to relate to the real economy.

3.3 Impacts of the 2008 Financial Crisis in Developing Countries

Developing economies had more rapid growth from 2002 to 2007 due to lower inflation and more sustainable fiscal issues. They grew on average at 7.16 % from 2002 to 2007 and these countries had higher growth rates than the advanced countries (Comert and Uğurlu 2015).

As in shown in Fig. 1, the growth rate of emerging markets and developing countries has been higher than in advanced economies before and during the crisis. Especially, while the growth rate of emerging markets and developing countries was nearly 3 %, the advanced economies' growth rate was nearly negative 4 % (http://blog.euromonitor.com 2013).

It is expected that developing countries grow by 4.3 % and 4.8 % in 2016 and 2017, respectively (United Nations 2016).

Before the crisis, international investors preferred to invest in developing countries because of higher rates and returns. Since the crisis, the amounts of investment have been extended to developing countries. Developing countries' governments and private sectors have gained additional financial sources such as bonds and private equity capital. For example, companies in emerging countries issued bonds in the value of $375 billion US in the period of 2009–2012. Although the cost of borrowing through bond issues has increased for developing countries, the amount is more than double the volume compared to the 2005–2008 period. The external

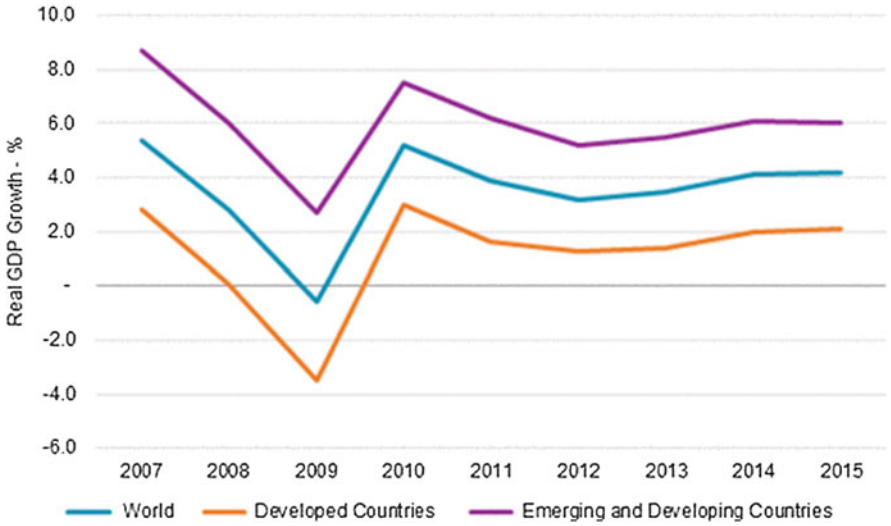

Fig. 1 Global Real GDP Growth: 2007–2015. Source: http://blog.euromonitor.com/2013/01/as-world-leaders-meet-in-davos-whats-next-for-the-global-economy.html, 2013

debt of developing countries is financed more by private creditors than by public creditors (German Development Institute 2015).

During the crisis the developing countries were affected by three main channels: banking failures and reductions in domestic lending, reductions in export earnings and reductions in financial flows to developing countries (Naudé 2009).

Developing countries were substantially affected by the economic downturn in advanced economies through trade and financial market channels. Before the crisis, developing countries had high dependency on developed countries for their exports and trade. Exports increased as a share of developing countries' GDP from 29 % in 2000 to 39 % in 2007 (Yifu 2008). After the crisis, the drop in exports due to decreased global demand led to a decline in the value of traded goods and it caused the deterioration of current accounts in developing countries (United Nations 2009).

After the crisis, the developing countries were affected by the high current account deficits and dependency on financial flows. Stock markets declined sharply and some currencies depreciated considerably. In addition, because of dollar-denominated debt creditor banks were vulnerable to a depreciation of the exchange rate (Comert and Uğurlu 2015).

Banks in developing countries, negatively direct affected from financial contagion in accordance with financial connection level with developed countries. On the other hand there were some indirect impacts such as declining stock market prices and housing prices. These impacts generated solvency problems and caused to limited lending funds. After that, the governments required to recapitalize the banks. Besides that, limited bank lending led to decreased investment, lower growth and an increase in unemployment (Naudé 2009).

After the crisis, some economists considered that debt crises are related to debt levels and debt composition. Improving debt management capacity at the domestic level can lead to a more optimal debt composition and can reduce the risks of over-borrowing. In the meantime, international policies can help developing countries to move to a safer debt structure, which would make the countries more resilient to external shocks. One of the reasons for developing countries' high cost of borrowing is a lack of accurate and timely information on their debt level. In addition, it is related to an increase in the risk of the debt issued by these countries (United Nations 2009).

Developing countries don't have substantially higher public debt than advanced economies. But relatively low levels of debt are a bigger problem for developing countries than for developed countries. Developing countries will be able to sustain higher levels of debt by improving their policies and institutions. They also can focus on a debt structure that involves a combination of public and private sources (United Nations 2009).

4 Renewable Energy Financing in Developing Countries After the 2008 Financial Crisis

4.1 Renewable Energy Financing in Developing Countries After The Crisis

International Energy Agency explains that "Renewable energy is derived from natural processes that are replenished constantly. In its various forms, it derives directly from the sun or heat generated deep within the earth. Included in the definition is electricity and heat generated from solar, wind, ocean, hydropower, biomass, geothermal resources and biofuels and hydrogen derived from renewable resources" (IEA 2002).

The development of renewable energy resources deal with some obstacles which are mainly connected to cost, regulation and financing. The cost of renewable energy investment is much expensive than fossil fuels. There are some policy mechanisms include fiscal incentives and regulatory precautions to reduce the cost of renewable energy financing (United States International Trade Commission 2013). Typically market-based incentives and policies have been applied to increase renewable energy investments through reducing cost (Lee and Zhong 2015).

The majority of renewable energy project costs happen at the beginning of the project with high initial capital investment. Besides, the ratio of initial capital investment to total project cost varies in accordance with renewable energy sources (Nelson and Shrimali 2014).

Renewable energy projects have main participations such as debt and equity funders, assessment consultants, insurers, project developers, equipment suppliers,

project operation, energy purchasing and distribution companies. In addition, governments have a play strong role in renewable energy financing and investments (MaRS Market Insights 2010).

According to Kalamova et al. (2011), there are mainly four financing instruments for a renewable energy project: grants (subsidy), debt (loan), equity and mezzanine finance. Grants are generally provided by governmental organizations and if a project achieves commercial success, grants are convertible to debts or equity.

Debt is a common and less expensive financing source for renewable energy projects to decrease the cost of financing. Debt can come from many different of sources including senior debt, junior or subordinate debt, low-interest loans or lease finance. Debts are generally provided by banks, national and international organizations and lenders for renewable energy projects (Nelson and Shrimali 2014).

Equity is much expensive than debt because the expected returns for equity holders are higher. Renewable energy project developers want to have substantial equity during the early years of the project because they are not obligated to repay for equity. Equity can take many different form which include venture capital funds, private equity funds, tax equity investors (Kalamova et al. 2011).

Mezzanine finance is a hybrid of debt and equity. Mezzanine finance instruments are known that as subordinated loan and convertible bonds (World Economic Forum 2013).

Generally, the financing of renewable energy sector requires more than 20 years. Long-term investment decision is important for the future of the world economy and it could play a positive role in financial market stability and sustainability (Bassanini and Reviglio 2011).

Although energy markets were not the main reason for the crisis, most people believed that energy market changes such as the high oil prices played a significant role to create the crisis. The high price of oil caused a negative impact for oil-exporting industrialized countries before the crisis. In addition, increased oil prices damaged their current accounts, inflation rates and economic growth (Clapp et al. 2009).

A well-designed and consistent policy is important to support renewable energy investments. But the crisis influenced energy policies in a negative way and it caused uncertainty for investors. Nevertheless, the renewable energy sector continued to grow against the increase of global energy consumption and reduction in oil prices in developing countries during the last few years (Renewables 2015 Global Status Report 2015).

Growth rate, inflation, rate of unemployment and investment growth have decreased and the volatility of macroeconomics have increased in developed and developing countries since the onset of the crisis. However, developing countries have much affected negatively in rate of macroeconomics compared to developed countries. The crisis affected developing countries through trade and capital flows. Most developing countries' governments managed effective fiscal incentives and regulatory solutions to sustain new investments and improve macroeconomic variables (United Nations 2016).

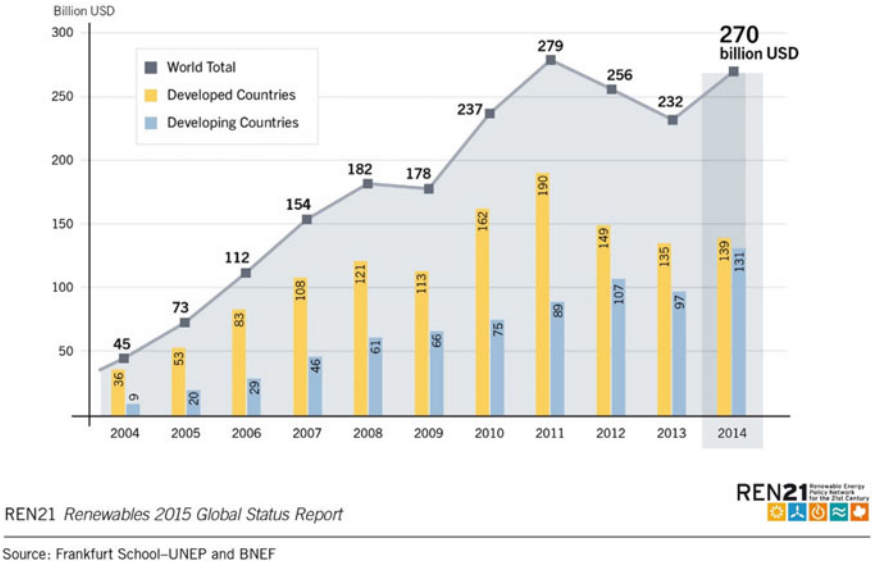

Fig. 2 Global new investment in renewable power and fuels, developed and developing countries, 2004–2014

According to Bloomberg New Energy Finance, global new investment in renewables was $270.2 billion US in 2014 (Fig. 2). Investment in developing countries at $131.3 billion US, was up 36 % on the previous year and came the closest to developed countries at $139 billion US, up 3 % on the year. Developing countries have increased their renewable energy investments steadily in a straight line since 2004 except in 2013. Especially global new investments in the developed economies fell in 2009 due to the crisis, but it reached a peak in 2011 because of stimulus programs and financial incentives (Renewables 2015 Global Status Report 2015).

Figure 3 illustrates new investment in renewable energy by source between 2004 and 2014. There was a big growth rate in new energy investment until the crisis.

Renewable energy investments affected by three ways since the beginning of the crisis: tighter credit, lower profitability and declining demand (G8 Energy Ministers Meeting 2010).

Finding credit and financing is generally difficult and expensive in developing countries because of higher risks, inflation and lower saving rates. Renewable energy corporations in developing countries are mostly dependent on external financing to launch new projects. External financing generally relies on the banking sector instruments, which are traded in stock exchanges (Brunnschweiler 2009).

The flow of debt from banks to renewable energy developers started to decrease from late 2008. Because the crisis tightened credit markets and significantly reduced financing options for renewable energy project developers. Banks carried out tight credit policies and were extremely reluctant to lend for more than 6 or

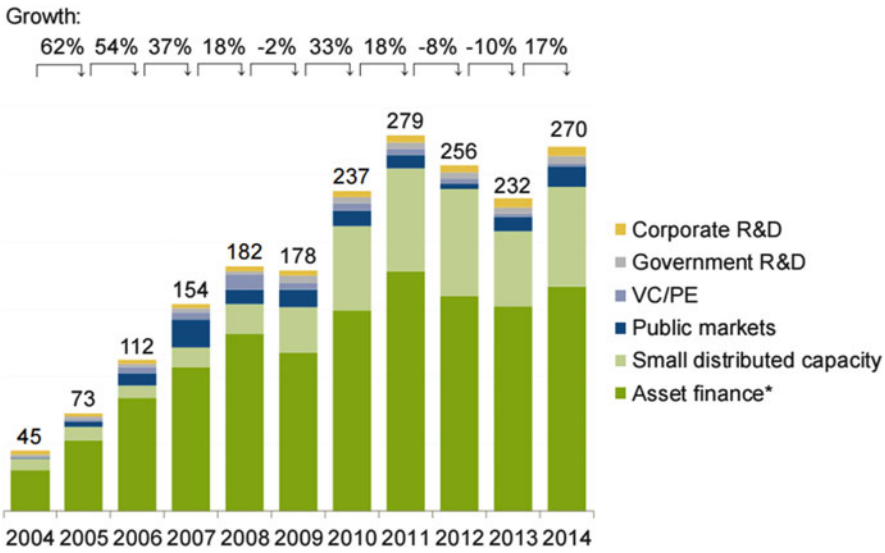

Fig. 3 New investment in renewable energy by source 2004–2014 (US$ BN). Source: https://wwwf.imperial.ac.uk/business-school/intelligence/research-blog/powering-the-future-new-models-in-renewable-energy-finance/p.1

7 years, compared to the 15 year loans that were available before the crisis (Justice 2009).

The bonds have attracted to interest as a debt from the capital market since the crisis. Bonds mainly issued by governments, banks or corporates. Green bonds issued to get lower cost of capital for green and climate change related projects (World Economic Forum 2013).

Increasing cost of borrowing led to fall in capital demand during the crisis. Therefore, not many renewable energy projects were financed during the crisis because of reduced lending activities. After that, debt markets had an abrupt reduction in liquidity which decreased debt financing significantly for project developers (Schwabe et al. 2009).

The difficulty of finding the cheaper debt for renewable energy companies was one of the reasons caused to decrease the profits of renewable energy companies during the crisis. By reason of the general stock prices' sharp declined and lower dividends for investors caused to reduced market capitalization of some renewable energy companies (Justice 2009).

There were some approaches to minimize the crisis negative effects. One was that reducing risk caused the lower cost of renewable energy financing; another was that finding alternative sources such as pension funds and green bonds which provide the credit demand (Justice 2009).

There are many financial channels such as multilateral development banks, regional development banks, United Nations, government and private sector,

public-private partnership and banks. These financial channels provide funds for renewable energy sector in developing countries (Bobinaite and Tarvydas 2014).

Mainly, multilateral development banks provide technical and financial assistance to developing countries by giving market-based loans, guarantees, risk management products for renewable energy investment projects in renewable energy sector. As a multilateral development bank, World Bank Group is the leading financier of renewable energy sector in developing countries. The Group's financial support increased into renewable energy sector in developing countries from 1990 to 2012. Especially, there was significantly increased fund into developing countries during the crisis because of reducing the long-term debt financing in private sector (Bobinaite and Tarvydas 2014).

Government policies have played a key role in the development of renewable energy in developing countries during the crisis. Because their main role results from the implementation of national programs and provision of financial incentives (Liming 2009). After the first shock of the crisis, the costs of the bank bailouts led to large budget deficits for many governments (Hofman and Huisman 2012). Developing countries' governments created stimulus packages to support investment during the crisis (Geels 2013).

4.2 Renewable Energy Financing in Turkey After The Crisis

As a developing country, the Turkish economy has had many fluctuations since the liberalization of the economy in the 1980s. In parallel to liberalization, the Turkish economy has become more dependent on the movements of international flows.

After the 2001 Turkish Banking Crisis, the Turkish government launched a new economic program under the auspices of the International Monetary Fund (IMF). The program brought some new regulations to the Turkish banking sector and decreased the high inflation rate in the Turkish economy. Although with the new economic program's successes, Turkey had many structural macroeconomic problems. For instance, investment rates didn't change substantially and exports increased rapidly because of high dependence on imports to produce export products (Comert and Uğurlu 2015).

After the 2008 crisis, the Turkish GDP growth began to decline from the third quarter in 2008 and the Turkish economic performance was one of the worst in the world during the 2008–2009 crisis (Comert and Çolak 2014).

The net financial flow as a percentage of GDP were 7.2 % in Turkey in 2007 and it started to decline in the third quarter of 2008. The net flow declined by a large amount and the net flow as a share of GDP became 1.7 % in 2009. This illustrates that the Turkish economy faced an abrupt halt but global funds continued to come to Turkey in smaller amounts in 2009 (Comert and Çolak 2014). The decline in net capital inflows has caused to significant currency depreciations in Turkey since 2013 (United Nations 2016).

The energy demand of Turkey has been growing more rapidly than the energy production since Turkey is a developing country. Turkey is the second largest economy on demand for electricity and natural gas. In addition Turkey has become one of the fastest growing energy markets among the OECD countries in the world (Kaplan 2015).

The Turkish government has made significant energy reforms during the last decade. The significant progress that has been made in the field of renewable energy started after the enactment of the Law on Utilization of Renewable Energy Resources for the Purpose of Generating Electrical Energy (Renewable Energy Law, REL) in 2005 (Kaplan 2015).

The Turkish government announced the National Renewable Energy Plan, which has a plan for efficient development of renewable energy until year 2023. The National Renewable Energy Plan was prepared in February 2016. According to the Ministry of Energy and Natural Recourses, the total amount of investments required to meet the energy demand in Turkey by 2023 is estimated to be around $110 billion US, more than double the total amount invested in the last decade (Kaplan 2015).

Especially, the International Finance Corporation, European Investment Bank, European Bank for Reconstruction and Development and The French Development Agency have provided project finance loans to renewable energy investments in Turkey. The Industrial Development Bank of Turkey holds the leadership in financing renewable energy projects (PWC 2012).

Before the crisis in the Turkish renewable energy market, sponsors were not able to obtain non-recourse loans, which are secured by the project assets and paid back by the project's cash gain itself. During the crisis, financing conditions for investors, became much stricter and difficult. Moreover, sponsors had to complete reports for their projects, which are required to obtain project finance loans. In addition, the overall financing environment has not improved significantly since the global financial crisis (PWC 2012).

5 Conclusion

The global financial crisis, which originated in the advanced economies to developing economies, hit the rest of the world strongly. Developing countries were expected to face by weakening global trade, capital flows and commodity prices from the advanced economies. But the crisis contributed to them due to stronger demand from the U.S. and other developed countries.

Investment in renewable energy projects slowed down in the last quarter of 2008 to end of 2009. The situation forced many sponsors because cost of renewable energy financing had increased. It was not a major problem for strong projects. In addition, the banks started to shorten the period for loan repayment although some governments pressured the leading banks to lend to renewable energy sector.

The Federal Reserve Bank (Fed) raised the interest rate in late 2015, for the first time since 2006. After the increasing of the U.S. interest rate, it is expected that the

U.S. dollar will continue to rise and bond yields will remain low in most countries. Investors who purchase bonds outside of their home markets will move their investments to the U.S. to benefit from a stronger dollar.

There will be tighter financing conditions for most developing countries include Turkey which will be affected negatively by the volume of capital flows. In addition, this situation will affect cost of renewable energy in developing countries such as Turkey. Under these circumstances Turkey must find new alternative sources for renewable energy financing. Capital market can be organized and structured for alternative financing instruments.

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The Impact of Russian Economy on the Trade, Foreign Direct Investment and Economic Growth of Turkey: Pre- and Post-Global Financial Crisis

Ayhan Kapusuzoglu and Nildag Basak Ceylan

Abstract The purpose of this chapter is to examine the impact of Russian economy on the trade, foreign direct investment (FDI), and economic growth of Turkey by taking into account the global financial crises that occured in 2008 by analyzing the data both for the pre- and post-crises periods in addition to the whole period. The reason of choosing Russia in this study is its being the first country for Turkey in terms of foreign direct investment as of 2015 and also being one of the major trading partner of Turkey. To this end, the impact of Russian economic performance on the trade, GDP and FDI of Turkey is examined by using quarterly data for the 2002–2015 period. The data that is used in the study is obtained from Global Financial Data and Economic Data Delivery System (EDDS) of Central Bank of the Republic of Turkey. As a model, structural vector autoregressive (SVAR) model which is similar to the model of Cushman and Zha (1997) is used. The impact of the shock given to Russian GDP showed that the effect on the variables has changed when we compare pre- and post-crises periods. The impulse responses show that a shock to Russian GDP increases Turkish export, import and GDP for four periods statistically significantly. When the analysis is carried out for the pre- and post-crises periods, the findings emphasize that the impact of the shock on Turkish exports is positive and statistically significant starting from the first period, after the crises the impact has a statistically significant impact only at the first quarter. The impact of Russian GDP has no statistically significant impact on Turkish import both before and after the crises. When one standard deviation shock is applied to Russian GDP, before the crises it's statistically significant affect is observed on Turkish GDP starting from the first period for four periods. After the crises the effect is examined only contemporaneously.

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1 Introduction

Starting from 1990s the main phenomenon which affects the economies are globalization trend. Owing to globalization the countries become more integrated and owing to this integration, the economies of the countries are being affected from each other. Especially if the country under the concern is a major trading partner of a country, it is expected that the economy of that country affects the domestic country's economy significantly. The studies of Burdekin (1989), Lastrapes and Koray (1990), Holman and Neumann (2002), Horvath et al. (1998), Backus et al. (1992), Stockman and Tesar (1995) examined cross country correlations between the macroeconomic performances. The study of Schmitt-Grohe (1998) considered how Canada's economic performance is being affected from the economic performance of US emphasizing that the output of a large country might affect the small country. Mackowiak (2007) examined whether the fluctuations in Asian and Latin American countries stemmed from US monetary policy shocks and they reported that less than 10 % of the fluctuations in emerging markets are caused by shocks in US monetary policy. Berument et al. (2006) analyzed how the economy of Japan affected the economy of Indonesia, as being a major trading partner, they reported that growth of Japan appreciated local currency, decreased inflation and increased growth of Indonesia. Arora and Vamvakidis (2001) examined how US economic growth affected the economies of the other countries. They reported that being a global trading partner, its affect is found significant.

In this study, Russia is chosen as a big open economy to affect the relatively small open economy, Turkey. The reason of choosing Russia firstly stems from Russia's being one of the major trading partner of Turkey and also Turkey is Russia's second major trading partner as well. The main component of exports from Turkey to Russia are fruits and vegetables, textile products and automobiles. In addition, the revenues of Turkey coming from shuttle trade revenues from Russia for the periods between 2010 and 2014 is 49 %. Secondly, Russia and Turkey have many bilateral trade and infrastructure deals including nuclear power plant or proposed construction of a gas pipeline between the two countries. A considerable amount (around 60 %) of natural gas of Turkey is imported from Russia. Moreover, for the case of tourism, Turkey's considerable amount of tourism income is also provided by the Russian tourists. As reported by Demir (2015), among the 36 million foreign tourists in 2014, 4.5 million were from Russia which corresponds to 12.5 %. Moreover, Russia's FDI in Turkey is 4938 million USD having a share of 3.8 % in total. Having too much importance for Turkish economy, in terms of trade, GDP, and FDI, it is aimed to find in this study how the economy of Russia affects the economy of Turkey using VAR models and impulse response functions. This issue is analyzed for the period between 2002 and 2015. In addition, to see whether the global financial crises occurred in 2008 affected the impact of the Russian economy on the economy of Turkey, the analysis are also carried out considering both before and after the crises periods. The results point out the existence of significant changes in the impact of Russian GDP growth on Turkish export, import

and GDP. To the best of our knowledge, the effect of Russian economy on Turkish economy has not been studied using impulse responses with trade and GDP variables.

The organization of the paper is as follows: In Sect. 2, the dataset and methodology is discussed. In Sect. 3, the estimates of the model are reported, and Sect. 4 concludes.

2 Data Set and Methodology

The real gross domestic product (GDP) data for Russia and Turkey are obtained from Global Financial Data and export and import data are gathered from Turkish Statistical Institute. Our data span covers the period 2002:01–2015:04 and the data are quarterly.

As a model, a structural vector autoregressive (SVAR) model which is suggested by Cushman and Zha (1997) is used. In this block recursive model, Russia's economic performance is determined by its own lags and the Turkish variables follow a near VAR model. In this model, which varies from a two variable standard VAR model, the lagged values of Turkish variables do not enter the Russia's growth specification, but Turkish variables are affected both contemporaneously and with lags of the Russia's growth. There are some advantageous of using VAR model over single equation model. The dynamic relationships among the variables and higher predictive power can be counted as superiority of VAR model. Moreover, an identified VAR model having block exogeneity is used in order to keep Russian growth being affected from Turkish variables.

The identified VAR model suggested by Cushman and Zha (1997) is;

$$A(L)y(t) = \varepsilon(t) \tag{1}$$

where $A(L)$ is an $m \times m$ matrix polynomial in the lag operator L, $y(t)$ is the $m \times 1$ observations vector, and $\varepsilon(t)$ is the $m \times 1$ vector of structural disturbances. The model can be specified as follows:

$$y(t) = \begin{bmatrix} y_1(t) \\ y_2(t) \end{bmatrix}, \quad A(L) = \begin{bmatrix} A_{11}(L) & 0 \\ A_{21}(L) & A_{22}(L) \end{bmatrix}, \quad \varepsilon(t) = \begin{bmatrix} \varepsilon_1(t) \\ \varepsilon_2(t) \end{bmatrix}. \tag{2}$$

where, $\varepsilon(t)$s are assumed to be uncorrelated with $y(t-j)$ for $j > 0$ and $A(0)$ is non-singular. Besides, the block ($y_2(t)$) exogeneity is zero and is represented by $A_{12}(L)$. Here, $y_1(t)$ is exogenous to the second block both contemporaneously and with lags. Modified error bands of Bernanke et al. (1996) are used to compute maximum likelihood estimation (MLE) and the inference for the system. This is because, MLE of the VAR model is not applicable to the identified VAR model having block exogeneity (Sims 1986; Gordon and Leeper 1994).

Observation matrices used in the study as $y_1 = [Russia's\ output\ growth]$, $y_2 = [Turkish\ output\ growth]$ or $y_2 = [Turkish\ export\ to\ Russia]$ or $y_2 = [Turkish\ import\ to\ Russia]$. The lag order of the identified VAR model is 1 as suggested by the Bayesian Information Criteria. In this study, the GDP growth of Turkey and Russia at time t (GDP_t) is calculated as follows:

$$GDP_t = [(G_t / G_{t-1}) - 1]\ 100$$

where; G_t is the real GDP of Turkey and Russia in USD at time t.

The other variables which are export and import of Turkey to Russia is calculated as follows:

$$export_t = [(X_t / X_{t-1}) - 1]\ 100$$
$$import_t = [(M_t / M_{t-1}) - 1]\ 100$$

where; X_t is the export of Turkey to Russia and Y_t is the import of Turkey from Russia in USD at time t.

3 The Results of the Impulse Response Function Analysis

The impulse response functions of Turkey's GDP, export and import to a one standard deviation shock (1.36) to the Russian GDP growth is estimated for the period 2002:01–2015:04 and for the pre-crises period 2002:01:2008:02 and for the post crises period 2008:03–2015:04. In the division of dataset into two sub periods as pre- and post-crises periods, the collapse of Lehman Brothers which occured in 15.09.2008 is considered.

The impulse responses functions for the whole period are reported in Figs. 1, 2 and 3. The results of the estimates which is shown in Fig. 1 suggest that when one

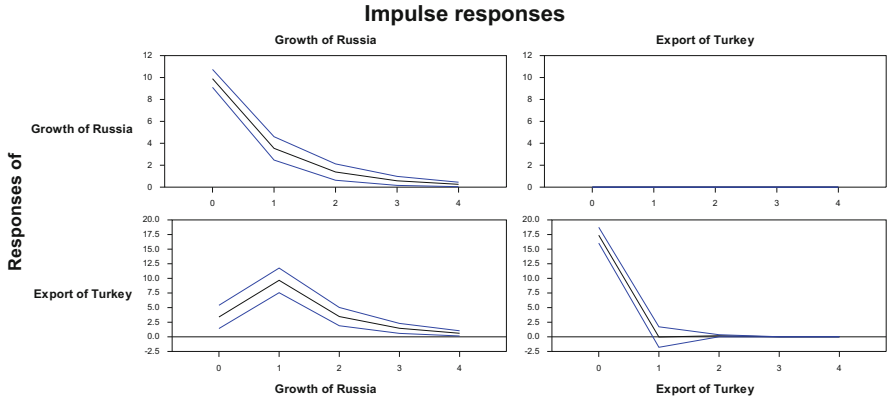

Fig. 1 The impact of one standard deviation shock to GDP of Russia on Turkey's export to Russia

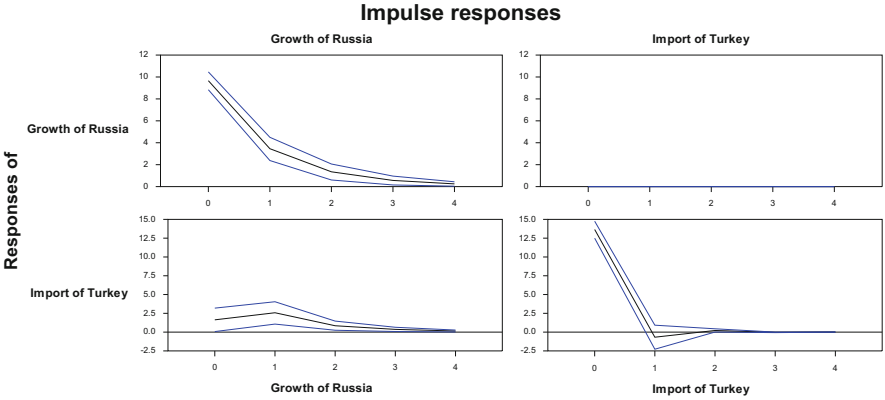

Fig. 2 The impact of one standard deviation shock to GDP of Russia on Turkey's import to Russia

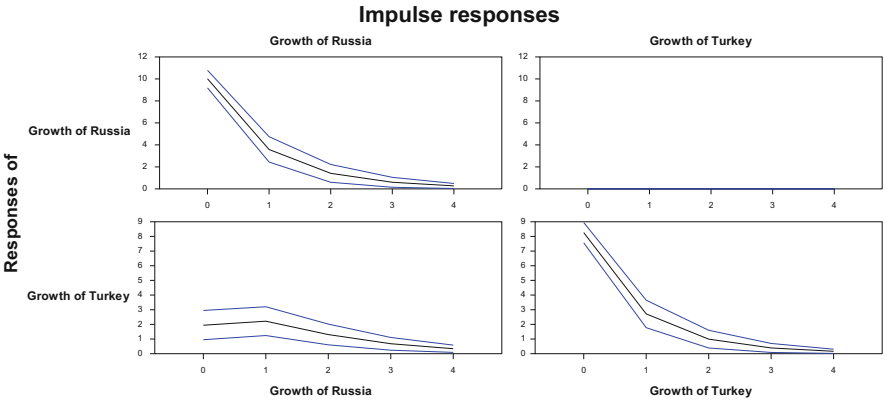

Fig. 3 The impact of one standard deviation shock to GDP of Russia on Turkey's GDP

standard deviation shock is applied to Russian GDP, Turkish exports to Russia increases statistically significantly for four periods. After that, the effect dies out.

When the same shock is applied to Russian GDP, as shown in Fig. 2, Turkish imports to Russia increases statistically significantly for four periods and the effect dies out after four periods.

The impact of one standard deviation shock to Russian GDP increases Turkish GDP for four periods statistically significantly.

The analysis is also carried out both for the pre- and post-crises periods in order to compare how the impact of the shock on export, import and GDP have changed. The pre-crises period is the period between 2002:01 and 2008:02 which is the period before the collapse of Lehman Brothers. When one standard deviation shock is applied to Russian GDP, Turkish export increases during the first four period which is reported in Fig. 4. The statistically significant effect is not observed contemporaneously and the impact of the shock dies out after the fourth period.

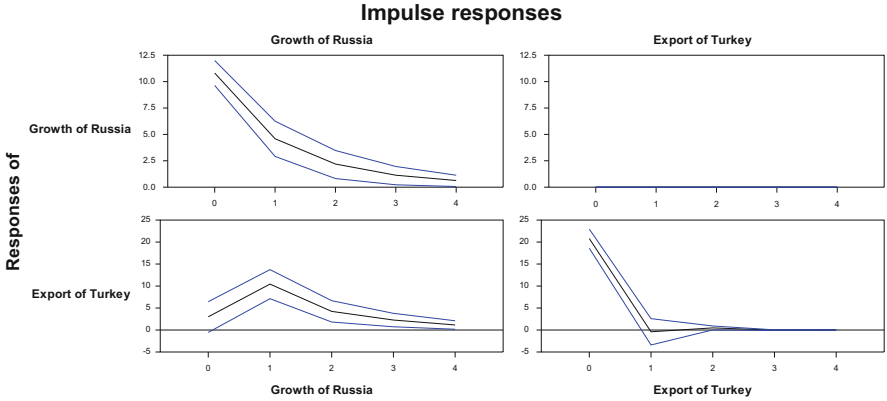

Fig. 4 The impact of one standard deviation shock to GDP of Russia on Turkey's export to Russia before crises

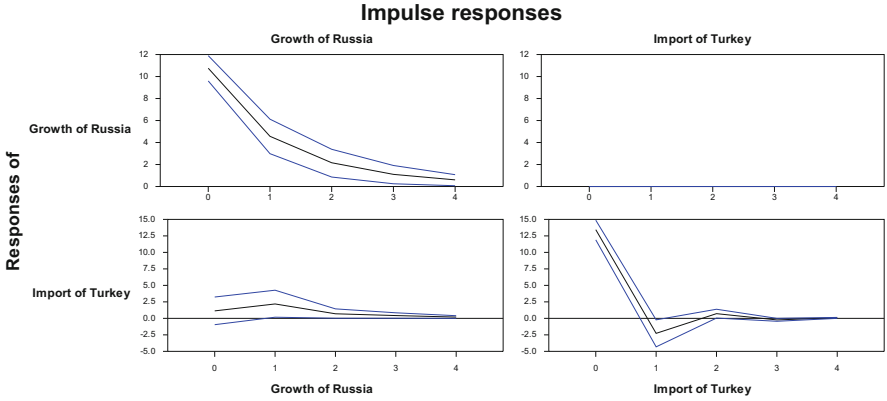

Fig. 5 The impact of one standard deviation shock to GDP of Russia on Turkey's import to Russia before crises

When the impact of the shock is examined on Turkish imports to Russia before the crises, it is not statistically significant in any of the periods so it doesn't have a statistically significant effect on Turkish imports to Russia as shown in Fig. 5.

When one standard deviation shock is given to Russian GDP before the crises, it affects Turkish GDP statistically significantly starting from the first period which is shown in Fig. 6. The impact seems to die out after the fourth period.

The post crises period is the period between 2008:03 and 2015:04 which is the period after the collapse of Lehman Brothers. When the same analysis is carried out for the post crises period, it is observed that the impact of one standard deviation shock to Russian GDP increases Turkish export both contemporaneously and at the first period as reported in Fig. 7.

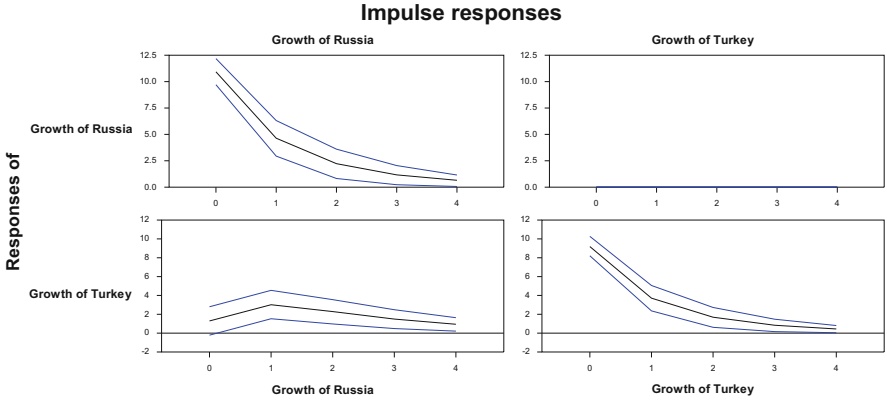

Fig. 6 The impact of one standard deviation shock to GDP of Russia on Turkey's GDP before crises

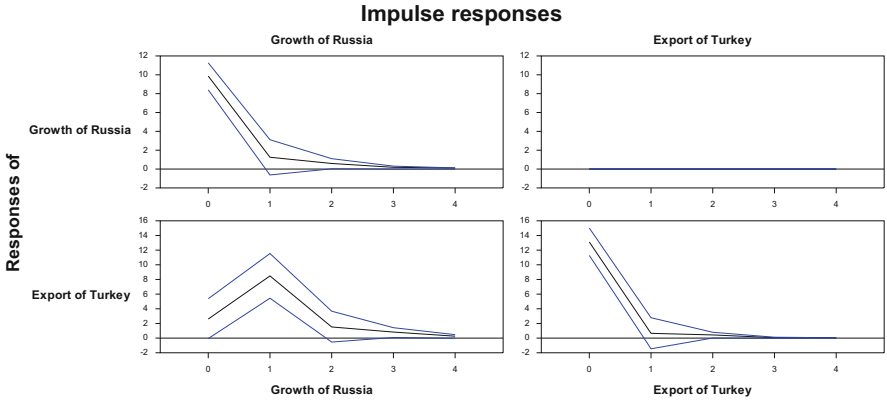

Fig. 7 The impact of one standard deviation shock to GDP of Russia on Turkey's export to Russia after crises

When one standard deviation shock is applied to Russian GDP, it does not affect the import of Turkey to Russia statistically significantly as shown in Fig. 8.

When one standard deviation shock is given to Russian GDP, Turkish GDP increases statistically significantly at the current period as shown in Fig. 9.

In order to check whether the results are robust or not, we also carried the analysis using structural VAR model similar to Cushman and Zha (1997), a block recursive model. In the model Russia's GDP is determined by its own lags while a three variable VAR is constructed for the Turkish variables. Russian GDP affects Turkish variables exegenously. The VAR model used here is different from a

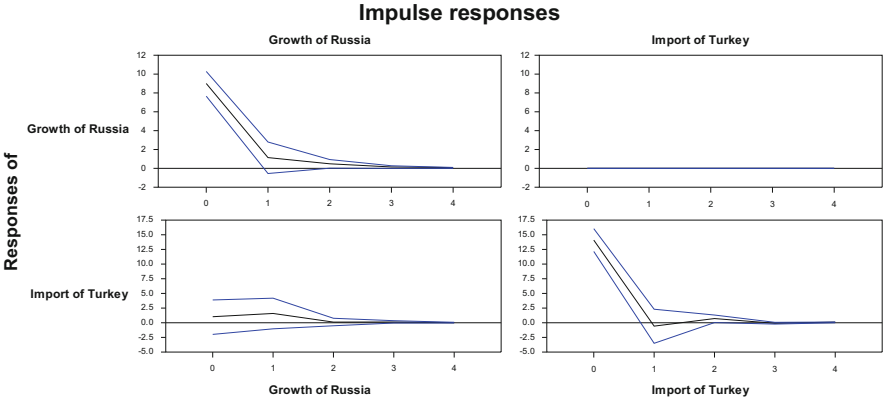

Fig. 8 The impact of one standard deviation shock to GDP of Russia on Turkey's import to Russia after crises

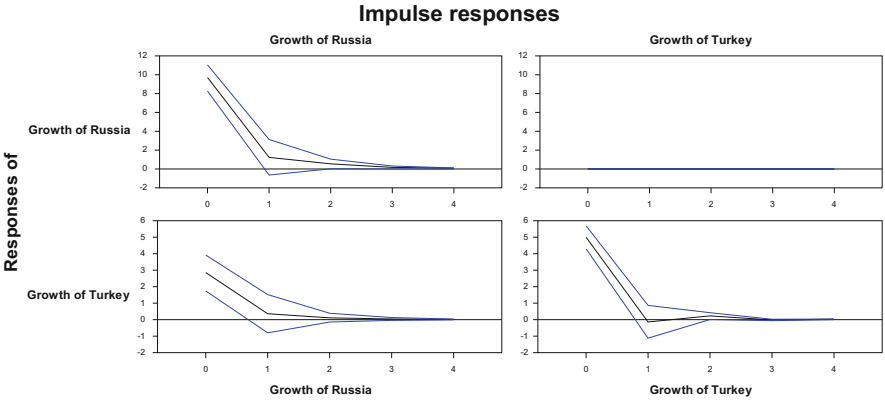

Fig. 9 The impact of one standard deviation shock to GDP of Russia on Turkey's GDP after crises

conventional VAR model, in that none of the lagged values of the Turkish variables affect Russia's GDP, but Russian GDP affects Turkish variables contemporaneously and with lags. A three variable VAR model is constructed which is similar to Kamin and Rogers (2000), Berument and Pasaogullari (2003) in order to consider the dynamic effects of Turkish variables. In the VAR specification, the three endogenous variables are export, import and GDP are considered with different ordering, but the results are all robust which are reported in Figs. 10, 11 and 12.

The analysis is also carried out considering FDI from Russia to Turkey. As the FDI do not occur continuously, the data on FDI is shown in Fig. 13. The figure

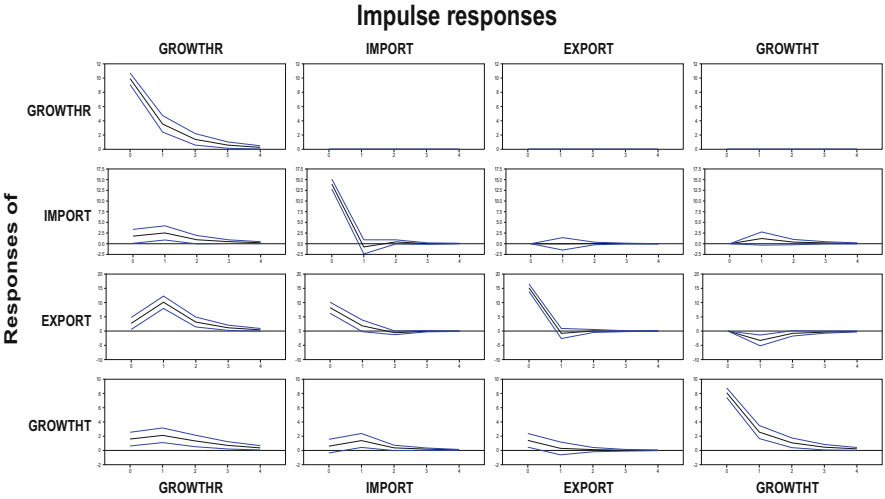

Fig. 10 The impact of one standard deviation shock to GDP of Russia on Turkey's export, import and GDP

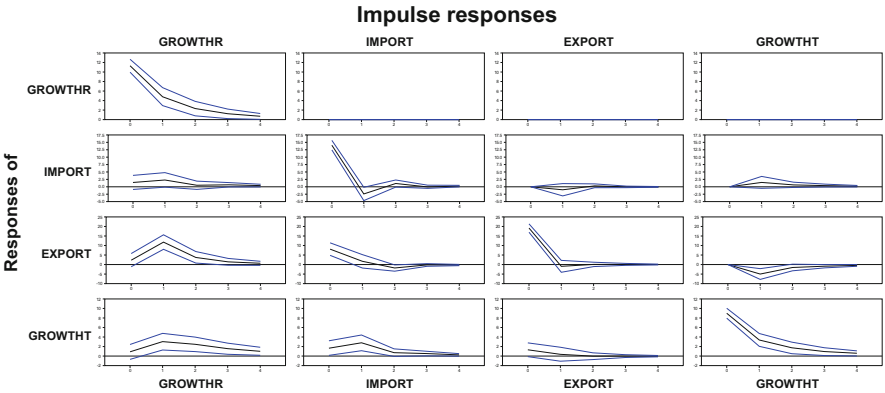

Fig. 11 The impact of one standard deviation shock to GDP of Russia on Turkey's export, import and GDP before crises

shows that FDI from Russia to Turkey has increased after 2011 except for the year 2012. The FDI from Russia to Turkey is 762 million USD in 2011, 875 million USD in 2013, 723 million USD in 2014 and 747 million USD in 2015.

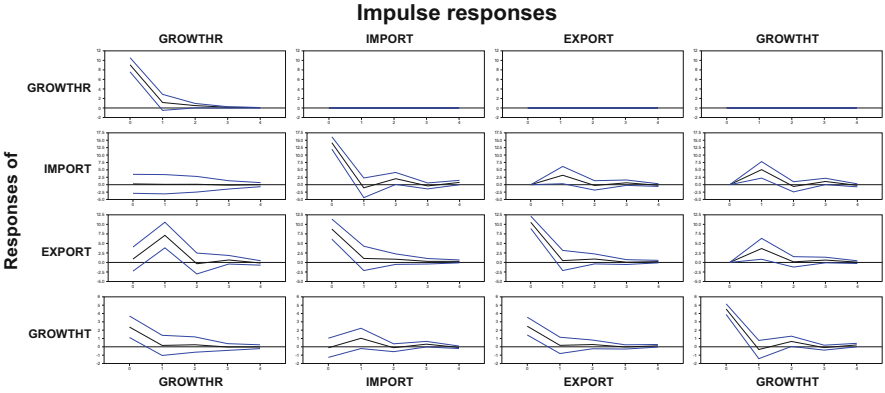

Fig. 12 The impact of one standard deviation shock to GDP of Russia on Turkey's export, import and GDP after crises

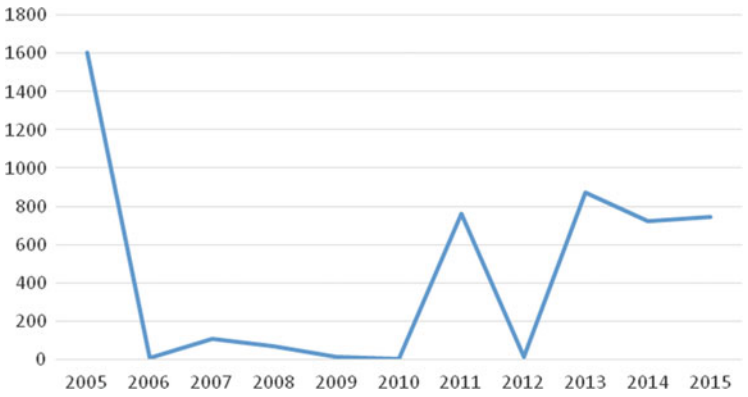

Fig. 13 FDI from Russia to Turkey for the period 2005–2015 in million USD (Data obtained from Data Delivery System (EDDS) of Central Bank of the Republic of Turkey, the Figure prepared by the authors)

4 Conclusion

In the study, the impact of Russian economy on the trade, GDP and FDI of Turkey to Russia is examined by using VAR models and impulse response functions. Russia is considered as a big open economy to affect the relatively small open economy, Turkey. One of the reasons of analyzing the impact of Russian economy on trade, GDP and FDI variables of Turkey is Russia's being one of the major trading partner of Turkey. Another reason is Russia and Turkey have many bilateral trade and infrastructure deals which includes nuclear power plant or proposed construction of a gas pipeline. When all these facts are considered, to the best of our knowledge, the effect of Russian economy on Turkish economy has not been

studied using impulse responses with trade and GDP variables. Therefore, this study will contribute to economy literature by showing the effects of Russian economy on the variables of Turkey.

When the impacts of Russian GDP on Turkish export, import and GDP are analyzed by using VAR models for the 2002:01–2015:04 period, the impulse responses are obtained and the findings suggest that a shock to Russian GDP increases Turkish export, import and GDP for four periods statistically significantly. When the analysis is carried out for the pre-crises and post-crises periods the findings emphasize that the impact of the shock on Turkish exports was positive and statistically significant starting from the first period, after the crises the impact has a statistically significant impact only at the first quarter. The impact of Russian GDP has no statistically significant impact on Turkish import both before and after the crises. When one standard deviation shock is applied to Russian GDP, before the crises it's statistically significant affect is observed on Turkish GDP starting from the first period for four periods. After the crises, the effect is examined only contemporaneously. Although in this study the effects of Russian GDP growth on Turkish trade, GDP and FDI are analyzed, it is not limited to these variables only. Other financial, macro, political and social variables may also be considered in the analysis. As a future study, researchers may look at the recent bilateral arrangements, social, political and economy issues and use more extended data sets.

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Export Diversification in Emerging Economies

Hatice Karahan

Abstract The positive impact of export diversification on countries' economic growth is widely recognized in literature. Moreover, there has been a growing consensus lately on the role of diversification as a protection tool against crises and shocks. In other words, countries with higher export concentrations are thought to be exposed to more susceptibilities and vice versa. Hence, for most developing countries, for which exports performance are vital, understanding the so-called association matters. This study aims at providing evidence for certain emerging economies in that respect and starts with illustrating the performance of the BRICS and MINT economies in terms of product/sector and market diversification in the 2000s. The chapter then investigates the relationship between export concentration and trade collapse for the 2008–2009 global crisis. Conclusions derived by the study show resemblance to certain findings in literature and address to a positive relationship between the level of product concentration and the severity of trade collapse in case of a crisis. Basic calculations on the market diversification, however, do not imply a meaningful relationship for the period in question.

1 Introduction

There is no doubt that the level of exports is a significant matter for most economies around the world, particularly the developing ones. High growth performances of some emerging Asian economies driven considerably by exports in the last few decades have also raised the attention paid to the subject. On the other hand, as implied by Sannassee et al. (2014) in evaluating a country's trade performance, appropriate criteria could go well beyond the level and rather extend to the degree of export diversification achieved. One reason for this argument is the widely recognized contribution of exports to long-term economic growth and

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development, especially in developing countries. Regarding this, empirical evidence in various studies including Herzer and Nowak-Lehmann (2006), Lederman and Maloney (2007), and Hesse (2008) points at a positive impact of export diversification on income growth.

There exist different avenues through which export variety leads to economic growth. One way might be explained through cases of vertical diversification, referring to moving forward to higher value added manufactures for export purposes (Samen 2010). Simply put, vertical diversification fabricates further uses of existing commodities and/or other primary products. Therefore, it not only creates greater market opportunities but also reveals the economic potential to increase productivity and accelerates output growth through new skills acquired and some spillover effects thereof. Such a process is claimed to help an exporter country achieve sustainable growth.

At that point, it is argued that economic growth through structural change is highly associated with the products traded. Concerning the role of diversification towards new activities on economic growth, analyses in literature such as Hausmann et al. (2005), and Hausmann and Klinger (2006) indicate some positive correlations. Piñeres and Ferrantino (1999) on the other hand, stresses the association between the rate of export structural change and the accelerated GDP growth, rather than the diversification simply.

Another channel through which variety in trade contributes to economic growth is observed in cases of horizontal export diversification. By adding new products and/ or sectors to the existing ones, countries can reduce their reliance on a limited number of commodity goods that are mostly exposed to price ups and downs. Hence horizontal diversification has the potential to increase export earnings of the country while enhancing the stability of revenues against shocks and fluctuations. This, in turn, yields advantages for a more sustainable growth pattern in the long run, particularly by diminishing sizable costs resulting from unreliable demand dynamics. Thus, export instability is another cause brought forth in the discussions of export diversification. As regards to fluctuations, vertical diversification is also considered to support a more consistent growth trend for an economy since manufactured goods show less variations in prices than basic commodities do.

On the other hand, despite a load of evidence on a positive association between export variety and economic growth, the literature also witnesses some findings indicating ambiguous or non-existent correlations between the two dynamics. Still, taking into account that economic openness carries the risk of hurting economies through global shocks, a narrow portfolio of exports cannot be denied to have a "potential" to deliver fluctuations. Practice shows that high export concentration (i.e. low diversification), particularly in commodities, happens to result in sharp volatilities of export revenues over time for a number of countries. Therefore, diversification can be regarded as a hedge against unexpected risks through trade channels. In this context, the theory of "natural resource curse" and the studies regarding it indicate that the share of natural resources in the exports of a country negatively might affect the GDP growth in the long run.

2 Measures of Diversification

Diversification refers to reducing the dependence on limited trade portfolios in terms of number of products and/or markets. In that regard, the concept evaluates a country's export concentration based on the range of its product mix or sectors as well as the number of its destinations. Therefore, it is possible to measure diversification in several different dimensions.

Basically, if a country sells to a higher number of partners and/or creates a wider mix of goods for its exports, then its concentration ratio lowers, making the country a more diversified exporter. As implied above, there exist various ways to measure the export concentration or the diversification level of an economy. The logic employed for this purpose takes its roots predominantly from the income distribution literature and applies similar indices to find out inequality between export shares. In this sense, the types of concentration ratios which are most commonly used to measure diversification are the Herfindahl, Gini and Theil.

For all these ratios, lower levels of concentration values reflect higher diversification across export products or destinations. As an example, the Herfindahl Index takes values in the range of 0 and 1, indicating maximum diversification of exports on one end and maximum concentration on the other, respectively.

This chapter of the book employs the Herfindahl measure of concentration to analyze the diversification patterns of certain emerging economies. In this context, the formula for a standard Herfindahl index (H) is given in Eq. (1).

$$H = \sum_{k=1}^{n} s_k^2 \tag{1}$$

According to this formula, for a given country and time period;

s_k represents the export share of each of the n groups in the chosen dimension (geography or product) with respect to the total. The squared values of each s_k are summed up to calculate the concentration ratio of that country's exports.

In this framework, the "Herfindahl Product Concentration Index" focuses on the share of the export value of each product group with respect to all exports for one given country in a specified period, whereas the "Herfindahl Market Concentration Index" measures the dispersion of trade value across the partners of the exporter in question. For the former one, 2-digit trade data refer rather to sectoral or industrial concentration, while 4-digit data elicit more detailed information on concentration by goods. In this study, product concentration (or diversification) ratios address to calculations based on a 2-digit industrial dataset.

3 Export Diversification in Emerging Economies

Having laid the foundation, this part of the chapter will focus on investigating export diversification for selected emerging economies, namely the BRICS group. As is well known, the famed bloc, composed of Brazil, Russia, India, China and South Africa, has been the apple of the eye of the global economy after the acronym's introduction in the early 2000s, due to their promising indicators by then. On the other hand, when the pre- and post-global crisis periods of those economies are compared, it is observed that the attractiveness of the BRICS group as a whole has unquestionably eroded in time. Having noted that, evaluating the development of the export portfolios of the so-called "rising stars" of the emerging world over the related period carries importance, since trade has been a major driver for their GDP growth.

In this context, Fig. 1 exhibits how export concentration for the BRICS economies has evolved in the 2000s. The Herfindahl values calculated for 2-digit product concentration for each country indicate that in the beginning of the decade, the group performed a relatively higher diversification across sectors and increased its reliance over time. To be more specific, all five countries recorded ups and downs during this period, with Russia, Brazil, China and India ending up at somewhat higher Herfindahl values as of 2014. South Africa, on the other hand, managed to exhibit a ratio of 0.08 in 2014, which is around the initial level.

As is seen in the graph; Russia, which entered the period of interest with an already conspicuously high concentration of 0.29 hit the level of 0.44 in 2008 and reached to a ratio of 0.49 in the end of the period explored. Behind the strikingly concentrated outlook of Russian economy lies the heavy reliance of its exports on energy products, namely mineral fuels and oils.

What is further seen in Fig. 1 is that Brazil, the member of the bloc with the lowest initial Herfindahl figure of 0.04, climbed to 0.05 and 0.06, in 2008 and 2014, respectively. Computations also reveal that India increased its concentration ratio from 0.05 in 2001 to 0.06 in 2008, recording it at 0.07 as of 2014. China, on the other hand, raised its product concentration of 0.07 to 0.10 before the crisis and carried the same level to the end of the period along with some fluctuations.

What these figures briefly tell is that the BRICS group have not achieved but rather moved away from a better industry diversification in the 2000s. The calculations point out that this pattern was valid before the burst of the crisis, as well.

With a similar approach, Fig. 2 displays the evolution of "export concentration across partners" in the BRICS countries for the same period. The graph signals a general downward trend in market concentration, which is quite the opposite of what Fig. 1 shows in terms of sectors. At this point, the findings point out that all economies in the bloc except for Russia considerably increased their geographical diversification in the period of question.

Furthermore, it is observed that the decline in the market concentration "before the global crisis" draws a sharper and smoother pattern for Brazil, China and India, in particular. Between 2001 and 2008, China attracts attention with an initial

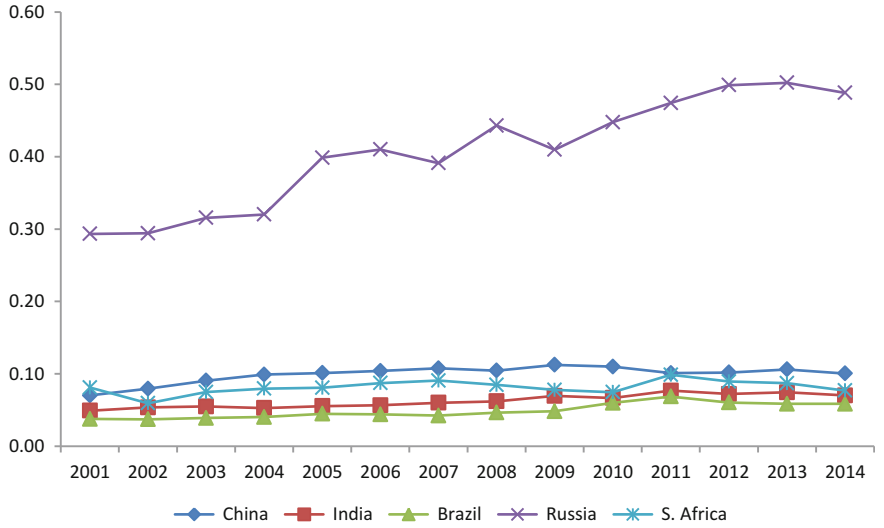

Fig. 1 Herfindahl Index values for 2-digit product concentration: BRICS. Data Source: TradeMap, Author's Calculations

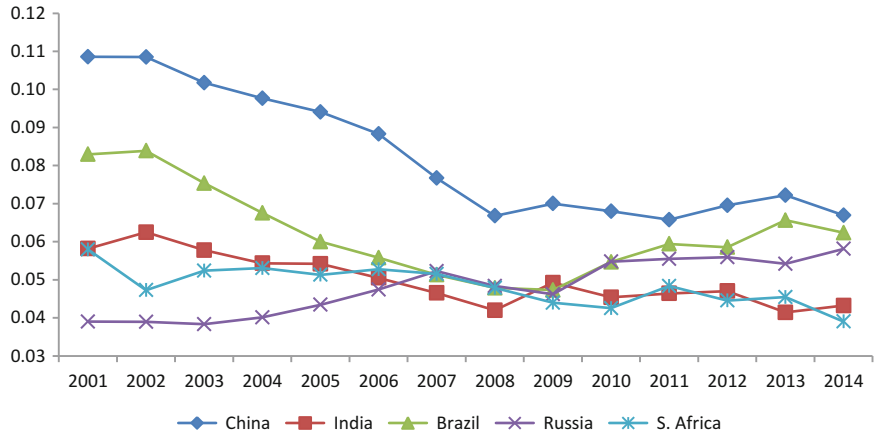

Fig. 2 Herfindahl Index values for market concentration: BRICS. Data Source: TradeMap, Author's Calculations

Herfindahl value of 0.11 that later went down to 0.07, while Brazil lowered its concentration from 0.08 to 0.05. Similarly, India followed a descending move and decreased its market concentration ratio from 0.06 in 2001 to 0.04 in 2008. On the contrary, Russia presented an upward change, increasing its Herfindahl value from 0.04 to 0.05.

As of 2014, South Africa and India exhibited the highest market diversification ratio within the group, while China still yielded the lowest one. Correspondingly, one main message drawn from the graph is that Russia who had the largest market portfolio in the beginning of the millennium could not improve on that advantage, while the other four members of the bloc moved forward and somehow ameliorated their narrower portfolios. At this point however, the deviating patterns of the ratios for the post-crisis period should also be underlined.

Furthermore, some other blocs of emerging economies gathered under the roof of interesting acronyms are also available to focus on. One of those groups that has drawn attention after the global crisis in particular, is MINT. Composed of Mexico, Indonesia, Nigeria and Turkey, MINT was coined based on the favorable economic prospects and demographics of its members. So in the context of diversification in emerging economies, it would be beneficial to take a look at the profiles of the MINT countries, as well.

When the product concentration ratios of the MINT economies are calculated for this purpose, it is noticed that Nigeria stands out within the group with its quite high Herfindahl concentration values. While the ratios computed for the country exhibit an almost non-diversified portfolio at the level of 0.99 in the year of 2001, a downward trend is observed for the following years. In that respect, the Herfindahl product value for Nigeria's exports went down to 0.85 and 0.83 in 2008 and 2014, respectively. The heavy reliance of the Nigerian exports on mineral fuels and oils causes the markedly high concentration levels observed.

Within the MINT bloc, the economy with the least concentration in the 2000s turns out to be Turkey. While the product concentration of Turkey had entered the period of interest at 0.05 and risen to 0.06 right before the global crisis, it ended up at 0.05 in 2014, keeping the country as the most diversified economy in the group. In terms of diversification performance, Turkey has been followed by Indonesia, with a ratio increased from 0.09 in 2001 to 0.11 in 2008 and marked the same as the latter in 2014. Mexico, on the other hand, seems to have slightly lowered its product concentration from 0.14 to 0.13 within the 13 years examined.

Moreover, when studied for geographical destination, data reveal that Turkey outshines with its index values of 0.06 and 0.03 in the years of 2001 and 2014, respectively. Indonesia chases Turkey in this category too, with a ratio of 0.1 in the beginning of the period that eventually declined to 0.06. Further, Nigeria is observed to have started the millennium around a concentration level of 0.2 and raised it to 0.24 right before the global crisis. However, it is witnessed that the country managed to lower its concentration ratio to 0.07 in the years following the crisis.

Within the MINT group, Mexico differentiates itself with a notably concentrated market portfolio. In this sense, the country attracts attention with a Herfindahl value of 0.74 in 2001 that had reached 0.79 in 2004, and later exhibited a downward trend accompanied with some fluctuations, leading to the level of 0.65 in 2014. Mexico's apparently poor market diversification stems from the reliance of its exports mostly on the US market.

4 Export Diversification and Crises

A leading factor raising the need for diversification for emerging markets is the well-known fact that a number of those countries are heavily dependent on commodity exports, making them exposed to considerable amount of susceptibilities in times of shocks or crises. Regarding that, findings of Cashin and McDermott (2002) indicate that rapid, unexpected, and often large movements in commodity prices can have serious consequences for the terms of trade, real incomes, and fiscal positions of commodity-dependent countries. Based on this fact, the growing consensus implies that in order to avoid or minimize the possible costs that could be faced through commodity-related shocks, emerging economies with such reliance should add other types of goods into their trade portfolios and hence try to stabilize their export earnings. Such changes in the patterns of trade refer to product diversification and require a rearrangement in the manufacturing structure of the so-called economies.

On the other hand, in making the connection to economic crises, one other reason put forward for the call for diversification is the risk evolving in cases of limited export destinations. The rationale behind this argument concerns the adverse reflections of political and economic instabilities or shocks within certain partner countries or regions on bilateral trade relations. According to this, diversification by geographic destination lessens the market-related risks by disseminating the bulk of exports to a greater number of countries.

Therefore, export diversification is considered a hedge against various forms of crises, spreading the risks over a wider portfolio to reduce the harmful effects of potential shocks.

In this context, as a recent relevant experience, the 2008–2009 financial crisis can be focused on due to the trade collapse it caused. As is well known, upon the outbreak of the global crisis, the decline in international demand and prices led export revenues around the world to fall considerably, hitting numerous economies. In this framework, the export earnings of the developing countries declined by 23 % in 2009, affecting their GDP growth rates adversely and significantly.

Data indicate that the sharpest declines in this period were observed in the economies of Commonwealth of Independent States (CIS) and Africa, while regions like Asia and North America witnessed below-the-average decreases. At this point, differences in the size of trade contractions draw attention to the connection between vulnerability of revenues and concentration of export portfolios. As an example to this association, Asia can be characterized by a rather highly diversified product basket while CIS is recognized with a much narrower portfolio.

This also reminds of the findings in literature addressing to the link between trade diversification and revenue volatility: Countries with more diversified exports seem to have a more stable stream of earnings. Data reveal that increased export concentration is strongly correlated with higher export earnings volatility. The least developed countries, for example, had the highest concentration ratio as a group and

exhibited the highest relative deviation in export earnings between 2002 and 2008 (UNDP 2011).

In that respect, regression results by Camanho and Romeu (2011) on Latin America provide evidence that for the period 1996–2008, a 1 % increase in the export concentration ratio resulted in a 0.5 % increase in export revenue volatility. The study also finds out that product diversification attenuated the trade collapse in Latin American countries during the financial crisis of 2008–2009, whereas weaker evidence is attained on market concentration. The conclusion reached by the paper that industry and product diversification significantly affected the resilience of the Latin American countries' trade during the crisis shows coherence with the theoretical arguments explained above.

In like manner, dynamics of the trade collapse that the BRICS and MINT countries experienced upon the global crisis are a matter of interest. Trade data show that all members of the two blocs had declines in export revenues in the year of 2009 through various degrees. On the BRICS side, Russia had a loss of 35.5 %, while the exports of South Africa and Brazil contracted by 27.2 % and 22.7 %, respectively. On the other hand, China's exports earnings marked a 16 % decrease in this period. India, however, weathered the crisis with a one-digit loss of 2.8 %. When it comes to the MINT, the outlook is no better. The most severe revenue decline in the bloc belongs to Nigeria with a 39 % fall, followed by Turkey (22.6 %) and Mexico (21.2 %). Indonesia, on the other hand, appears to have recorded a loss of 15 %.

Regarding this outlook, particularly the steeper declines observed in Russia's and Nigeria's exports, which are characterized by relatively lower sectoral/product diversifications, serve as a reminiscent of the effects of concentration on the trade collapse in times of crises. Inspired from this, Fig. 3 displays the relationship between product concentrations of countries and the corresponding decline rates of exports (trade collapse) in the year of 2009. In addition, data for market concentration and trade collapse for the two emerging blocs are demonstrated in Fig. 4. The Herfindahl Index values employed in both graphs are 1-year lagged.

The trend lines of the two graphs imply associations coherent with some previous findings in literature. This is because, for the BRICS and MINT experiences together, the linear relationship between the level of product/industry diversification and the decline in exports earnings seem to be meaningfully strong, whereas the pattern for partner diversification seems to be relatively inevident.

Put differently, for the case of the 2008–2009 financial crisis, sectoral export concentration appears to have a positive relationship with the size of trade collapse, while market reliance exhibits a weaker pattern for the group of nine emerging economies in question. However, it should also be noted that such an outlook for the market diversification might issue from the "global" nature of the relevant crisis. In cases of regional and/or country-specific economic crises, the effect of market concentration could turn out to be more meaningful.

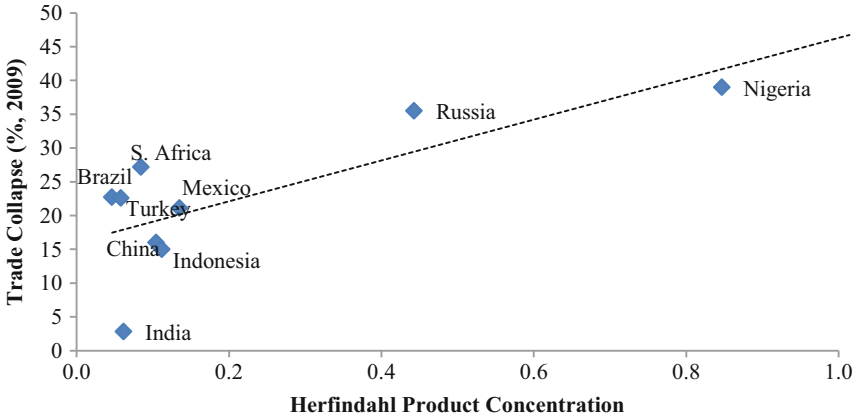

Fig. 3 Product concentration and trade collapse: BRICS + MINT. Data Source: TradeMap, Author's Calculations

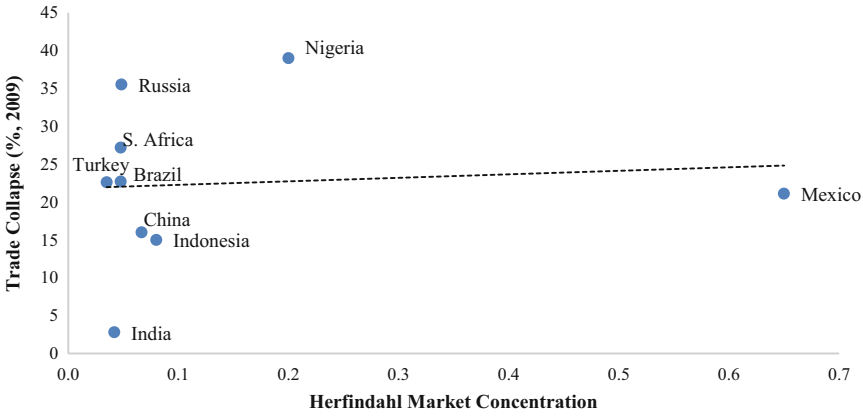

Fig. 4 Market concentration and trade collapse: BRICS + MINT. Data Source: TradeMap, Author's Calculations

5 Conclusion

Export diversification aims at enlarging trade portfolios in terms of products/sectors and partners. Beyond its contribution to growth, diversification is propounded to serve as a hedge against economic crises and shocks. Therefore, taking into account the significant role of exports for emerging economies, some of which rely predominantly on commodity trade, the attention paid to the subject has recently risen.

In an attempt to contribute to the literature, this chapter has provided relevant data for the emerging economies that constitute the BRICS and MINT blocs, along with the Herfindahl index values computed for their "market" and "2-digit product" concentrations. Data for the 2008–2009 global crisis reveal that, upon the shock, all

related countries marked trade collapses with different degrees, while higher sectoral concentration seems to have augmented the adverse effect. In this sense, Russia and Nigeria deliver the most conspicuous examples to the negative correlation witnessed between product diversification and the size of trade collapse, based on the heavy reliance of their exports on mineral fuels and oils.

Relationship between geographical diversification and the change in export earnings, on the other hand, turns out to be quite weak, addressing to an insignificant association between the two. At this point however, the "globally spilled" consequences of the 2008–2009 crisis need to be highlighted, as the potential factor undermining the partner-related effects. Therefore, further studies capturing regional and/or country-specific crises could provide richer evidence to grasp the relationship of interest in a better way.

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Equity and Debt Financing Strategies to Fuel Global Business Operations During Crisis

Muhammad Azeem Qureshi, Tanveer Ahsan, and Toseef Azid

Abstract We use panel data techniques to analyze the debt and equity financing strategies of the non-financial firms operating in the G8 countries and the selected emerging economies and compare them with those adopted during the financial crisis of 2007–2008. For this purpose, we analyze corporate financial data of 9952 firms in the G8 and 10,531 firms in the emerging economies over 12 years (2003–2014) to understand the corporate financing strategies in two different business environments. We find an increase in corporate debt financing in the G8 as well as the emerging economies during the period of financial crisis. Specifically, the firms operating in the G8 increased short-term debt financing whereas the firms operating in the emerging economies increased long-term debt financing. We also find institutional factors playing their role significantly but differently during the period of financial crisis.

1 Introduction

Since the great depression of 1930s, the world has seen three major financial crises known as: the dot.com bubble, the subprime crisis, and the European sovereign debt crisis. Among the three the subprime crisis (2007–2008) is viewed as the worst financial crisis on a global scale. During the subprime crisis, many financial

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institutions collapsed and resulted in a freeze in global credit markets (Erkens et al. 2012) that may have implications for corporate financing decisions. In this study, we intend to investigate the impact of subprime crisis on financing choices of the firms.

Corporate finance literature has evolved over time. During initial three decades of 1960s, 1970s and 1980s, the focus of the studies was the development of theories such as the trade-off theory, pecking order theory, and agency theory (DeAngelo and Mesulis 1980; Myers 1984; Myers and Majluf 1984). During 1990s, the focus of the studies was firm and country level determinants of corporate capital structure (Booth et al. 2001; Rajan and Zingales 1995). During 2000s, the studies shifted their focus towards cross country analysis of debt and equity choices (Gungoraydinoglu and Öztekin 2011; Jong et al. 2008) and investigated that debt and equity choices of the firms differ according to their operating environment. Some recent studies have also investigated the impact of financial crisis and institutional settings (Alves and Francisco 2015; Vermoesen et al. 2013). The objective and approach of this study is novel as compared to the earlier studies carried out in the field of corporate capital structure as this study aims to:

(i) Evaluate the debt and equity financing choices of the firms before, during, and after subprime crisis;
(ii) Evaluate the impact of subprime crisis on debt and equity financing choices of the firms of G8 and selected 16 emerging economies and compare the financing strategies of the firms of the two groups;
(iii) Evaluate the influence of economic conditions and institutional factors on financing choices of the firms.

To carry out the objective of our study, we collect the data of the firms from 24 countries including G8 economies and 16 emerging economies over the years 2003–2014. We apply fixed-effects panel data technique on 75,666 firm-year observations for G8 economies, and 66,374 firm-year observations for 16 emerging economies. We find that the corporate debt financing has increased during the period of financial crisis irrespective of the economy in which they operate. However, the firms operating in G8 economies increased the short-term debt financing while the firms operating in 16 emerging economies increased the long-term debt financing during the period of financial crisis (2007–2008). We also find significant impact of institutional as well as country level variables on financing decisions of the firms.

Organization of the paper is as follows. Along with the introduction in Sect. 1, Sect. 2 builds theoretical framework and identifies determinants of corporate financing decisions. Section 3 describes the data and develops the econometric model grounded in the relevant literature. Section 4 discusses the context of the two different sets of business environments. Section 5 presents and discusses the results. Section 6 puts forward the conclusions and the policy implications. We provide references at the end.

2 Literature Review

2.1 Financial Crisis and Leverage

The financial crisis of 2007–2008, also known as subprime crisis, is considered as the worst financial crisis of the century. It started on 15th September 2008, when Lehman Brothers asked for Chapter 11 of bankruptcy protection. This act of Lehman Brothers sent shock waves all over the world that might have implications for corporate financing decisions. According to Frank and Goyal (2008), aggregate leverage remains stationary over the long periods of time but the market conditions do have its impact on leverage. The market conditions changed considerably during the period of financial crisis and made the investors risk averse. Due to risk aversive behavior of the investors and the financial mediators there was a considerable decline in the syndicated loans and the corporate bond markets during the period of financial crisis. Further, increased information asymmetry during the period of financial crisis affected capital markets and led the firms to use short-term debt as a substitute of long-term debt. Furthermore, increased agency costs between equity-holders and long-term bond-holders (asset substitution) due to investors' risk aversion also affected the bond market. As a result, long-term capital supply decreased while cost of issuing long-term capital increased significantly and the firms had no choice but to issue short-term debt (Ivashina and Scharfstein 2010; Santos 2011). Although the financial crisis of 2007–2008 created credit shocks as well as liquidity problems however, it also effected leverage in a positive manner all over the world through the issuance of short-term debt (Custodio et al. 2013; González 2015; Vermoesen et al. 2013). By compiling the above reasoning, we put forward the following testable hypotheses:

Hypothesis-1: *Aggregate leverage remains stationary over the long periods of time.*

Hypothesis-2: *Market conditions do have an impact on leverage decisions.*

Hypothesis-3: *Firms use more debt as compared to equity during the period of financial crisis.*

Hypothesis-4: *Firms use more short-term debt as compared to long-term debt during the period of financial crisis.*

2.2 Economic Environment and Leverage

A number of empirical studies have concluded that economic environment of the firms do have an impact on their leverage decisions (Booth et al. 2001; Gungoraydinoglu and Öztekin 2011; Jõeveer 2013). Unlike the firm-level variables, economic conditions act differently on the financing decisions of firms operating in different institutional setting (Alves and Francisco 2015). In this study, we investigate two factors associated with economic environment: economic growth rate

and inflation rate. We postulate that higher rate of economic growth provides more corporate investment opportunities to the firms that may require more external finances. Accordingly, economic growth is likely to be positively related with leverage. Alternatively, the firms may manage more revenue during the times of higher economic growth and consequently they have higher supply of internal funds and lesser need for external financing. Accordingly, economic growth may be negatively related with leverage. For inflation, the second economic factor we investigate, the trade-off theory postulates a positive association between tax shield and leverage (Modigliani and Miller 1963) as higher inflation rate provides an opportunity to have higher real value of tax deductions on debt. Accordingly, we expect a positive relationship between inflation rate and leverage. Empirically, Booth et al. (2001) found a positive but statistically insignificant impact of economic growth on corporate leverage for 10 developing countries. They concluded that real economic growth may positively affect book leverage, because firms are expected to raise more financing in the times of economic prosperity. Further, Jong et al. (2008) observed that economic growth does have some impact on corporate debt level in 42 countries and Bokpin (2009) found a negative relationship between economic growth and leverage and positive relationship between inflation rate and leverage for 34 emerging economies. Furthermore, Jõeveer (2013) also observed a negative association between inflation rate and leverage. In line with the above reasoning and empirical results, we formulate the following:

Hypothesis-5: *GDP growth rate is expected to be positively associated with leverage.*

Hypothesis-6: *Inflation rate is expected to be positively associated with leverage.*

We measure economic growth as GDP per capita growth rate and inflation as annual inflation (consumer prices) rate, consistent with previous studies (Ahsan et al. 2016c; Alves and Francisco 2015; Jõeveer 2013).

2.3 Financial Market Development, Business Environment and Leverage

The results of the studies carried out by La Porta et al. (1997, 1998) about institutional variables suggest that shareholders' rights and creditors' rights are very important to study the role of legal environment for corporate capital structure decisions. They observed that countries where investor protection is poor have very smaller financial (debt and equity) markets. Considering stages of market development, Demirguc-Kunt and Maksimovic (1996) observed that initial developments in stock markets produced high debt to equity ratios in 30 developing economies, whereas improvements in already developed stock markets lead towards substitution of debt with equity financing. While comparing civil law and common law systems, Ergungor (2004) explained that financial markets are more developed in

the countries where common law courts are more effective as these courts provide protection to shareholders as well as creditors. Further, Alves and Ferreira (2011) found a direct relationship between leverage and stock market development and an inverse relationship between leverage and banking development using data of 31 countries. Their results are in line with Demirguc-Kunt and Maksimovic (1996) who show that initial development in capital markets lead towards high debt to equity ratios, specifically long-term debt. Furthermore, Muradoğlu et al. (2014) also found positive influence of stock-market development on leverage but their results for the relationship between banking development and leverage were inconclusive. However, a number of empirical studies found a positive relationship between banking development and short-term debt (Alves and Ferreira 2011; Demirguc-Kunt and Maksimovic 1996; Fan et al. 2012). They observe that the short-term debt is easy to monitor as compared to the long-term debt specifically when creditors' right are not well-protected. Empirical studies have also found a positive relationship between stock market development and long-term debt (Alves and Ferreira 2011; Demirguc-Kunt and Maksimovic 1996). In line with the results of these studies, we expect a positive impact of banking development on short-term debt in countries with under-developed legal systems. Further, we expect a positive impact of stock-market development on long-term debt. Following previous studies (Alves and Francisco 2015; Jõeveer 2013), we measure legal conditions of a country by Corruption Perception Index (CPI) of Transparency International (TI) and expect the firms to be more leveraged operating in countries that are considered as more corrupt. For this purpose, we use total value of shares traded during a year as percentage of GDP for stock-market development and total domestic credit provided by the banks during a year as a percentage of GDP for banking development consistent with previous literature (Alves and Francisco 2015; Lee 2012). Following are our hypotheses regarding financial market development and legal environment of a country.

Hypothesis-7: *Stock market development has a positive relationship with long-term debt.*

Hypothesis-8: *Banking development has a positive relationship with short-term debt.*

Hypothesis-9: *Firms operating in countries that are considered more corrupt tend to be more leveraged.*

2.4 Leverage and Firm Level Variables

Consistent with the previous literature (Ahsan et al. 2016a; Alves and Francisco 2015; González 2015), we take book as well as market leverage as dependent variable. We choose firms level variables (tax shield, growth, profitability, asset structure and firm size) that are most commonly used by previous empirical studies in the related field (Alves and Francisco 2015; Booth et al. 2001; González 2015;

Sheikh and Qureshi 2014). In Table 1, we present all dependent and independent variables used in the study, their model name, measurement proxies and source name. We also explain dummy variables used in the study. We take 2007 and 2008 to represent the crisis period consistent with previous studies (Alves and Francisco 2015; Erkens et al. 2012; Ivashina and Scharfstein 2010; Kashyap and Zingales 2010).

Table 1 Dependent and independent variables, their model name and proxy

Variable level	Variable name	Model name	Proxy	Source
Dependent	Short-term book leverage	$STBL_{it}$	Short-term debt/Total assets	Osiris
	Long-term book leverage	$LTBL_{it}$	Long-term debt/Total assets	Osiris
	Short-term market leverage	$STML_{it}$	Short-term debt/(Total assets − Book value of equity + Market value of equity)	Osiris
	Long-term market leverage	$LTML_{it}$	Long-term debt/(Total assets − Book value of equity + Market value of equity)	Osiris
Independent firm level	Tax shield	TS_{it}	Tax payments/Gross profit	Osiris
	Growth	G_{it}	Market to book ratio	Osiris
	Profitability	P_{it}	(Net profit before extraordinary items + Tax payments + Interest expense)/ Total assets	Osiris
	Assets structure	TAN_{it}	Fixed assets/Total asset	Osiris
	Firm size	S_{it}	Ln(Total assets)	Osiris
Country level	Inflation rate	INF_t	Annual inflation (consumer prices) rate	World Bank
	Economic growth	GDP_t	Annual per capita GDP growth rate	World Bank
	Stock market development	SMD_t	Total value of shares traded during the period (% of GDP)	World Bank
	Banking development	BD_t	Domestic credit provided by the banks (% of GDP)	World Bank
	Corruption perception index	CPI_t	Perceptions of the degree of corruption, ranges between 10 (highly clean) and 0 (highly corrupt)	Transparency International
Dummy	Region	D_i	Dummy; 1 for the G8 & 0 for the emerging economies	
	Crisis	D_t	Dummy; 1 for year 2007 and 2008 and 0 for all others	

3 Data and Methodology

3.1 Data

We draw our sample firms from 24 countries[1] including developed (G8) as well as emerging economies. We obtain annual accounting and market data for the period from 2003 to 2014 from Osiris database for listed non-financial firms from the countries mentioned above. We omit the data of financial firms due to their regulated operating environment. Further, to avoid survivorship bias, we include both active and inactive publically traded non-financial firms.

We include a firm in our sample dataset that has non-missing values for the following heads in Osiris database: current liabilities, non-current liabilities, fixed assets, total assets, market value per share, book value per share, number of shares outstanding, tax payments, gross profit, net profit before extraordinary items, and interest expense. A firm with missing values on these heads has been excluded from our sample dataset. After all these steps of data cleaning, 9952 firms with 75,666 firm-year observations for G8 economies, and 10,531 firms with 66,374 firm-year observations for 16 emerging economies remain in our final dataset. Further, to reduce the impact of potential outliers we winsorize all firm-level variables at 1% from both the sides (top and bottom) of the own variable distribution. We obtain the data for macroeconomic variables (inflation, GDP, capital market development, banking development) from the World Bank database (WDI) and for Corruption Perception Index from the Transparency International (TI).

3.2 Methodology

In order to analyze an unbalanced panel of 75,666 firm-year observations for G8 economies, and 66,374 firm-year observations for selected emerging economies, the study considers panel data analysis as an appropriate technique that is also used in akin studies (Ahsan et al. 2016b; Alves and Francisco 2015). Of the two contending models, random-effects model (REM) and fixed-effects model (FEM), we choose later following the nature of our dataset.[2] Further, the aim of the study is to find out the variations in the capital structure of the firms operating in G8 economies and emerging economies over the years from 2003 to 2014, therefore,

[1]Canada, France, Germany, Italy, Japan, United Kingdom, United States, Russian Federation, Brazil, China, Egypt, India, Indonesia, Iran, Israel, Malaysia, Mexico, Nigeria, Pakistan, Philippines, Poland, South Africa, Taiwan and Turkey.

[2]According to (Wooldridge 2012) fixed-effects model has no problem to deal with an unbalanced panel data.

FEM is the best choice for our analysis (Baltagi 2005). We present our model in the following equation:

$$L_{it} = \beta_0 + \beta_x X_{it} + \beta_y Y_t + \alpha_i + \varepsilon_{it}$$

where L_{it} is one of the book and market measures of leverage ($STBL_{it}$, $LTBL_{it}$, $STML_{it}$, $LTML_{it}$) for the ith firm at time t, X_{it} are the firm level explanatory variables of ith firm at time t; Y_t are the country level explanatory variables at time t; β_x are the coefficients for the X_{it}, β_y are the coefficients for the Y_t, β_0 is intercept, α_i are panel (firm) fixed-effects, and ε_{it} are the remainder error component for the ith firm at time t.

3.3 Descriptive Statistics

Table 2 represents summary statistics of all the proxies used to measure dependent and explanatory variables for G8 and emerging economies, separately.

The mean value 22.9 % for short-term book leverage and 22.3 % for long-term book leverage for G8 economies, and 33.9 % for short-term book leverage and 16.9 % for long-term book leverage for emerging economies indicate a higher use of short-term debt by the firms in emerging economies as compared to the firms in G8 economies. Furthermore, the mean value of 1.4 % for inflation rate for G8 economies and 5.1 % for emerging economies explain that emerging economies have experienced higher inflation rate as compared to G8 economies. On the other hand, the mean value of 1.2 % for economic growth rate for G8 economies and 6.2 % for emerging economies indicate that emerging economies have enjoyed higher economic growth as compared to G8 economies. Moreover, the mean value of 1.345 for stock-market development for G8 economies and 0.690 for emerging economies explain that the stock-markets of G8 economies are far more developed as compared to their emerging economies' counterparts. However, corruption level in emerging economies is much higher (mean value of 4.102 for CPI for the emerging economies) as compared to that in G8 economies (mean value of 7.411 for CPI for G8 economies).

Figure 1a shows mean leverage ratios for G8 economies over the period under study. It depicts that both of the book leverage ratios for G8 economies remained almost smooth over the period under study, with a minor increase during the period of financial crisis (Hypothesis-1). But, we observe a jump in both of the market leverage ratios during the period of financial crises 2007–2008 suggesting that market conditions do have an impact on market leverage ratios of G8 economies (Hypothesis-2).

Figure 1b shows mean leverage ratios for emerging economies over the period under study. It depicts an increase in both of the market leverage ratios for emerging economies during the period of financial crisis (Hypothesis-2). But, we observe a

Table 2 Descriptive statistics of sample firms

	G8 economies (9952 firms, 75,666 firm-year observations)					16 emerging economies (10,531 firms, 66,374 firm-year observations)				
Variable	Mean	SD	Median	25th	75th	Mean	SD	Median	25th	75th
$STBL_{it}$	0.299	0.170	0.274	0.167	0.403	0.339	0.180	0.314	0.195	0.459
$LTBL_{it}$	0.223	0.181	0.181	0.074	0.330	0.169	0.163	0.117	0.039	0.255
$STML_{it}$	0.268	0.185	0.228	0.118	0.386	0.311	0.197	0.273	0.152	0.440
$LTML_{it}$	0.194	0.166	0.155	0.060	0.284	0.163	0.171	0.101	0.030	0.243
TS_{it}	0.054	0.082	0.047	0.008	0.096	0.053	0.077	0.046	0.013	0.087
G_{it}	1.404	0.917	1.121	0.904	1.548	1.365	0.926	1.076	0.853	1.526
P_{it}	0.042	0.126	0.054	0.018	0.096	0.070	0.091	0.065	0.030	0.110
TAN_{it}	0.513	0.234	0.498	0.337	0.686	0.470	0.219	0.464	0.304	0.632
S_{it}	12.896	2.080	12.844	11.491	14.307	11.948	1.858	11.952	10.728	13.112
INF_t	0.014	0.016	0.016	0.001	0.026	0.051	0.042	0.040	0.020	0.076
GDP_t	0.012	0.022	0.017	0.001	0.024	0.062	0.033	0.063	0.041	0.087
SMD_t	1.345	0.866	1.093	0.737	1.643	0.690	0.432	0.619	0.385	0.908
BD_t	0.942	0.349	0.995	0.593	1.077	0.933	0.571	0.714	0.496	1.276
CPI_t	7.411	0.857	7.400	7.300	7.700	4.102	1.096	3.600	3.400	5.000

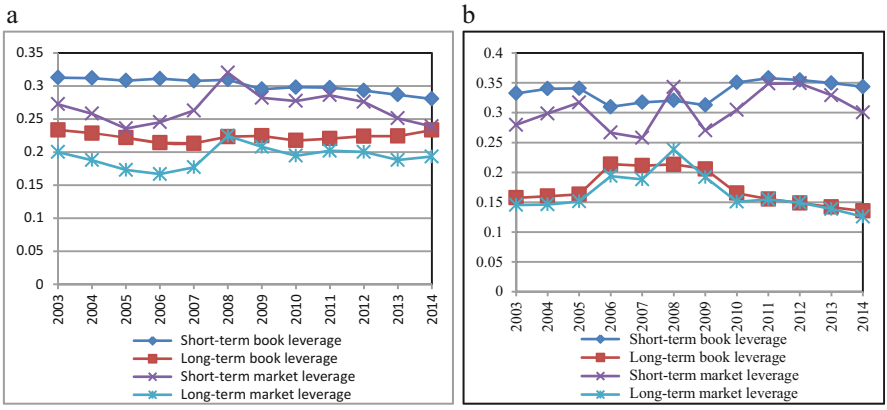

Fig. 1 Mean leverage ratios. (**a**) The G8 economies (**b**) The emerging economies

decrease in short-term book leverage ratio and an increase in long-term book leverage ratio of emerging economies during the period of financial crises 2007–2008.

3.4 Robustness and Sensitivity Analysis

We use five firm level and five country level variables along with one dummy variable for the financial crisis 2007–2008. Further, we also use interaction term of the dummy variable with the country level variables. Autocorrelation and multicollinearity might be an issue for such a big database and a large number of variables. We find that Variation Inflation Factor (VIF) for interaction term of dummy variable with CPI_t, SMD_t, and BD_t is more than 10 for different models (Nachane 2006; Ott and Longnecker 2001). To avoid multicollinearity issue, we use three models. In Model-1, we include five country level variables and dummy for the crisis period 2007–2008 along with five firm level control variables. In Model-2, we include five country level variables and interaction term of INF_t, GDP_t and CPI_t with dummy for the crisis period 2007–2008, and five firm level control variables. Finally in Model-3, we include five country level variables and interaction term of SMD_t, and BD_t with dummy for the crisis period 2007–2008. In all three models we include five firm level control variables. To ensure validity and robustness of the results, we carry out some post estimation tests such as modified Wald test for group-wise heteroskedasticity in fixed effects regression model and Wooldridge test for autocorrelation in panel data. As a remedy for autocorrelation, we use robust standard errors adjusted for heteroskedasticity and clustered robust standard errors adjusted for clusters in panels (firms).

4 Empirical Results

4.1 Short-Term Leverage

In Table 3, we present the results of fixed-effects model for short-term leverage ratio for the G8 and the emerging economies. Panel-A presents the results of short-term book leverage ($STBL_{it}$) while Panel-B presents the results of short-term market leverage ($STML_{it}$). We include and exclude interaction term of country level variables with financial crisis dummy in different models to avoid multicollinearity. For the G8 economies, our models explain 13–15 % of the variations in short-term book leverage and 38–40 % of the variations in short-term market leverage. For the emerging economies, our models explain 13–16 % of the variations in short-term book leverage and 26–29 % of the variations in short-term market leverage.

The firms in operating in two different environments display opposing short-term debt financing behavior. The positive coefficients of D_t (dummy for the crisis period 2007–2008) in Model-1 of Panel-A and Panel-B for the G8 economies suggest that the firms operating in these economies increased the use of short-term debt financing during the period of financial crisis, supporting our Hypothesis-4. On the other hand, negative coefficients of D_t in Model-1 of Panel-A and Panel-B for the 16 emerging economies explain that the firms operating in these economies decreased the use of short-term debt financing during the period of financial crisis, opposing our Hypothesis-4.

Contrary to the Hypothesis-6, we find a significant negative relationship of INF_t with $STBL_{it}$ as well as $STML_{it}$ for the G8 economies. This relationship turns positive during the crisis period (positive relationship of D^*INF_t with $STBL_{it}$ and $STML_{it}$ in Model-2) suggesting that the firms operating in the G8 economies increased the use of short-term debt financing during the period of financial crisis (supporting Hypothesis-4) may be due to easy access. On the other hand, we find a significant positive relationship of INF_t with $STBL_{it}$ as well as $STML_{it}$ for the 16 emerging economies (supporting Hypothesis-6). This relationship turns negative during the crisis period (negative relationship of D^*INF_t with $STBL_{it}$ and $STML_{it}$ in Model-2) suggesting that the firms operating in these emerging economies decreased the use of short-term debt financing (opposing Hypothesis-4) with an increase in inflation rate during the period of financial crisis.

Further, we find significant positive relationship of GDP_t with $STBL_{it}$ (supporting our Hypothesis-5) and negative with $STML_{it}$ in all three models for the G8 economies. The negative relationship of GDP_t with $STML_{it}$ remains same during the crisis period (negative relationship of D^*GDP_t with $STML_{it}$ in Model-2 of Table 3 Panel-B). However, the positive relationship of GDP_t with $STBL_{it}$ turns negative during the crisis period (negative relationship of D^*GDP_t with $STBL_{it}$ in Model-2 of Table 3 Panel-A) indicating that during the period of crisis the firms operating in the G8 economies may have relied on the supply of internal funds to fulfill their financing needs. On the other hand, we find a significant negative relationship of GDP_t with $STBL_{it}$ as well as with $STML_{it}$ in Model-2 for

Table 3 Results of fixed effects analysis for short-term leverage ratio

	G8 economies						16 emerging economies					
	Coef.	Prob.	Coef.	Prob.	Coef.	Prob.	Coef.	Prob.	Coef.	Prob.	Coef.	Prob.
	(1)		(2)		(3)		(1)		(2)		(3)	
Panel-A: Short-term book leverage ($STBL_{it}$)												
INF_t	−0.198	0.000	−0.208	0.000	−0.185	0.000	0.559	0.000	0.641	0.000	0.489	0.000
GDP_t	0.084	0.000	0.097	0.000	0.079	0.000	0.027	0.104	−0.060	0.001	0.043	0.009
CPI_t	−0.010	0.000	−0.010	0.000	−0.011	0.000	−0.008	0.001	−0.007	0.002	−0.007	0.004
SMD_t	0.000	0.574	0.000	0.590	0.000	0.958	−0.020	0.000	−0.028	0.000	−0.027	0.000
BD_t	−0.018	0.007	−0.018	0.009	−0.022	0.001	−0.003	0.288	0.003	0.192	−0.004	0.094
D_t	0.009	0.000					−0.018	0.000				
D^*INF_t			0.003	0.959					−0.599	0.000		
D^*GDP_t			−0.133	0.006					0.275	0.000		
D^*CPI_t			0.001	0.000					0.001	0.280		
D^*SMD_t					0.001	0.098					−0.015	0.000
D^*BD_t					0.007	0.000					0.015	0.000
TS_{it}	0.029	0.000	0.029	0.000	0.029	0.000	−0.049	0.000	−0.049	0.000	−0.047	0.000
G_{it}	0.007	0.000	0.007	0.000	0.007	0.000	0.010	0.000	0.011	0.000	0.012	0.000
P_{it}	−0.132	0.000	−0.132	0.000	−0.132	0.000	−0.258	0.000	−0.260	0.000	−0.262	0.000
TAN_{it}	−0.156	0.000	−0.156	0.000	−0.156	0.000	−0.202	0.000	−0.203	0.000	−0.201	0.000
S_{it}	−0.014	0.000	−0.014	0.000	−0.014	0.000	0.029	0.000	0.029	0.000	0.032	0.000
Constant	0.651	0.000	0.648	0.000	0.656	0.000	0.108	0.000	0.117	0.000	0.081	0.001
F-Stat.	91.40	0.000	79.55	0.000	83.69	0.000	164.86	0.000	148.95	0.000	149.81	0.000
R-Sq.	0.1412		0.1410		0.1395		0.1490		0.1538		0.1360	
Observations	75,666		75,666		75,666		66,374		66,374		66,374	
No. of firms	9952		9952		9952		10,531		10,531		10,531	
Panel-B: Short-term market leverage ($STML_{it}$)												
INF_t	−0.213	0.000	−0.391	0.000	−0.165	0.000	0.796	0.000	0.884	0.000	0.675	0.000

GDP_t	−0.121	0.000	−0.025	0.075	−0.143	0.000	−0.224	0.000	−0.311	0.000	−0.196	0.000
CPI_t	0.000	0.980	0.003	0.112	−0.001	0.529	−0.001	0.540	−0.002	0.467	0.000	0.922
SMD_t	−0.017	0.000	−0.019	0.000	−0.020	0.000	−0.046	0.000	−0.053	0.000	−0.056	0.000
BD_t	0.038	0.000	0.038	0.000	0.021	0.001	−0.008	0.003	−0.004	0.122	−0.016	0.000
D_t	0.035	0.000					−0.005	0.003				
D^*INF_t			0.310	0.000					−0.692	0.000		
D^*GDP_t			−0.977	0.000					0.222	0.000		
D^*CPI_t			0.005	0.000					0.006	0.000		
D^*SMD_t					0.007	0.000					−0.024	0.000
D^*BD_t					0.022	0.000					0.044	0.000
TS_{it}	−0.016	0.016	−0.014	0.031	−0.016	0.014	−0.081	0.000	−0.081	0.000	−0.077	0.000
G_{it}	−0.062	0.000	−0.061	0.000	−0.062	0.000	−0.073	0.000	−0.072	0.000	−0.070	0.000
P_{it}	−0.161	0.000	−0.158	0.000	−0.161	0.000	−0.253	0.000	−0.256	0.000	−0.257	0.000
TAN_{it}	−0.133	0.000	−0.132	0.000	−0.133	0.000	−0.169	0.000	−0.170	0.000	−0.169	0.000
S_{it}	0.002	0.300	0.002	0.237	0.002	0.203	0.031	0.000	0.030	0.000	0.035	0.000
Constant	0.394	0.000	0.373	0.000	0.416	0.000	0.156	0.000	0.171	0.000	0.127	0.000
F-Stat.	424.11	0.000	422.22	0.000	398.87	0.000	620.14	0.000	525.70	0.000	635.30	0.000
R-Sq.	0.3921		0.3868		0.3956		0.2802		0.2843		0.2631	
Observations	75,666		75,666		75,666		66,374		66,374		66,374	
No. of firms	9952		9952		9952		10,531		10,531		10,531	

the emerging economies that turns positive during the crisis period (positive relationship of D^*GDP_t with $STBL_{it}$ as well as $STML_{it}$ Panel-A and Panel-B of Table 3). These relationships indicate that under better economic conditions the firms operating in the emerging economies reduce their dependence on short-term debt but the squeeze during the crisis period forces them to raise short-term financing.

Furthermore, we do not find any significant relationship between SMD_t and $STBL_{it}$ (Model-3 in Table 3 Panel-A) but we do find a significant negative relationship of SMD_t and $STML_{it}$ and a significant positive relationship of BD_t and $STML_{it}$ (Model-3 in Table 3 Panel-B), for the G8 economies. These significant relationships provide support for our Hypothesis-7 and Hypothesis-8 that the developed stock markets in the G8 economies discourage the use of short-term debt financing but at the same time developed banking systems encourage firms to use more short-term debt financing. During the crisis period, we find significant positive relationship of SMD_t and BD_t with $STBL_{it}$ as well as $STML_{it}$ (Model-3 in Table 3 Panel-A and Panel-B) for the G8 economies. These relationships support our Hypothesis-3 that the firms increase the use of debt financing during the period of financial crisis. For the emerging economies, we find a significant negative relationship of SMD_t with $STBL_{it}$ and $STML_{it}$, in favor of our Hypothesis-7. This relationship remains the same during the period of crisis (Model-3 in Table 3 Panel-A and Panel-B). Contrary to our Hypothesis-8, we find a significant negative relationship of BD_t with $STBL_{it}$ and $STML_{it}$, that turns positive during the period of crisis (positive relationship of D^*BD_t with $STBL_{it}$ as well as $STML_{it}$ in Model-3 of Table 3, Panel-A and Panel-B) favoring our Hypothesis-4.

Moreover, we find a significant negative relationship of CPI_t with $STBL_{it}$ of the G8 as well as the emerging economies that turns positive during the crisis period (positive relationship of D^*CPI_t with $STBL_{it}$ and $STML_{it}$ in Model-2) suggesting that lower level of corruption builds owners' faith in the system and consequently they increase the level of their equity investment in the firm reducing the use of debt financing in the G8 as well as the emerging economies supporting our Hypothesis-9. However, during the period of financial crisis the firms operating in the G8 as well as the emerging economies increased the use of short-term debt financing regardless of the level of corruption. We do not find any significant relationship between CPI_t and $STML_{it}$ for both types of the economies.

4.2 Long-Term Leverage

In Table 4, we present the results of fixed-effects model for long-term leverage ratio for the G8 and the 16 emerging economies. Panel-A presents the results of long-term book leverage ($LTBL_{it}$) while Panel-B presents the results of long-term market leverage ($LTML_{it}$). For the G8 economies, our models explain 37–38 % of the variations in long-term book leverage and 35–36 % of the variations in long-term

Table 4 Results of fixed effects analysis for long-term leverage ratio

	G8 economies						16 emerging economies					
	Coef.	Prob.	Coef.	Prob.	Coef.	Prob.	Coef.	Prob.	Coef.	Prob.	Coef.	Prob.
	(1)		(2)		(3)		(1)		(2)		(3)	
Panel-A: Long-term book leverage ($LTBL_{it}$)												
INF_t	−0.182	0.000	−0.291	0.000	−0.223	0.000	−0.555	0.000	−0.654	0.000	−0.495	0.000
GDP_t	−0.031	0.012	0.016	0.217	−0.034	0.006	0.081	0.000	0.184	0.000	0.063	0.000
CPI_t	−0.001	0.556	0.000	0.765	−0.001	0.745	−0.022	0.000	−0.022	0.000	−0.023	0.000
SMD_t	0.001	0.343	0.000	0.825	−0.002	0.129	0.020	0.000	0.030	0.000	0.026	0.000
BD_t	−0.011	0.089	−0.010	0.123	−0.012	0.073	−0.018	0.000	−0.026	0.000	−0.018	0.000
D_t	−0.002	0.127					0.034	0.000				
$D*INF_t$			0.157	0.002					0.702	0.000		
$D*GDP_t$			−0.470	0.000					−0.335	0.000		
$D*CPI_t$			0.000	0.317					0.003	0.000		
$D*SMD_t$					0.002	0.027					0.022	0.000
$D*BD_t$					−0.001	0.452					−0.007	0.000
TS_{it}	−0.033	0.000	−0.032	0.000	−0.033	0.000	−0.005	0.528	−0.005	0.529	−0.008	0.339
G_{it}	0.000	0.888	0.000	0.629	0.000	0.998	−0.003	0.000	−0.003	0.000	−0.005	0.000
P_{it}	−0.094	0.000	−0.093	0.000	−0.094	0.000	−0.077	0.000	−0.075	0.000	−0.073	0.000
TAN_{it}	0.206	0.000	0.207	0.000	0.206	0.000	0.163	0.000	0.164	0.000	0.161	0.000
S_{it}	0.028	0.000	0.028	0.000	0.028	0.000	0.025	0.000	0.026	0.000	0.023	0.000
Constant	−0.214	0.000	−0.225	0.000	−0.214	0.000	−0.090	0.000	−0.098	0.000	−0.057	0.011
F-Stat.	130.22	0.000	123.74	0.000	121.66	0.000	139.80	0.000	128.40	0.000	112.65	0.000
R-Sq.	0.3768		0.3746		0.3743		0.1252		0.1253		0.1239	
Observations	75,666		75,666		75,666		66,374		66,374		66,374	
No. of firms	9952		9952		9952		10,531		10,531		10,531	

(continued)

Table 4 (continued)

	G8 economies						16 emerging economies					
	Coef.	Prob.	Coef.	Prob.	Coef.	Prob.	Coef.	Prob.	Coef.	Prob.	Coef.	Prob.
	(1)		(2)		(3)		(1)		(2)		(3)	
Panel-B: Long-term market leverage ($LTML_{it}$)												
INF_t	−0.083	0.011	−0.332	0.000	−0.150	0.000	−0.411	0.000	−0.535	0.000	−0.357	0.000
GDP_t	−0.158	0.000	−0.052	0.000	−0.173	0.000	−0.131	0.000	0.005	0.727	−0.155	0.000
CPI_t	0.001	0.658	0.004	0.013	0.001	0.396	−0.018	0.000	−0.019	0.000	−0.019	0.000
SMD_t	−0.002	0.008	−0.005	0.000	−0.009	0.000	0.013	0.000	0.027	0.000	0.016	0.000
BD_t	0.024	0.000	0.025	0.000	0.016	0.013	−0.017	0.000	−0.029	0.000	−0.018	0.000
D_t	0.009	0.000					0.044	0.000				
D^*INF_t			0.441	0.000					0.865	0.000		
D^*GDP_t			−1.057	0.000					−0.476	0.000		
D^*CPI_t			0.002	0.000					0.005	0.000		
D^*SMD_t					0.008	0.000					0.030	0.000
D^*BD_t					0.000	0.960					−0.006	0.003
TS_{it}	−0.074	0.000	−0.072	0.000	−0.074	0.000	−0.031	0.000	−0.031	0.000	−0.035	0.000
G_{it}	−0.035	0.000	−0.034	0.000	−0.035	0.000	−0.032	0.000	−0.032	0.000	−0.033	0.000
P_{it}	−0.105	0.000	−0.102	0.000	−0.105	0.000	−0.090	0.000	−0.087	0.000	−0.086	0.000
TAN_{it}	0.171	0.000	0.172	0.000	0.171	0.000	0.175	0.000	0.175	0.000	0.172	0.000
S_{it}	0.029	0.000	0.029	0.000	0.029	0.000	0.028	0.000	0.029	0.000	0.026	0.000
Constant	−0.229	0.000	−0.253	0.000	−0.220	0.000	−0.102	0.000	−0.110	0.000	−0.066	0.002
F-Stat.	328.77	0.000	340.22	0.000	324.50	0.000	279.23	0.000	249.39	0.000	233.05	0.000
R-Sq.	0.3599		0.3544		0.3588		0.1821		0.1831		0.1857	
Observations	75,666		75,666		75,666		66,374		66,374		66,374	
No. of firms	9952		9952		9952		10,531		10,531		10,531	

market leverage. For the 16 emerging economies, our models explain 12–13 % of the variations in long-term book leverage and 18–19 % of the variations in long-term market leverage.

The negative coefficient of D_t in Model-1 of Panel-A supports our Hypothesis-4 and explains that the firms in the G8 economies decreased the use of long-term debt financing during the period of crisis. However, positive coefficient of D_t in Model-1 of Panel-B for the G8 economies oppose our Hypothesis-4. Contrary to our Hypothesis-4, we find a positive coefficient of D_t in Model-1 of Panel-A and Panel-B for the 16 emerging economies suggesting that the firms operating in these emerging economies increased the use of long-term debt financing during the period of financial crisis.

We find a significant negative relationship of INF_t with $LTBL_{it}$ as well as $LTML_{it}$ for the G8 as well as the emerging economies that turns positive during the crisis period (positive relationship of D^*INF_t with $LTBL_{it}$ and $LTML_{it}$ in Model-2) indicating that the firms operating in these economies increased the use of long-term debt financing (opposite to our Hypothesis-4) with an increase in inflation rate during the financial crisis period.

Further, we find a positive but insignificant relationship of GDP_t with $LTBL_{it}$ in Model-2, a significant negative relationship in Model-1 and Model-3, and a significant negative relationship with $LTML_{it}$ in all three models for the G8 economies. The negative relationship of GDP_t with $LTBL_{it}$ as well as $LTML_{it}$ remains the same during the crisis period (negative relationship of D^*GDP_t with $LTBL_{it}$ and $LTML_{it}$ in Model-2 in Panel-A and Panel-B). On the other hand, we find a significant positive relationship of GDP_t with $LTBL_{it}$ and a positive but insignificant relationship with $STML_{it}$ in Model-2 for the emerging economies that turns negative during the crisis period (negative relationship of D^*GDP_t with $LTBL_{it}$ as well as $LTML_{it}$, Panel-A and Panel-B). These relationships explain that the firms operating in the emerging economies prefer to finance their business projects with debt financing (Hypothesis-5) but during the period of crisis these firms had to rely on available short-term debt along with their internal funds.

Furthermore, we do not find any significant relationship between SMD_t and $LTBL_{it}$ (Model-3 Panel-A) but we do find a significant negative relationship of SMD_t and $LTML_{it}$ (Model-3 Panel-B) for the G8 economies (opposite to our Hypothesis-7). For the emerging economies, we find a significant positive relationship between SMD_t and $LTBL_{it}$ as well as $LTML_{it}$ for all three models (supporting our Hypothesis-7) that remains same during the crisis period (positive relationship of D^*SMD_t with $LTBL_{it}$ as well as $LTML_{it}$, Panel-A and Panel-B). Further, we find a significant negative relationship between BD_t and $LTBL_{it}$ for all three models for the G8 as well as the emerging economies that remains the same during the crisis period (negative relationship of D^*BD_t with $LTBL_{it}$, Panel-A). However for $LTML_{it}$, we find a significant positive relationship of BD_t for the G8 economies and a significant negative relationship for the emerging economies during normal as well as crisis period.

Moreover, the relationship of CPI_t with $LTBL_{it}$ of the G8 economies remains insignificant during normal as well as the crisis period, but we find a significant positive relationship of CPI_t with $LTML_{it}$ for the G8 economies that remains positive during the crisis period (positive relationship of D^*CPI_t with $LTML_{it}$ in Model-2). On the other hand, we find a significant negative relationship of CPI_t with $LTBL_{it}$ as well as $LTML_{it}$ for the emerging economies, explaining that lower level of corruption reduces the agency conflict and consequently the firms use lesser debt financing in the emerging economies (in favor of Hypothesis-9). However, during the financial crisis period firms operating in the G8 as well as the emerging economies increased the use of long-term debt financing regardless of the level of corruption in their economies.

5 Discussion of Results

The results indicate that book leverage ratios for the G8 remained almost stationary during the period from 2003 to 2014 with a minor increase during financial crisis (Fig. 1). On the other hand, we observe a decrease in short-term book leverage ratio and an increase in long-term book leverage ratio for the emerging economies during the period of financial crisis (Fig. 1). However, the two ratios revert back to their pre-crisis level. Our results highlight the sticky nature of corporate financial leverage in the two different contexts. Similar results of Frank and Goyal (2008) led them to demand a satisfactory theory that must explain as to why the firms keep leverage stationary and why the environment serves to maintain the leverage despite managerial differences. We observe that capital structure is path-dependent and support the connotation of Bhamra et al. (2008). We observe that path-dependence theory (Nelson and Winter 1982) may explain this observed sticky nature of book leverage. The results for market leverage however, reject our Hypothesis-1. Consequently, these results suggest a little amendment in Hypothesis-1. We can state that the book leverage is path-dependent and generally remains stationary over the long periods of time. In support of our Hypothesis-2, we observe changes in book leverage ratios in the emerging economies and a jump in market leverage ratios in both the contexts during the financial crises period suggesting that the capital market conditions do have an impact on corporate leverage decisions.

The results also indicate that during the period of financial crisis the firms operating in the G8 as well as the emerging economies increased the use of debt financing. However, their choice was different. The firms operating in the G8 economies increased short-term debt financing during the period of financial crisis, whereas the firms operating in the emerging economies increased long-term debt financing during the period of financial crisis (Tables 3 and 4). These results generally support our Hypothesis-3. We observe that these firms might be

constrained by poor supply of internal funds due to financial crisis and the poor market conditions might also have restricted them to issue new equity. Resultantly, these firms had to raise debt to finance their needs. Another plausible explanation comes from agency theory that suggests that the stockholders try to pass on their risk to the creditors by raising debt during crisis. Further, increased use of short-term debt by the firms in the G8 countries possibly indicates that the firms consider the financial crisis as a temporary phenomenon and raise short-term debt to finance their needs whereas their counterparts in the emerging economies consider it a long-term phenomenon and raise long-term debt. Alternatively, it seems easier to raise long-term debt in the emerging markets as compared to the G8 economies even during the financial crisis. We also find that good economic conditions provide investment opportunities to the firms, irrespective of their country. The firms operating in the G8 economies raise short-term as well as long-term debt financing to avail these opportunities. However, during the period of financial crisis these firms reduce their debt dependence and consequently they forego their growth as well as profitability. On the other hand, good economic conditions helped the firms operating in the emerging economies to adjust their term structure by raising long-term debt and paying-off short-term debt during normal time periods whereas they raised short-term debt and paid-off long-term debt during the period of financial crisis.

The firms belonging to two different groups display similar long-term financing strategy whereas opposing short-term financing strategy while facing inflation not only during normal period but also during financial crisis. Normally, they decrease their long-term debt financing with an increase in inflation rate whereas during crisis they increase their long-term debt. For short-term debt, the firms operating in the G8 economies decrease their short-term debt with an increase in inflation rate whereas their counterparts in the emerging economies increase their short-term debt. However, during the period of financial crisis they do the opposite. Except for short-term debt in the emerging economies, these results reject our Hypothesis-6.

We find that stock market development does not have any significant effect on book leverage ratios of the firms operating in the G8 economies. The plausible reason may be that the stock-market of these countries are already developed enough that further development does not have any significant impact. On the other hand, stock-market development has a direct relationship with long-term debt of the firms in emerging economies, in line with Demirguc-Kunt and Maksimovic (1996) where they explain that initial development in stock market produces high debt to equity ratio in emerging economies.

Moreover, we find that lower level of corruption encourages the use of equity financing in the G8 as well as the emerging economies. However, during the period of financial crisis the firms operating in two different settings increase the use of debt financing regardless the level of corruption. Table 5 summarizes the hypotheses developed in the study and the observed financing behavior of the firms operating in the G8 as well as the emerging economies.

Table 5 Summary of the hypotheses developed in the study

Hypothesis no.	$STBL_{it}$	$LTBL_{it}$	$STML_{it}$	$LTML_{it}$	$STBL_{it}$	$LTBL_{it}$	$STML_{it}$	$LTML_{it}$
1.	True	True	False	False	False	False	False	False
2.	True	True	True	True	True	True	True	True
3.	True	True	True	True	False	True	True	True
4.	True		True		False		False	
5.	True	True	False	False	False	True	False	True
6.	False	False	False	False	True	False	True	False
7.		False		False		True		True
8.	False		True		False		False	
9.	True	False	False	False	True	True	True	True

6 Conclusions Drawn and Policy Implications

The study analyzes the impact of recent financial crisis (2007–2008) on the business operations and investigates financing strategies adopted by the businesses during the financial crisis. This study carries out this analysis by comparing the strategies of the firms operating in the G8 economies with the firms operating in the 16 emerging economies. To accomplish this, the study applies fixed-effects technique on a panel data of 75,666 firm-year observations for the G8 economies and 66,374 firm-year observations for the 16 emerging economies. We observe a generally stick nature of the book leverage in two different contexts and consider that path dependence theory may provide a better explanation. We also find a major increase in the market leverage ratios of both types of the economies during the period of financial crisis. The results also highlight that the firms operating in the G8 as well as the emerging economies increased the use of debt financing during the period of financial crisis. Further, we find out that the firms operating in the G8 economies manage the impact of financial crisis with an increase in short-term debt financing while, the firms operating in the emerging economies do it by increasing long-term debt financing. We observe that raising long-term debt is seemingly easy in the emerging economies. The WDI database[3] shows that the 16 emerging economies have higher average non-performing loans to total gross loans ratio (6.8 %) as compared to that of the G8 economies (3.8 %) during the study period. Moreover, the 16 emerging economies are weaker as compared to the G8 economies on strength of legal rights index of WDI. The policy implication of our finding and the WDI data is that regulators need not only to reconsider the governance mechanism of their credit markets but also to improve the legal rights of the creditors to help develop their firms and the economies.

The results suggest that the firms operating in two different economic environments increased their debt with an increase in inflation rate during the financial crisis. We also observe that lower economic growth during the period of financial

[3] http://databank.worldbank.org/data/reports.aspx?source=world-development-indicators

crisis hurts profitability of the firms operating in the G8 as well as the emerging economies and as a result these firms raise debt to finance their business activities. Further, we explore the role of stock-market development and find out that its impact was more significant during the period of crisis as compared to normal time periods for the G8 as well as the emerging economies. Furthermore, we find a positive impact of banking development on debt ratio of the firms during the period of crisis irrespective of their country. Moreover, we explore that the firms, operating in economies with higher level of corruption, have higher leverage ratio as compared to the firms operating in lower corruption level countries. But, level of corruption becomes irrelevant during the period of crisis and the firms increase their debt irrespective of corruption level of their operating economy. These results highlight the need for legislation to help curb corruption to help develop a resilient corporate arena.

The results of our study have impending policy implications as they imply that the recent financial crisis not only affected financing strategies of the firms but did so in a different way across different economies. Our results have confirmed the relevance of the stock-market development and banking development with corporate financing strategies.

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Part III
Market Anomalies and Price Fluctuations in Capital Markets During Crisis

Stock Market Development and Economic Growth: The Case of MSCI Emerging Market Index Countries

Veli Akel and Talip Torun

Abstract Aim of this study is to empirically investigate the role of stock market development on economic growth of the emerging markets listed in MSCI Emerging Market Index using annual data over the period from 1995 to 2012. We employ Panel Data Analysis to examine this relationship. The MSCI Emerging Market Index is a free float-adjusted market capitalization index that is designed to measure equity market performance of emerging markets. The MSCI Emerging Market Index consists of the following 19 emerging market country indices: Brazil, Chile, China, Colombia, Czech Republic, Egypt, Hungary, India, Indonesia, Morocco, Mexico, Peru, Philippines, Poland, Russia, South Africa, Korea, Thailand, and Turkey. Among the stock market development indicators used in the study, stock market capitalization ratio is used as a proxy for market size while value traded ratio and turnover ratio are used as proxies for market liquidity. The individual indicators of stock market development reveal that the market capitalization and turnover ratios robustly and positively influence the level of economic growth.

1 Introduction

There are numerous studies in the literature that theoretically and empirically examine the relationship between financial development and economic growth. These academic studies date back to the seminal work of Schumpeter (1934), which suggests that a well-functioning financial system enhance economic growth. The empirical and theoretical literature on this subject may be grouped four main paradigms: supply-leading hypothesis, demand-following hypothesis, bidirectional causality or feedback hypothesis (cautionary hypothesis) and neutrality hypothesis.

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Only a few studies, however, also suggest that financial development on economic growth have failed to give a consensus or a clear direction.

The first paradigm is supply-leading hypothesis, which states that financial development causes economic growth. Most of studies on financial development-economic growth nexus, support supply leading hypothesis, such as Levine (1991), Levine and Zervos (1996), Levine and Zervos (1998), Beck et al. (2000), Beck and Levine (2004), Christopoulos and Tsionas (2004) McCaig and Stengos (2005) among others. Generally, these studies argue that financial markets can reduce transaction costs and informational asymmetries hence improve the allocation of capital, thus, positively affect economic growth. Also, positive effect can be obtained through risk diversification, physical capital accumulation, productivity improvement and technological change.

The second paradigm is demand-following hypothesis, which states that economic growth causes financial development, i.e. reverse causation. According to this paradigm, high economic growth creates demand for certain financial services, instruments and arrangements and that financial markets effectively respond to these demands. Thus, economic growth induces financial development. For instance, Robinson (1952), Stern (1989), Liang and Teng (2006), Ang and McKibbin (2007) support this paradigm.

Third, bidirectional causality or feedback hypothesis is the combination of supply leading and demand following hypotheses, states that financial development and economic growth have mutual causality. According to this paradigm, financial development gradually stimulates economic growth through several channels. In turn, this economic growth creates for certain financial services. As the financial system respond to these demands, then this changes spur a higher economic growth. Briefly, both financial development and economic growth are mutually beneficial. This paradigm supported by Demetriades and Hussein (1996), Luintel and Khan (1999), Apergis et al. (2007), Jun (2012), Lebe (2016) among others. Demetriades and Hussein (1996) also claim that where the financial reforms are able to contribute to financial deepening they may also contribute to economic development.

Fourth paradigm is neutrality hypothesis, which states that there is an insignificant or no causality relationship between financial development and economic growth. For instance, Naceur and Ghazouani (2007), Ake and Ognaligui (2010) and Haque (2013) support this hypothesis. Akbas (2015) more recently examined relationship between financial market development and economic growth in emerging markets. He analyzed annual data for the period of 1988–2013 from 13 emerging countries, using the bootstrap panel causality test. He found that there is a weak relationship between financial development and economic growth. Results of the study support the neutrality hypothesis in emerging countries except for one country.

In the light of the rapid evolution of capital markets in emerging economies, more recent studies expand the analysis to examine the relationship between stock market development and economic growth. These recent studies largely confirm that stock market development have strong positive effect on economic growth (Levine and Zervos 1998; Bekaert et al. 2001; Beck and Levine 2004). The

importance of stock market development has been analysed empirically quite extensively, but conclusions on such importance varies across different studies.

This study utilizes a panel data by adopting a generalized least square of fixed effects model to examine the relationship between stock market development and economic growth. Specifically, our sample consists of 19 emerging markets over 18 years (1995–2012). The empirical analysis is based on the annual data for selected MSCI Emerging Market Index including Brazil, Chile, China, Colombia, Czech Republic, Egypt, Hungary, India, Indonesia, Morocco, Mexico, Peru, Philippines, Poland, Russia, South Africa, Korea, Thailand, and Turkey.

The remainder of the paper is organized as follows: The next section summarizes the literature. The third section presents data and description of the variables. And the fourth section presents the methodology and discusses the empirical results and robustness. The last section concludes the paper.

2 Literature Review

In the empirical literature, various variables were used as proxy measures of financial development. Most of these variables were related to banking sector development. Relationship between stock market development and economic growth was first investigated by Levine and Zervos (1996). They found a positive and strong relationship between stock market development and economic growth. Following Levine and Zervos, several researchers studied the linkage between stock market development and economic growth on several samples and using several analytical techniques. Some of these studies especially have used panel data techniques can be summarized as below.

Using a dynamic panel method, Mohtadi and Agarwal (2001) examined the stock market development-economic growth nexus for 21 emerging markets over 21 years. They suggested that stock market positively affects economic growth both directly and indirectly. Market liquidity has a positive effect on growth directly; indirectly market size affects investments which, in turn affects economic growth.

Chang (2001) explored that impact of stock market development on economic growth. He used the panel data approaches on a sample of 70 countries over the period 1975–1992. The results show that stock market development has a significant impact on both the long run growth rate and the short run level of real GDP per capita. Chang also found that stock market affects economic growth mainly through the channel of productivity improvement. Furthermore, impact of stock market on growth for low income countries is stronger than other countries.

Evidence obtained by Bekaert et al. (2001) indicates a positive effect of stock market development on economic growth. Beck and Levine (2004) examined the effect of both stock markets and banks on economic growth. They used panel data for 40 countries for the period 1976–1998. They analyzed this data with generalized-method-of moments (GMM) estimators. They conclude that both

stock market development and bank development positively affect economic growth.

Rioja and Valev (2014) examined the impact of both stock markets and banks on economic growth using a panel for 62 countries that covers low and high income countries over the period 1980–2009. They found that banks have a significantly impact on capital accumulation in low-income countries; stock markets, have not an impact on capital accumulation and productivity in these countries. On the contrary, they found that stock markets positively affect productivity and capital growth in high-income countries. Similarly, Seven and Yetkiner (2016) also examined impacts of both banking and stock market development on economic growth across three different income levels using GMM (generalized methods of moments) approach. Their comprehensive panel data covered 146 countries and 21 years. They found that banking development has a positive impact on economic growth in low and middle income countries; stock market development has a positive impact on middle and high income countries.

Haque (2013) examined stock market development—economic growth nexus in SAARC (South Asian Countries) Region by using the two dynamic panel models for the 1980–2008 period. He concludes that stock market development don't affect the real economic activity in the region, because of fund mobilized by stock market is transitional period.

Hailemariam and Guotai (2014) examined linkage between stock market development and economic growth using GMM (generalized methods of moments) with panel data of 17 emerging and 10 developed market economies for 2000–2011 periods. They found that stock market development support economic growth both directly and indirectly. Directly, market liquidity positively affects economic growth; indirectly, money growth affects market size which, in turn affects economic growth.

Dökmen et al. (2015) analyzed the relationship between market capitalization and economic growth, using annual data of eight emerging markets over the 1991–2012 period. Using panel vector autoregressive models, they conclude that stock market has significantly contributed to economic growth in emerging countries. Their findings suggest that stock markets are important for economic growth by providing services to economy. They also claim that investing in the stock market may contribute to the economic growth in emerging countries.

In their study, Naik and Padhi (2015) investigated finance-growth nexus considering the stock market based indicators, such as market capitalization, value of share traded and turnover ratio. The authors used a panel of 27 emerging market economies using annual data over the 1995–2012 period. They analyzed data using a dynamic panel "system GMM" estimator. The results of the study indicate that there is a significantly relationship stock market development between economic growth. Also, results indicate that causality is unidirectional from stock market development to economic growth. This finding supports the supply leading hypothesis.

Ruwaydah and Ushad (2015) examined the linkage of stock market development and economic growth with using a pooled panel data set of nine developing countries from SADC (Southern African Development Community) region over the period of 1980–2011. The results of study suggest that well-developed and functioning stock market affects economic growth through better capital accumulation and better resource allocation, especially in developing countries.

Finally, there is conclusive evidence suggesting a definite relationship between stock market developments and economic growth among emerging market economies.

3 Data and Description of Variables

This section provides empirical evidence on the relationship between stock market development and economic growth based on the some emerging markets. The impact of stock market development on economic growth is examined using a panel data of 19 emerging economies selected from MSCI Emerging Market Index, for the period between 1995 and 2012. The MSCI Emerging Markets Index is a free float-adjusted market capitalization weighted equity index launched in 1988. It is designed to measure the performance of equities in Argentina, Brazil, Chile, Greece, Jordan, Malaysia, Mexico, Philippines, Portugal and Thailand. In 1988, there were just 10 countries with just over fifty billion dollars in market capitalization. It consists of 21 countries and close to four trillion dollars in market cap at the end of March 2014 (MSCI Emerging Market Views, March, 2014). As of June 30, 2014, partial list of the country selection criteria adopted by MSCI is the following:

- 3 companies in country with minimum $1.26 billion market cap and 15 % turnover,
- Openness to foreign ownership,
- Easing of capital inflows and outflows,
- Efficient market structure and entry,
- Well-functioning clearing and settlement procedure.

When the MSCI Emerging Market Index was launched, it consisted of just 10 countries representing less than 1 % of world market capitalization. As of March 31, 2016, the MSCI Emerging Markets Index consists of 23 countries representing 10 % of world market capitalization. The Index is available for a number of regions, market segments/sizes and covers approximately 85 % of the free float-adjusted market capitalization in each of the 23 countries.

The emerging economies considered in this study are Brazil, Chile, China, Colombia, Czech Republic, Egypt, Hungary, India, Indonesia, Morocco, Mexico,

Table 1 Selected emerging economies among MSCI Emerging Market Index

Americas	Europe, Middle East & Africa	Asia
1. Brazil	1. Czech Republic	1. China
2. Chile	2. Egypt	2. India
3. Colombia	3. Greece	3. Indonesia
4. Mexico	4. Hungary	4. Korea
5. Peru	5. Poland	5. Philippines
	6. Russia	6. Thailand
	7. South Africa	
	8. Turkey	

Table 2 Description of variables

Dependent variable	Explanations	Source	Expression sign
GDP growth (GDP)	Growth rate of gross domestic product (%)	World Bank	
Independent variables			
Market capitalization ratio (CAP)	It equals the value of market capitalization of listed shares divided by GDP (%)	World Bank	+
Turnover ratio (STR)	It equals the value of total shares traded divided by market capitalization (%)	World Bank	+

Peru, Philippines, Poland, Russia, South Africa, Korea, Thailand, and Turkey (Table 1).

The annual series related to MSCI EM Index countries are collected from database of the World Bank, and the data of these countries are preferred according to their availability in the database. The variables used in the study are as follows:

As shown in Table 2, Growth rate of gross domestic product (GDP) is the annual percentage growth rate of GDP at market prices based on constant local currency. Two measures as stock market development indicators are also specified.

First, market capitalization ratio (CAP) equals the value of listed domestic shares divided by GDP. Market capitalization or market value is the share price times the number of shares outstanding for listed domestic shares. Investment funds, unit trusts, and companies whose only business goal is to hold shares of other listed companies are excluded. The assumption behind this measure is that overall market size is positively correlated with the ability to mobilize capital and diversify risk on an economy-wide basis. Market capitalization is considered as a measure of the size of stock markets, is an indicator that measure market development.

Second, the Turnover Ratio (STR) measures the value of the traded shares in the stock market divided by the total value of shares in the market. The value is annualized by multiplying the monthly average by 12. STR measures how active

or liquid the stock market is relative to its size. STR is used as an index of comparison for market liquidity rating and level of transaction costs. Beck and Levine (2004) use this stock market development indicator exclusively in their study. As turnover ratio captures trading relative to the size of the stock market, high ratio is often considered to be an indicator of low transaction costs (Naik and Padhi 2015: 367).

Overall, both CAP and STR are important variables as determinants of economic growth. Thus, the relationship between stock market development and economic growth are consistent with Levine and Zervos (1998) and Rousseau and Wachtel (2000), suggesting that there is strong and statistically significant relationship between initial stock market development and subsequent economic growth (Hailemariam and Guotai 2014: 178).

4 Methodology and Empirical Findings

To test for the existence of long-run equilibrium relationship stock market development indicators and economic growth, specifically, the following pooled regression model can be specifying as follows:

$$GDP_{it} = \alpha_i + \beta_i CAP_{it} + \beta_j STR_{it} + e_{it} \quad (1)$$

where,

i: 1, 2, ……, 19;
t: 1995, 1996, ……, 2012;
GDP: annual gross domestic product growth (%),
CAP: ratio of value traded stocks to the total value of stocks in the market (%),
STR: ratio of value of all stocks to market capitalization (%), and
e_{it}: white noise error term.

In the panel regression model, GDP is used as the dependent variable and market capitalization ratio and stock market turnover ratio are included as explanatory variables. The purpose of this panel regression is to identify the relationship between stock market development and economic growth and to evaluate whether the coefficients are consistent with the theory or not.

4.1 Descriptive Statistics and Correlations

Table 3 presents descriptive statistics and correlation coefficients for the sample panel data.

According to Table 3, the average size of the stock market (CAP) is about 51 % of GDP, while STR is about 64 % of the economy. The average GDP growth over

Table 3 Descriptive statistics and correlations

	GDP	CAP	STR
Mean	3.2319	51.4131	64.4061
Median	3.5383	36.2436	43.3694
Maximum	13.5677	291.2753	376.5525
Minimum	−14.3852	3.2820	2.3868
Std. Dev.	3.6206	43.9484	63.9019
Jarque-Bera	148.1176 (0.0000)	884.4305 (0.0000)	587.3768 (0.0000)
Observations	342	342	342
Correlations			
GDP	1		
CAP	0.1036 (0.0556)	1	
STR	0.2417 (0.0000)	−0.0205 (0.7052)	1

The p-values are provided in parenthesis below the coefficient statistics of each variable

Table 4 First generation panel unit root tests

Variables (Level)	LLC	IPS
GDP	−13.0513 (0.0000)***	−10.3415 (0.0000)***
CAP	−4.3405 (0.0000)***	−3.1821 (0.0007)****
STR	−5.8034 (0.0000)***	−4.2836 (0.0000)***

Notes: LLC= Levine, Lin and Chu (2002), IPS = Im, Pesaran and Shin (2003). The statistics are asymptotically distributed as standard normal with a left hand side rejection area. The null hypothesis for LLC and IPS is that each cross-section series in the panel has a unit root and the alternative hypothesis that at least one cross-section in the panel is stationary

*** indicates the rejection of the null hypothesis of nonstationarity (LLC, IPS) at the 1 % level of significance

all countries is about 3.2 %. The maximum GDP growth is 13.57 % and the minimum of −14.39 % in the 1995–2012 period. In the correlation panel of Table 4, it can be noted that economic growth is more correlated with turnover ratio. The correlation between economic growth and market capitalization ratio is about 10 %. Table 4 shows that all the indicators of stock market development have positively correlated to growth rate of gross domestic product. Except the correlation between the market capitalization ratio and turnover ratio, the correlation coefficients are lower than 0.5, implying that the data exhibit no multicollinearity problem. Multicollinearity is the situation in which the explanatory variables in a multiple regression model are highly correlated.

4.2 Panel Unit Root Tests

We implement two first generation of panel unit root tests, namely the Im, Pesaran and Shin (2003) test (IPS); the Levine, Lin and Chu (2002) test (LLC). According to Baltagi (2008), cross-sectional dependence is a problem in macro panels with long time series (over 20–30 years). This is not much of a problem in micro panels such as data used in this study. Thus, cross-sectional dependency is not investigated for the sample data. The panel unit root test results are presented in Table 4.

The variables of growth (*GDP*) and measures of stock market development (*CAP, STR*) are tested in levels. As it can be inferred from Table 4, LLC and IPS tests fail to reject the null hypothesis of nonstationarity at the 1 % level of significance. Therefore, sample data series are well characterized as an I(0) process. Since all variables are stationary at level, we have not employed a test for panel cointegration between stock market development and economic growth.

4.3 Generalized Least Squares Estimation of Fixed Effects Model

Since our goal is to investigate the common effect size for the MSCI Emerging Markets Index countries, and not to generalize to other populations, we use the fixed effect model, not random effect model. Fixed effects are constant across individuals, but random effects vary. Fixed effects are estimated using Generalized Least Square pooled time-series cross sectional method (or, more generally, maximum likelihood), since it assumes that the slope and intercept of countries are constant across individuals and time.

To run the regression model, we utilize the Generalized Least Square (GLS) method to test the estimation model for Eq. (1). Table 5 presents the results of the fixed effects panel estimation for the whole sample.

The estimated coefficients of the two indicators of stock market development (CAP and STR) are all positive and statistically significant for all countries. The results of GLS estimates confirm the existence of a long run relationship between

Table 5 The stock market development and economic growth nexus: panel least squares

Variable	Coefficient	Std. error	t-Statistic	Prob.
CAP	0.035183	0.008666	4.060004	0.0001***
STR	0.010153	0.004711	2.155250	0.0319**
C	0.769148	0.559423	1.374894	0.1702
R^2	0.480859			
Durbin-Watson statistic	1.833406			
F-statistic	7.610352			
Prob(F-statistic)	0.000000			

Notes: *** and ** indicate level of significance at 1 and 5 %, respectively

stock market development and economic growth for the MSCI Emerging Market Index Countries.

Panel least squares procedure assumes that the expected variability of each observation is constant. This assumption is called homoscedasticity or constant variance. When the expected variability of each observation varies by observation, the data are said to be heteroscedastic. ***Heteroscedasticity*** affects the efficiency of the regression coefficient estimators. Ordinary least squares is a consistent estimator of β even in the presence of heteroscedasticity (Greene 2003: 222). Heteroscedasticity poses potentially severe problems for inferences based on least squares. We test for heteroscedasticity in order to modify our estimation procedures accordingly. Several types of heteroscedasticity tests have been suggested in the literature.

A test for heteroskedasticiy is the Modified Wald statistic for groupwise heteroskedasticity in the residuals of a fixed effect regression model. The null and alternative hypotheses of this test are the following:

H0: $\sigma_i^2 = \sigma^2$, *for all i (The null is homoscedasticity or constant variance)*
H1: *Not H0 (The alternative is heteroscedasticity)*

The resulting test statistic is distributed Chi-squared ($\chi 2$) under the null hypothesis of homoskedasticity. The test statistics calculated is given:

$\chi 2\ (19) = 864.99$
$\text{Prob} > \chi 2 = 0.0000$

The results ($P < 0.05$) indicate that we must reject the null hypothesis of homoscedasticity. In other words, we reject the null hypothesis and conclude heteroskedasticity in the panel least squares estimation.

Another problem with regard to the panel estimation diagnosis is the ***autocorrelation*** or ***serial correlation*** of the disturbances across periods. The problems for estimation and inference caused by autocorrelation are similar to those caused by heteroscedasticity (Greene 2003: 253). Serial correlation tests apply to macro panels with long time series (over 20–30 years). However, serial correlation is not serious problem in micro panels (with very few years), the Wooldridge test is chosen to detect whether there is a serial correlation in the panel data. As the Wooldridge test is based on fewer assumptions, it should be less powerful than the more highly parameterized tests, but it should be more robust (Drukker 2003: 168). Wooldridge (2010) discusses a test for serial correlation in the idiosyncratic errors of a linear panel data model.

Wooldridge (2010) proposes to test for AR(1) serial correlation. Wooldridge test's hypotheses are given as follows:

H0: $\sigma_\gamma^2 = 0$(No first-order autocorrelation)
H1: Not H0 (First-order autocorrelation)

Table 6 The stock market development and economic growth nexus: panel least squares corrected with PCSE

Variable	Coefficient	Std. error	t-Statistic	Prob.
CAP	0.035183	0.008207	4.287043	0.0000***
STR	0.010153	0.005009	2.027060	0.0435**
C	0.769148	0.538749	1.427655	0.1544
R^2	0.480859			
Durbin-Watson statistic	1.833406			
F-statistic	7.610352			
Prob(F-statistic)	0.000000			

Notes: The standard errors are robust to heteroskedasticity with Cross-section SUR (PCSE) correction
*** and ** indicate level of significance at 1 and 5 %, respectively

The Wooldridge test statistics calculated for autocorrelation in panel data is given:

$$F(1, 18) = 1.150$$
$$\text{Prob} > F = 0.2978$$

The probability obtained for our model is 0.2978. So, we fail to reject the null hypothesis and conclude the data does not have first-order autocorrelation.

We are now facing only heteroskedasticity problem with linear panel least squares model. Assuming homoskedastic disturbances when heteroskedasticity is present can lead to biased statistical results. To ensure validity of the standard errors robust to heteroskedasticity, we employ panel-corrected standard errors (PCSE), an alternative estimator suggested by Beck and Katz (1995). The PCSE estimator is based on ordinary least squares in a statistical environment characterized by (1) groupwise heteroscedasticity, (2) first-order serial correlation, and (3) contemporaneous cross-sectional correlation. Table 6 presents the estimated results with Cross-section SUR (PCSE) correction that are as follows.

As can be seen from Table 6, the impact of stock market development on growth rate of gross domestic product is found to be significant and positive as expected. Based on the estimation results whose standard errors are robust to heteroskedasticity with Cross-section SUR (PCSE) correction, the R^2 is about 0.48. That is 48 % variation in GDP is explained by the independent variables, CAP and STR. The sign of the coefficient of market capitalization ratio is positive and statistically significant at 1 % level of significance. It shows that a 1 % market capitalization ratio brings about 0.035 % increase in growth rate of gross domestic product. Similarly, the coefficient of turnover ratio carries a positive sign and statistically significant at 5 % level of significance. It shows that a 1 % turnover ratio brings about 0.010 % increase in growth rate of gross domestic product. These findings are in line with the previous empirical work of Levine and Zervos (1996, 1998), Rousseau and Wachtel (2000).

5 Conclusion

The study investigates the long-run relationship between stock market development and economic growth in a sample of 19 countries from MSCI Emerging Market Index over the period 1995–2012. The empirical analysis is based on panel data for selected MSCI Emerging Market Index including Brazil, Chile, China, Colombia, Czech Republic, Egypt, Hungary, India, Indonesia, Morocco, Mexico, Peru, Philippines, Poland, Russia, South Africa, Korea, Thailand, and Turkey.

To test for the existence of long-run equilibrium relationship stock market development indicators (market capitalization ratio and turnover ratio) and economic growth, generalized least squares estimation of fixed effects model has been employed. The key findings of the our panel regression estimation reveal that there exists statistically significant relationship between stock market development and economic growth for the emerging markets classified by index provider of MSCI Inc. To summarize the empirical results, the individual indicators of stock market development reveal that the market capitalization and turnover ratios robustly and positively influence the level of economic growth. The empirical results do support the theoretical literature of the stock market development-economic growth nexus.

The significance of our results could possibly be improved upon by using macro panels with long time series (over 20–30 years). Furthermore, focusing on a selected range of emerging markets where data is available, a possible association between stock market development and economic growth may also be investigated by adopting a more complex vector autoregressive (VAR) and cointegration models that have been developed for panel data.

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Turkish Banking System: Maturing with Crises

Gonca Atici and Guner Gursoy

Abstract The history of financial crises entails numerous successive cases reshaping global economies. Limited scale and scope of individual financial crises has turned into regional after the deregulation process of 1970s. Tequila Crisis, Asian Flu, Russian Crisis, Dotcom Crash and the others have similarities and differences but they were all regional though the Global Financial Crisis has far-reaching effects due to the globalized economic and financial system of today. On one side, in an effort to find a panacea to economic problems, developed economies have made several attempts such as bail-outs, quantitative easing programs, tapering, low or negative interest rates and called the new circumstances as "*new normal*". On the other side, many emerging economies are still in a competition among themselves to decouple from their peers positively, while desperately hoping to hear for a delay of a possible hike in US Federal Reserve Bank interest rates. In such an environment, Turkey still gives a promising impression within the league of emerging economies due to her culture of crisis management coming from the past. Turkey has become highly experienced in economic and financial crises since the economy witnessed economic and financial crises successively, especially after the liberalization of capital flows in 1989. With the experience of major crises in years 1994 and 2001, banking sector is restructured from its ashes and became the major strength of the economy. While harmonizing current domestic banking rules with Basel criterion, capital buffer is still the most powerful vehicle in the hands of the banking system. Turkish banking sector announces high profits on the contrary of many European Union countries. But the question arises whether Turkish Banking sector keeps growing at the expense of the real sector growth.

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1 Introduction

Financial crises can be traced back hundreds of years (Kindleberger 1987). There is substantial literature on the episodes of the financial crises. Kindleberger (1996), Bordo and Schwartz (1996), Bordo et al. (2001), Bordo (2003), Eichengreen (2003), Isard (2005), Reinhart and Rogoff (2009) and Dungey and Jacobs (2010) used similar systematic comparison of the crises and divided the periods of crises into four parts as the Gold Standard Era (1880–1913), the Interwar Years (1919–1939), the Bretton Woods Period (1945–1971) and the Recent Period (1973–1997). In the aftermath of the Great Depression, a group of measures adopted in order be sure that such an event would not repeat. Separation of investment banking and commercial banking by Glass-Steagall Act, foundation of Securities and Exchange Commission and related regulations were successful in terms of stopping the crises. As a matter of fact, no financial crises experienced from 1945 until the early 1970s, except the crisis in Brazil in 1962 (Bordo et al. 2001). The success of stopping the crises was achieved mainly by preventing financial institutions to take risk and by shifting this role basically to governments. In different countries, governments undertook the role of decision maker to decide for the credit allocations which led financial system stop fulfilling its basic function which is resource allocation. In 1970s, deficiency of the prevailing system became visible and financial liberalization started in many countries but this process caused the return of crises (Allen and Carletti 2009). By the collapse of Bretton Woods system, different types of financial crises namely, banking crises, currency crises or twin crises occurred with adverse impacts on output, growth and employment. Financial crises occurred not only in counties with weak regulatory implementations but also in strong systems, regardless of their economic fundamentals. The pace of change continued in 1980s.

Growing literature confirms the fact that liberalization of capital flows has contributed to financial crises while it was not the sole responsible. Several studies assert that there is a direct link between financial liberalization and the beginning of the financial crises. Kaminsky and Reinhart (1996), conclude that banking and currency crises are the inevitable consequences of an uncontrolled financial liberalization. Demirgüç-Kunt and Detragiache (1998) report that banking crises are more likely happen in liberalized financial systems. After an extensive survey for countries covering Argentina, Chile, Mexico, Philippines, Thailand, Turkey, US and Venezuela, Williamson and Mahar (1998) suggest that financial liberalization is one of the most important elements that led to the eruption of financial crises worldwide (Singh 2005).

Kindleberger and Aliber (2005), in their comprehensive analysis of the history of financial crises sum up the chain of events that end up with crisis. They argue that financial crises and bank failures are a consequence of an implosion in asset price bubbles or sharp decreases in the values of national currencies in the foreign exchange market. In some cases triggering effect of a foreign exchange crisis is a bank crisis and in some other cases vice versa. They assert that bubbles in real estate

and stocks in Japan in 1980s, in Bangkok and in the nearby Asian countries in 1990s and in US stock prices in 1990s were all systematically related. They explain that the implosion of a bubble in country A, led to an increase in the flow of money from that county to another country or countries, B. The increase in the flow of money to country B led to an appreciation of the currencies in the foreign exchange market and an increase in the prices of real estates and in the securities available in country B. When the bubble imploded in county B, similar things repeated in favor of -at least, initially- some other country or countries, C. The 2007 Global Financial Crisis considered by many economists as the worst crisis since the Great Depression. However, by examining historical records of 18 earlier post-war banking crises in industrialized countries, Reinhart and Rogoff (2008) come up with the result that although all crises are distinct, they have striking similarities and global aspects of the current crisis is not new or unique.

Despite all discussions about differences and similarities between crises, one obvious thing is that the repercussions of the Global Financial Crisis is far-reaching as the synchronization effect has been stronger in globalized and integrated financial markets of today.

2 Ramifications of the Global Financial Crisis on Emerging Markets

As a maneuver against the financial turmoil and collapsing demand, US Federal Reserve Bank initiated the policy of purchasing an immense amount of US government bonds, called quantitative easing in order to stimulate the economy. Several rounds of quantitative easing swelled the US Federal Reserve Bank balance sheet to almost $4 trillion in 2013 from less than $1 trillion of 2007. This attempt welcomed by the global economy and especially by the emerging markets since they considerably took the advantage of it. Unwinding of this expansion which was signaled in May 2013 woke the emerging markets from sweet dream and the turbulence period called taper tantrum started (Estrada et al. 2015). Turbulence continued till the launch of tapering in December 2013. When it lasted in October 2014, US Federal Reserve Bank continued to be closely watched by the other central banks for a possible interest rate rise. After holding its benchmark rate near zero for seven years, US Federal Reserve Bank raised the interest rates in December 2015 as an attempt to normalization. As of the first hike, US Federal Reserve Bank closely followed by the emerging markets in order to understand whether the second round of hike is around the corner. Advanced economies' central banks and especially US Federal Reserve Bank's actions have had a serious impact on financial markets of emerging markets. While wave of capital supported emerging countries' lending, consumption and growth opportunities, things reversed when capital outflows began. Almost all emerging markets were affected

negatively in this period because they had less money to pay back their debts, finance their deficits and spend for their expenditures.

Figure 1, presents net capital inflows to GDP of more than 40 emerging market economies and it also demonstrates the number of external debt crises of emerging countries. Capital flows cover all financial flows such as foreign direct investments, portfolio investments and bank flows. Net capital inflows to GDP have three major episodes as 1981–1988, 1995–2000 and 2010 through the third quarter of 2015. These three episodes have been associated with external debt crises. The first episode coincides with the developing country debt crisis of 1980s, second episode overlaps with the 1997–1998 Asian Crisis and the other emerging market crises. Last episode covers the Global Financial Crisis. The decline in net capital flows which is more than $1 trillion from 2010 to 2015 can be linked to the increasing uncertainty, decreased prospects of growth and lessened confidence in an environment of decreasing oil and commodity prices in emerging countries. All three episodes are similar both in the aggregate size of the slowdown (2.4 to 4.8 percent) and in the fraction of the economies with declining ratios of net capital inflows to GDP (65 to 76 percent). Although there is a common decline in capital flows it differentiates according to the fundamentals and domestic policy factors of emerging countries. As a difference from the previous crises, emerging countries are more elastic since they are more integrated to the global financial system with their foreign assets and foreign exchange reserves. By this means, the third episode has been less abrupt and destroying as a result of better debt management and macro prudential policies. Moreover, exchange rate flexibility has eased the moves of emerging economies with regard to financing needs. Depreciations made the capital outflows costly and encouraged new inflows for the undervalued domestic assets (Yang 2016; IMF 2016a, b).

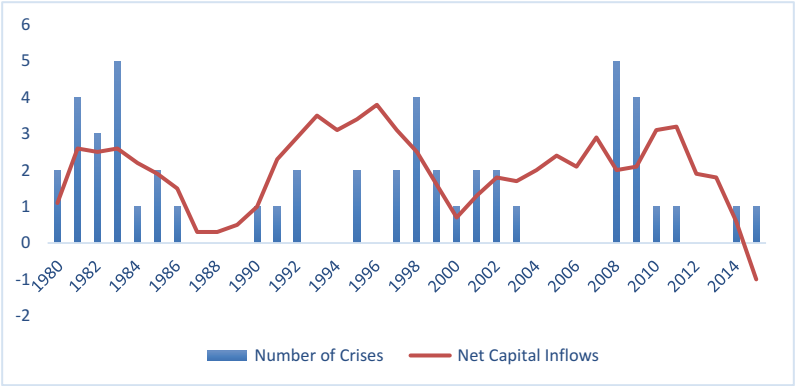

Fig. 1 Net capital inflows to emerging market economies and number of debt crises, 1980–2015: Q3 (percent of GDP). Sources: Catão and Milesi-Ferretti 2014; CEIC Asia database; CEIC China database; Haver Analytics; IMF, Balance of Payments Statistics; IMF, International Financial Statistics; World Bank, World Development Indicators database; and IMF staff calculations

Despite their competencies, emerging markets are in a struggle among themselves in a volatile global environment of tightened financial conditions, increasing uncertainty, reduced risk appetite and increasing risk factors. In this environment the distinguishing feature will be the financial soundness of their economies which will enable their resilience against the Global Financial Crisis. Soundness of emerging economies is crucial not only for their individual stance but also to prevent possible spillovers that may create from their own. In order to decouple themselves from their peers and to take the advantage of diminishing capital flows, emerging countries seem to take steps to strengthen their financial system and especially the banking system which has a vital importance in the resource allocation to real sector. Figure 2, demonstrates the nonperforming loans to total loans as an important health indicator of the banking system for the period of 2008 and 2014. According to the Figure, there is a deterioration in the performance of the emerging countries which began in 2008 and reached its peak in 2009. Since 2011 there is a second upward trend. On the contrary, performance of advanced countries keeps recovering since 2013. Decline in commodity prices, earnings and growth rates are the key reasons behind the upward trend of nonperforming loans (IMF 2016).

While increasing nonperforming loans to total loans may lead to a decrease in credit cycle, erosion in asset quality may arise as another distress factor. Towards these risks banking sector employs capital adequacy ratio as a buffer to protect its operations. Soundness of the system is crucial since banking sectors are dependent to the regional and advanced economies for funding needs and income. Table 1 presents the capital adequacy ratios of selected G-20 countries. Although there is a declining trend, all countries seem to provide the target rate of 12 percent and use buffer in order to protect themselves against potential losses.

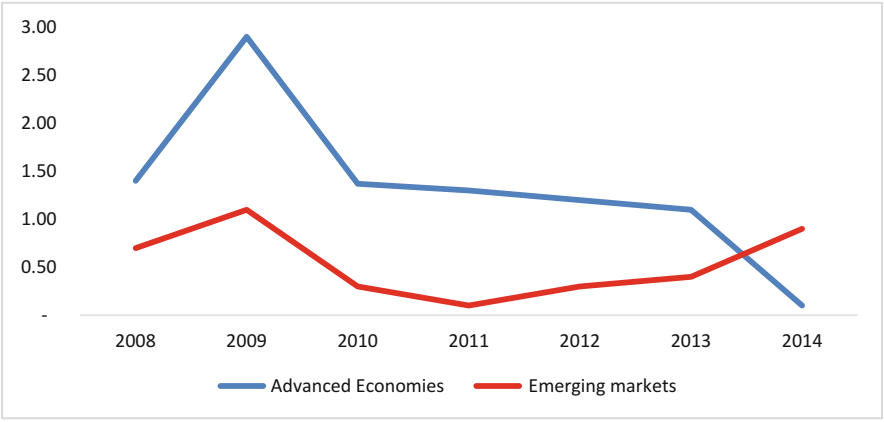

Fig. 2 Banking system health, 2008–2014 (nonperforming loans to total loans %). Sources: Bankscope and IMF

Table 1 Capital adequacy ratios of selected G-20 countries (%)

Countries	2009	2010	2011	2012	2013	2014	2015
US	13.9	14.8	14.7	14.5	14.4	14.4	14.1
Germany	14.8	16.1	16.4	17.9	19.2	18.0	18.1
Brazil	18.7	16.9	16.3	16.4	16.1	16.7	16.3
South Africa	14.1	14.9	15.1	15.9	15.6	14.8	14.1
India	14.3	15.2	13.1	13.1	12.3	12.5	12.8
Japan	11.2	13.3	13.8	14.2	15.2	15.6	13.6
Korea	14.4	14.3	14.0	14.3	14.5	14.2	NA
Russia	20.9	18.1	14.7	13.7	13.5	12.5	12.9
Turkey	20.6	19.0	16.6	17.9	15.3	16.3	15.5

Source: IMF, Financial Soundness Indicators

3 Ramifications of the Global Financial Crisis on Turkish Banking Sector

Global financial crisis demonstrated that a financially open economy has many areas of vulnerability (Rodrik 2012). Turkey has experienced three financial crises since she opened up her capital account in 1989. As a consequence of the lessons learned from the previous crises of 1994 and 2001, which stemmed from her own dynamics, she learned crisis management and affected from the Global Financial Crisis to a rather limited extent in comparison to her peers. The lessons behind the limited negative effects could be stated as preserving high capital adequacy ratio, high asset quality, low currency and low liquidity risks based on risk management, public supervision and effective management of other risks as well. Measures taken by the Central Bank and Banking Regulation and Supervision Agency contributed and still contribute to the healthy functioning of the banking sector against the risks in global financial markets (The Banks Association of Turkey 2009). Turkish economy remains resilient especially with the strength of its banking sector which dominates its financial system. It accounts for almost 70 percent of the overall financial services and attracts a considerable amount of foreign direct investment which is almost $30 billion over the years between 2007 and 2015. With its strong growth prospect, banking sector is a crucial component of economic growth and its health is a vital factor while performing in a cloudy global financial environment. Banking sector is the main provider of financing but loan growth presents a volatile trend in parallel with the monetary policies of the advanced economies, regional and domestic developments, regulations of banking authorities and cautiousness of the banking sector. As presented in Table 1, as a precautionary tool, capital adequacy ratio still maintains its importance in the Turkish banking system. It is above the legal limit of 8 percent since 1998. Especially, by the beginning of the restructuring period after the crisis of 2001, it has been increased well above the legal requirement and even the target ratio set in 2006 by the Banking Regulation and Supervision Agency, far exceeding that of many other emerging markets. The main reason of keeping a capital buffer that high was to

Table 2 Return on equity of selected G-20 countries (%)

Countries	2009	2010	2011	2012	2013	2014	2015
US	1.8	1.8	2.3	2.7	3.3	2.8	3.1
Germany	5.0	8.8	13.0	10.8	7.5	7.2	NA
Brazil	15.8	16.7	20.4	19.8	19.2	1.6	NA
France	7.2	12.0	8.3	6.0	8.4	4.4	NA
India	10.6	10.8	13.4	13.8	10.8	9.6	10.8
Japan	−5.7	5.5	4.8	5.7	9.1	7.8	6.3
Korea	8.6	9.7	13.2	8.2	4.0	7.2	NA
Russia	4.1	12.5	17.3	17.9	14.0	7.5	NA
Turkey	26.4	23.9	19.0	19.6	17.4	14.7	14.6

Source: IMF, Financial Soundness Indicators

protect banking system against negative shocks and put it under less pressure in its allocation function (Atici and Gursoy 2011). Volatility in exchange rates, increasing funding costs, decreasing profitability, fluctuating credit growth, and increasing nonperforming ratios of retail and corporate loans justify holding a capital buffer. As a key indicator of bank's loss-absorption capacity and capital strength along with the capital buffer, Turkish Banking Sector manages to keep a common equity Tier 1 ratio of almost 12 percent which is well above the Basel III target of 9 percent for 2019. Banking sector "capital to asset" ratio is around 11 percent is below the ratio of around 13 percent of 2012 but still higher than that of Germany and Japan that are around 6 percent. Liquidity buffer of the banking sector seems adequate justifying that even if the external debt roll-over ratio drops, banks would still have adequate short-term liquidity buffers (Roubini 2016). Turkish Banking System differentiates itself in terms of return on equity with almost 15 percent which is higher than the ratio of the advanced economies. As presented in Table 2, there is a decrease in year on year basis but the ratio is well above many of its peer countries.

4 Conclusion

While adapting "new normal" emerging economies confront the diminishing capital inflows from advanced economies. Emerging economies well aware that capital outflows will accelerate if the second interest hike strongly appears from the corner. In order to benefit from the current global capital inflows, they try to differentiate themselves from their peers by their financial systems. In the blurred environment of rising risks, Turkey is an important market player, experienced in the field of crisis management since the liberalization of her capital account in 1989. With the experience of major crises in years 1994 and 2001, banking sector is restructured by transferring a considerable amount of banks to the Savings Deposit Insurance Fund. Banking Regulation and Supervision Agency started a comprehensive multi-year restructuring for the Turkish Banking system after the 2001 crisis. Duty of Central

Bank is defined again. Monetary Policy Board is established and Central Bank aimed to perform transparently in parallel to the central banks of advanced economies. Basel implementations have been implemented successfully by the banking sector and harmonized with local regulations. All the local regulators contributed to the healthy functioning of the banking sector and banking sector began to dominate the financial sector and welcome a considerable amount of foreign direct investment from abroad. Turkish banking sector keeps holding high capital adequacy ratios as a buffer against the Post Global Financial Crisis environment. Besides, it meets the standards of Basel in terms of Tier 1 ratio and liquidity buffer and succeeds to remain adequately capitalized while advanced economies have troubles about meeting some of the requirements. In the meantime, exchange rate effect, recent rise in non-performing ratios of retail and corporate loans shape banking sector profitability indicators and figures have a slightly decreasing trend. Despite this, both capital adequacy ratios and profitability averages in Turkey are at reasonable levels compared to the levels in peer countries.

While Turkish banking sector dominates the financial system with a crucial role of resource allocation, some disturbance symptoms began to appear on the side of real sector. According to the income statement figures of the large industrial companies listed in the Chamber of Industry of Turkey, ratio of financing expenses to operating profit increased to 63.4 percent in 2015 from 34.1 percent in 2012. Another finding presents that share of equity in total assets decreased to 39.9 percent in 2015 from 47.2 in 2012. For the private sector companies, ratios are even worse with 37 percent in 2015 which decreased from 42.7 percent in 2012. So the question arises whether Turkish Banking sector keeps growing at the expense of the real sector growth.

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Investigating the Relationship Between Liquidity and Financial Performance in Turkish Banking Sector: A Pre and Post 2008 Financial Crisis Assessment

Kartal Demirgunes and Gulbahar Ucler

Abstract This study aims to shed light on the relationship between liquidity and financial performance in Turkish banking sector by comparing pre and post 2008 financial crisis periods. Throughout this aim, a panel data covering the period of 2001.Q1–2015.Q3 for the state-owned and privately-owned deposit banks in Turkey is analyzed by Breusch and Pagan (The Review of Economic Studies 47:239–253, 1980) and Pesaran (Cambridge Working Papers in Economics, No. 435, 2004) using cross-dependency tests; cross-sectional Augmented Dickey Fuller test of Pesaran (Journal of Applied Econometrics 22:265–312, 2007); panel cointegration test of Westerlund (Journal of Applied Econometrics, 23:193–233, 2008); Augmented Mean Group estimator developed by Eberhardt and Bound (MPRA Paper, No. 17870, 2009) and panel causality test of Dumitrescu and Hurlin (Economic Modelling 29:1450–1460, 2012), respectively. Empirical findings indicate that in both pre and post crisis periods, liquidity has statistically positive effect on financial performance of Turkish banking sector. It can be concluded that the effect of 2008 financial crisis on Turkish banks has not been so severe, in terms of financial performance-liquidity relationship. Another empirical finding of the study is the existence of bi-directional causality relationship between liquidity and financial performance of Turkish banking sector, in both pre and post crisis periods.

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1 Introduction

Especially beginning from the 1980s, both developed and developing countries worldwide have witnessed severe economic and financial crises than ever before. Among them are Latin American debt crisis originated in the early 1980s, Chilean crisis of 1982, 1983 Israel bank stock crisis, Japanese asset price bubble from 1986 to 1991, Black Monday in 1987, recession of the early 1990s' affecting majority of economies worldwide, Finnish and Swedish banking crises of 1990s', 1991 Indian economic crisis, 1994 economic crises in Turkey (also in 2000 and 2001) and Mexico, 1997 Asian and 1998 Russian financial crises, and 1998–2002 Argentine great depression. Following, financial distress in several markets in 2007–2008 led a new crisis, also referred as *2008 financial crisis*, *the global financial crisis* or *the global credit crunch*. According to Ben Bernanke, the former chairman of the Federal Reserve Bank, this crisis was the worst in history, surpassing even the Great Depression of 1929–1930. Starting as a crisis in the sub-prime mortgage market in the United States (US) in 2007, 2008 financial crisis has adversely affected economic and financial conditions in both developed and developing countries worldwide. In 2009, while Finland (−8.3 %), Russia (−7.9 %), Hungary (−6.7 %), Mexico (−6.5 %), Japan (−6.3 %), Denmark (−5.2 %), Sweden (−5.1 %), Italy (−5.1 %), United Kingdom (−5.0 %) and Turkey (−4.7 %) have been the top 10 economies that contracted in terms of gross domestic product (GDP); the deepest contradiction has been observed in Eastern Europe and Central Asia by −5.3 %.

Though 2008 financial crisis has some close similarities to the earlier ones in terms of strategic complementarities in financial markets (*see,* Bulow et al. 1985; Cooper and John 1991); failures in financial (and banking) regulations (Reinhart and Rogoff 2009); the presence of credit and asset price booms in some highly-developed countries (Claessens et al. 2012); asset-liability mismatch (*see*, Bodie 2006); and the liquidity demand of businesses and households that was not met by market-based funding sources (Mora 2010: 32); it has some specific differences. First of all, originating in the economies of North America and Europe, the starting point of 2008 financial crisis has been the developed countries, as "being global from the beginning". Secondly, though the 2008 crisis might resemble the earlier ones in terms of liquidity demand, the banks (especially the commercial ones) have been in the *very* center of the liquidity risks. In the previous crises, banks—as financial intermediates—have helped businesses and households avoid liquidations and financial distress in any liquidity shortages. However, along with 2008 financial crisis, the financial intermediation function of banks during financial crises have been come up for discussion and a general sense that banks had failed to realize the importance of liquidity (risk) management and its consequences for both themselves and the financial system, has dominated the market. This failure of realization significantly altered the banking landscape. Aggregate profitability of US banks dropped from 1 % at an annual rate at the beginning of 2007 to nearly −1 % by the end of 2008, and following five years after the crisis, the number of

US commercial banks fell by more than 800 by 14 % decline (McCord et al. 2015). In the period of 2007–2010, European banks have written off more than $1.3 trillion of bad loans and toxic securities. Besides, the number of credit institutions in EU27 decreased to 8356 in 2009 from EU25s' 9363 in 2001 and Euro-EU12s' 7213 in 2001 decreased to Euro-EU16s' 6458 in the same period (Eken et al. 2012).

The importance of liquidity as an instrumental factor during financial crises (and especially the one in 2008) has led us to investigate the causality relationship between liquidity and financial performance in Turkish banking sector and to make some implications on the subject by comparing pre and post 2008 financial crisis. The remainder of the study proceeds as follows. In the following, a brief *evolution of the Turkish banking sector* focusing on the 2000–2001 and 2008 crises affecting Turkish economy will be discussed. Then, the *Literature Review* on liquidity-profitability relationship in banking, and the *Methodology* will be given, respectively. Finally, these findings and some related policy implications will be discussed under *Conclusion*.

2 Evolution of Turkish Banking Sector: Pre and Post 2008 Financial Crisis Periods

Some related previous studies (*see for instance*, Gormez 2008; Altunbas et al. 2009) discuss the evolution of the Turkish banking sector in seven periods, beginning from the establishment of the Banque de Constantinople—the first bank of the Ottoman Empire—in 1847 until today. The first phase called the Ottoman period refers to the era before 1923. The second period is between 1923 and 1932, when national banks have been established to support prioritized areas of industrial development. In the third period between 1932 and 1945, the modernization of Turkish banking sector has increased with the approval of the Deposit Insurance and Banking Laws in 1933 and in 1936, respectively. The fourth period, beginning with the end of the World War II till the end of 1959s, has witnessed the emergence of private banks as a result of government policy shift to industrialization by supporting the private sector. In the fifth period between 1960 and 1980, the structure of Turkish banking sector has again been affected due to insistence of government on the mixed economy model by implementing an import substitution policy. In this period, banks had a new function of funding the "Five-Year Plans", firstly implemented between 1963 and 1967. Financial liberalization era introduced the sixth period which began in early 1980s and ended with the financial and economic crises of 2000–2001. In the seventh and last phase after 2000–2001 crises, the banking sector restructured again and entered a growth period. Especially after 2004, total assets of banks as a percentage of GDP increased substantially and reached 71.5 % in 2008. Another remarkable singularity of this period was the sudden increase in foreign bank entry. In the period of 2000–2008, the share of assets of foreign banks nearly tenfold (Akın et al. 2009).

As mentioned before, in 2008, the world economy faced the most dangerous crisis ever, causing negative effects including severe recessions in many countries, fall of many stock markets, collapse of extremely large financial institutions, and bail-out of banks by the governments in even the wealthiest nations. Turkey was one the countries suffering from the 2008 financial crisis most severely, considering the effects of the crisis on the real economy. However, Turkish banking sector has not been much affected by 2008 financial crisis compared to American and European banking sectors (Kılınc et al. 2012).

Though these periods referring the evolution of Turkish banking system have been shaped by the economic policies of various governments, the effects of developments in the global economy and financial markets as consequences of financial crises have also been very dominant. These effects have been more perceivable and observable especially in the sixth and seventh periods. In conjunction with the 2008 crisis, post 2008 crisis phase will be considered as the eighth period in the evolution of the Turkish banking sector. In harmony with the aim of the study, discuss the liquidity-profitability relationship of Turkish banks will be discussed by focusing mostly on the sixth and the seventh periods between years 1980–2008, and *so-called* eighth period between 2008 and Now, and by considering the effects of crises on both the Turkish economy and the banking sector.

2.1 Pre 2008 Financial Crisis Period

In the earlier periods before 1980s, as the economy itself, Turkish banking sector was repressed and not developed, and characterized by highly regulated interest rates, high liquidity and reserve requirement ratios, lack of competition and barriers to entry (Ozkan-Gunay and Tektas 2006). Foreign exchange operations and asset holdings were under the strict control of the government. However, the implementation of the Stabilization Program composed of financial and trade liberalization programs in 1980 triggered the development process of both the Turkish economy and the banking sector. Following the establishment of Capital Market Boards in 1982 and Borsa Istanbul (*formerly* Istanbul Stock Exchange-ISE) in 1985, a rapid technological transformation occurred in entire Turkish banking system in the beginning of the 1990s. Unfortunately, during the decade, these structural developments fell short of creating a stable, well-functioning banking environment due to local and global negative factors affecting the Turkish economy such as large and growing fiscal and external imbalances in economy; intense political instability; a rising share of military spending as a result of increase in terrorist attacks; the collapse of the Soviet Union; the rise of knowledge economy and contagious crises, etc. The Turkish economy took the first hit as a currency crisis in 1994, causing output to fall 6 %, inflation to rise to 3-digit levels, Turkish Lira (TL) to be devalued by 60 % and the overnight interest rates to peak to 1000 %. Along with the mentioned factors, enormous increases in public sector borrowing requirements in 1993 and early 1994, major policy errors in financing the deficit heavy off-shore

borrowing and loss of credibility in financial markets (Celasun 1998; Akyuz and Boratav 2003; Ozkan-Gunay and Tektas 2006) played an important role in the emergence of the crisis.

The crisis also affected the banking sector by creating severe liquidity problems and large losses as a result of huge amounts of withdrawal of deposits due to loss of trust and confidence in the sector and significant short positions in terms of foreign exchange. Though government introduced 100 % guarantee to savings deposits, the liquid assets to total assets ratios of both commercial and the entire sector banks have decreased an average of by more than 12 % in 1995, compared to 1993. However, the speed of recovery from 1994 crisis has been fast for Turkish banking sector by achieving an average annual growth rate of 18 % in the post-1995 period till 2000. But this did not take a long time. Following the East Asia and Russian crises of 1997–1998, Marmara earthquakes in 1999 and early elections restructuring the parliament, Turkish economy and consequently banking sector again began to give signals of a forthcoming crisis.

Supported by the International Monetary Fund (IMF), a stabilization program was introduced by The Turkish government in 1998 in order to recover the economy including strategies for debt reduction and a quick, comprehension privatization scheme. Following, foreign ownership was facilitated, and restrictions on foreign capital flows and international trade were pledged to be kept free by the government by Letters of Intent to IMF in September 29th and 9th December, 1999. Curtailing spending via reduction in labor costs, freezing wages of public sector employees in real terms and a radical reform of social programs were among the other intents (Dufour and Orhangazi 2009). Another attempt of recovery was the comprehensive disinflation program of the Turkish Government at the beginning of 2000 depending on tight fiscal and monetary policies supported by structural reforms and a pre-determined exchange rate path as a nominal arch.

The major impact of these programs was observed in banks' balance sheets as reductions in deposits due to sharp declines in market interest rates. The pre-determined exchange rate path caused TL to be used for funding currency liabilities. Expectation of the continuity of the path led Turkish banks to borrow foreign currency in the short term and to lend TL in the long term, causing maturity mismatch and foreign currency open positions once again, especially for private domestic and The Savings Deposit Insurance Fund (SDIF) banks. By September 2000, gross foreign currency open positions for private domestic and SDIF banks were US$−9637 million and US$−6271 million, respectively, compared to US $6061 million and US$−5345 million by January 2000 (BRSA 2001a). Besides, along with enormous increases especially in consumer credits (that four folded) in 2000, the Turkish banking sector again became defenseless against liquidity, interest rate and exchange rate risks.

Almost 12 months after launching the stabilization program, another crisis hit Turkish economy in November 2000. Capital outflows, sharp increases in Treasury bill rates combined with exchange and interest rate shocks, postponed privatizations of Turk Telekom and Turkish airlines, and the oppressive attitude of the Banking Regulation and Supervision Agency (BRSA) were the main causes of this

liquidity crisis. Its most devastating effects were observed during the period of November 20th and December 5th, 2000. In this period, net foreign exchange outflow was $6.4 billion, and by December 1st, 2000 the overnight interbank interest rates reached a peak of 1700 %. Net capital inflow recorded as the amount of US$11.1 billion in the first nine months of 2000, turned to an enormous outflow in September, resulting in a decline in net international reserves of the Central Bank by US$0.025 billion. 30 % value loss in ISE Index from November to December 15th and the fall of ISE-100 Index to the lowest level recorded since March 1999 were the other devastating effects of the 2000 crisis (Alper 2001). November 2000 crisis also caused a systematic banking crisis in Turkey causing significant capital losses in the sector. Though IMF made a quick attempt to prevent another crisis by freeing up US$10 billion in December 2000, the most serious crisis in its post-war history hit Turkish economy on February 21st, 2001 with the collapse of the TL peg to the US$ and 30 % devaluation in TL.

At the end of 2001, GDP contracted by 7.4 % in real terms and inflation increased to 68.5 % (Yeldan 2007). Unemployment rose from 6.5 % in 1999 to 10.4 % in 2002. During the first week of the crisis, losses of the two largest state banks reached to US$2.5 billion, about 2 % of GDP. Due to huge losses of these state banks and banks taken over by the SDIF, public debt rose from 38 % in 2000 to 74 % of GDP in 2001. Abandoning the recovery programs and pre-determined exchange rate system, floating exchange rate system began to be implemented.

These devastating effects of 2000–2001 crises on both Turkish economy and banking sector have led BRSA to introduce the Banking Sector Restructuring Program (BSRP) as a complementary section of the Transition to Strong Economy Program based on market orientation and openness to the world, in May 2001. The primary objective of the BSRP was to completely restructure the entire banking system by strengthening the private banks, restructuring the public banks, resolving the SDIF-controlled banks and strengthening of the regulatory and supervisory framework (BRSA 2001b).

In the post 2001 crisis period between 2002 and 2008, Turkish economy started to recover quickly. The average annual growth rate of economy became approximately 7 % in that period, and inflation rate fell to 8.39 % at the end of 2007. Besides, budget deficit to GDP ratio decreased to about 1 % at the end of 2006, compared to the ratio of 16 % in 2001, and public debt fell 41 % of GDP, compared to 74 % in 2001.

As the Turkish economy itself, Turkish banking sector has also shown the same rapid recovery performance. Total assets of the banking sector rose from US$130 billion to US$ 465 billion, the number of branches and employees in the sector increased from 6106 and 123,271 in 2002 to 8790 and 171,598 in 2008, respectively (The Banks Association of Turkey 2009). Strengthening capital structure, shareholders' equity figure of the banking sector increased from US$ 16 billion to US$ 54 billion in the period of 2002–2008, reaching a capital adequacy ratio of 18 % as of December 2008.

2.2 Post 2008 Financial Crisis Period

In 2008, the world economy witnessed its most dangerous crisis which began as a subprime mortgage crisis in 2007 when the housing prices began to decline. First the entire US financial sector, then almost all financial markets overseas suffered from contagion effects of the crisis.

Turkey was one of the countries that felt the negative effects of the 2008 crisis most severely. Between the second quarter of 2008—when the crisis began to affect Turkey—and the second quarter of 2009, Turkey was the sixth rapidly contracting country among 35 countries carrying out 87 % of global production and 76 % of world export, and the tenth economy that contracted in terms of GDP by −4.7 % in the world. Turkish Statistical Institute data pointing out a decline in GDP per capita by 18 % in 2008 and a drop in manufacturing capacity utilization rates from 106.3 in May 2008 to 72.9 in February 2009 support the contradiction. However, this rapid contradiction period was followed by again a rapid recovery period. Turkey's growth performance between the second quarter of 2009 and the second quarter of 2010 has been unbelievably high, as being the third rapidly recovering country with China (Kalkan 2010).

The pace of recovery of Turkey from the 2008 crisis may be related to the outstanding performance of Turkish banking system after the 2000–2001 crises. Unlike the real economy, the banking system in Turkey has not been affected much from the 2008 crisis such as US, European and other countries' banking systems. The negative effects of the 2008 crisis have diminished due to relatively high capital adequacy and profitability ratios, high asset quality and low currency and liquidity risks of Turkish banks as outcomes of the BSRP (*see*, Alp et al. 2010). Related data of the Banks Association of Turkey indicate that average quarterly capital adequacy ratios (in terms of shareholders' equity to totals assets) are 13.2 % and 12.3 %; average quarterly profitability ratios (in terms of net profit/loss to total shareholders' equity) are 10.2 % and 9.5 % and average quarterly liquidity ratios (in terms of liquid assets to total assets) are 34.4 % and 30.2 % in the periods of 2002.Q4–2008.Q2 and 2008.Q3–2015.Q3, respectively. These data confirm the stability of the Turkish banking sector in both pre and post 2008 crisis periods.

3 Literature Review

Though liquidity is an old phenomenon in finance literature, there is no consensus among researchers on its definition. This is because the phenomenon of liquidity arises from different economic perspectives. When used in the context of the degree to which as asset can be bought or sold, and a security can be traded quickly in the market without any affection on the asset's or security's price, it is termed as market liquidity. However, when used in the context of how easy one can obtain funding to

buy an asset or trade a security, it is termed as funding liquidity (Marozva 2015). In another definition by GARP (2013), liquidity is termed as a bank's capacity to fund increase in assets and meet expected and unexpected cash and collateral obligations at a reasonable cost and without incurring unacceptable losses. In accordance with the terminological difference and the definition by GARP (2013), it can be said that liquidity has played a crucial role in the emergence and contagion of the 2008 financial crisis in both ways, as many banks have not only failed to function as financial intermediates, but also were short on cash to cover their obligations.

Not only the differences in regulatory standards, accounting rules, economic and financial conditions across countries and regions, but also diverse econometric methodologies employed and different sample sizes under different time periods makes it so challenging to generalize empirical studies on banking, but it is obvious that related empirical literature mostly focus on the determinants of profitability in banking (*see for a detailed review*, Growe et al. 2014). These determinants can be categorized into three broad groups as bank-specific, industry-specific and macro-economic determinants. The scope of this study is *somehow* related to bank-specific determinants of profitability which include fundamental ratios obtained from financial statements related to liquidity, capital adequacy, asset quality, income-expenditure structure etc. Contrary to comprehensive literature on bank-specific determinants of profitability, the number of studies *especially* focusing on the effect of liquidity on bank profitability is very limited with mixed results.

In studies of Bourke (1989) on 90 banks in Europe, North America and Australia in the period of 1972–1981; Kosmidou (2008) on Greek banks during the period of European Union integration; Lartey et al. (2013) on listed banks in Ghana; Agbada and Osuji (2013) and Kurawa and Abubakar (2014) on Nigerian banks, empirical findings indicate a statistically positive relationship between liquidity and financial performance. These findings may be explained of that banks with relatively high amounts of cash holdings tend to benefit from funding the markets, reducing their financing costs and increasing profitability.

However, findings of Molyneux and Thornton (1992) on European banks in the late 1980s and Goddard et al. (2004) on European banks in the mid-1990s indicate a statistically negative relationship between liquidity and financial performance. The authors attribute this finding by the fact that banks sometimes hold liquid assets to meet financial obligations as mandated by the authorities. Alp et al. (2010) and Lee and Hsieh (2013) also support this finding in accordance with the portfolio theory suggesting that higher risk leads to higher profitability. They point out that as lower liquidity means higher risk, the relationship between liquidity and financial performance should be negative. Findings form studies of Shen et al. (2009), and Poposka and Trpkoski (2013) are among the others supporting the negative relationship.

Though the given studies are related to the relationship between liquidity and financial performance of banks, they do not fit exactly with the aim of this study. To our knowledge, along with the study of Bordeleau and Graham (2010), this is one of the first studies directly focusing on the relationship between liquidity and financial performance of banks comparing the pre and post 2008 financial crisis periods.

Bordeleau and Graham (2010)'s study presenting empirical evidence on the relationship between liquid assets holding and profitability for a panel of Canadian and US banks in the period of 1997–2009 indicate that liquidity—to some extent—affects profitability positively. However, after a point beyond which holding further liquid assets decreases banks' profitability, all else equal.

4 Methodology

4.1 Data, Variables and the Research Model

The panel data of the study covers the period of 2001.Q1–2015.Q3 for the state-owned and privately-owned deposit banks in Turkey, and is obtained from the quarterly financial statements of banks published on-line in the web-site of the Banks Association of Turkey. In consistence with the aim of the study, the period comprises two phases as pre and post 2008 financial crisis. The pre-crisis and the post-crisis periods are between 2001.Q1–2008.Q2, and 2008.Q3–2015.Q3, respectively. Though the peak and trough crisis periods may differ across countries, peak for Turkey was assumed at the second quarter of 2008, as the peak level of production before the effects of the global crisis being felt was recorded in the first quarter of 2008 (Kalkan 2010).

The research model consists of two variables: financial performance variable as the dependent and liquidity variable as the independent variables. Financial performance variable in terms of profitability is the return on assets calculated as net profit/loss to total assets and denoted by PROF. The most common measures of financial performance in terms of profitability used in related empirical studies are return on assets (ROA) and return on equity (ROE) ratios. Though, ROA may be biased due to off-balance-sheet activities, it reflects the ability of a bank to generate income from its assets. However, ROE is a combination of a bank's ROA and its equity multiplier which measures financial leverage. As ROE disregards the greater risks associated with high leverage, and financial leverage is often determined by regulation, it is more appropriate to use ROA as financial performance indicator for banks (IMF 2002). Liquidity variable is calculated as liquid assets to total assets and denoted by LIQ. Though it may vary across countries, liquid assets consist of cash, government securities, interbank deposits and short-term marketable securities.

The research models as regression equations to test the possible relationships between financial performance and liquidity of selected banks in the pre and post 2008 crisis periods are as:

$$Model_{pre-crisis} \Rightarrow PROF_{pre-crisis,it} = \alpha_{0i} + \alpha_{1i} LIQ_{pre-crisis,it} + \varepsilon_{it} \quad (1)$$

$$Model_{post-crisis} \Rightarrow PROF_{post-crisis,it} = \alpha_{0i} + \alpha_{1i} LIQ_{post-crisis,it} + \varepsilon_{it} \quad (2)$$

4.2 Empirical Findings

This study analyses the possible effect of liquidity on the financial performance of banks in Turkey comparing pre and post 2008 crisis periods by employing some advanced statistical tests including cross-sectional dependency (CD) and homogeneity tests developed by Breusch and Pagan (1980) and Pesaran (2004); Cross-sectionally Augmented Dickey-Fuller (CADF) and CIPS (a cross-sectional augmented version of the Im et al. (2003) (IPS) test) unit root tests of Pesaran (2003, 2007); cointegration test of Westerlund (2008); panel Augmented Mean Group (AMG) methodology introduced by Eberhardt and Bond (2009) and the causality test of Dumitrescu and Hurlin (2012).

4.2.1 Cross-Sectional Dependency and Homogeneity Tests

Before proceeding to panel unit root tests, cross-dependency of the series has to be examined. In case of no cross-dependency, first generation unit root tests can be used. However, the existence of cross-dependency necessitates use of second generation panel unit root tests. In this study, Breusch and Pagan (1980) and Pesaran (2004) test statistics are used to test the cross-dependency of the series.

The Breusch and Pagan Lagrange multiplier (LM) (1980) test statistic is based on the sum of squares of correlation coefficients among sectional residuals obtained by employing ordinary least squares (OLS) and is as:

$$CD_{LM1} = T\sum_{i=1}^{N-1}\sum_{j=i+1}^{N}\widehat{p}^{2}_{ij} \tag{3}$$

where $\widehat{p}^{2}_{ij}$ is the mentioned estimated correlation coefficients. Under the null hypothesis of no cross-dependency with a fixed number of cross-sections (N) and time period $T \to \infty$, the statistic has chi-square asymptotic distribution with $N(N-1)/2$ degrees of freedom. As Breusch and Pagan (1980) test is not applicable to data models with large N, Pesaran (2004) has proposed the use of a LM statistic as:

$$CD_{LM2} = \left(\frac{1}{N(N-1)}\right)^{1/2}\sum_{i=1}^{N-1}\sum_{j=i+1}^{N}\left(T\widehat{p}^{2}_{ij}-1\right) \tag{4}$$

Under the null hypothesis of no cross-dependency with first $T \to \infty$, then $N \to \infty$, this test statistic has asymptotic standard normal distribution. Though this improved test statistic is superior compared to Breusch and Pagan (1980)'s; in cases of when $N/T \to \infty$, it has tendency to exhibit substantial size distortions (Nazlioglu et al. 2011). To overcome these distortions, Pesaran (2004) has proposed a new test to be used for data models when N is large and T is small as:

$$CD_{LM3} = \left(\frac{2T}{N(N-1)}\right)^{1/2} \sum_{i=1}^{N-1} \sum_{j=i+1}^{N} \widehat{p}^{2}{}_{ij} \tag{5}$$

The difference between CD_{LM3} and CD_{LM1} is that CD_{LM3} is based on the sum of (not their squares of) the coefficients of correlation among cross-sectional residuals. Under the null hypothesis of no cross-dependency with $T \to \infty$, then $N \to \infty$ in any order, this test is also asymptotically distributed as standard normal.

Another important issue in panel causality analyses is to determine whether slope coefficients are homogenous or heterogeneous. To make an unrealistic assumption without any empirical evidence of that coefficients are homogenous may cause misinterpretations in considering the differences among the cross-section of households, firms, countries, etc. The most common way to test the null hypothesis of homogeneity, $H_0 : \beta_i = \beta$, for all i against the alternative hypothesis of heterogeneity, $H_1 : \beta_i \neq \beta_j$, for a non-zero fraction of pair-wise slopes for $i \neq j$ is to apply the standard F test, which is valid when the error variances are homoscedastic. Swamy (1970) has first developed the slope homogeneity test as:

$$\widetilde{S} = \sum_{i=1}^{N} \left(\overline{\beta}_i - \widetilde{\beta}_{WFE}\right)' \frac{x_i' M_\tau x_i}{\widehat{\sigma}_i^2} \left(\overline{\beta}_i - \widetilde{\beta}_{WFE}\right) \tag{6}$$

where $\overline{\beta}_i$ is the pooled OLS estimator, $\widetilde{\beta}_{WFE}$ is the weighted fixed effect pooled estimator, M_τ is an identity matrix, and $\hat{\sigma}_i^2$ is the estimator of error variance, σ_i^2.

As this test is mostly appropriate for panel data models with N relatively small to T, Pesaran and Yamagata (2008) has proposed a new so-called Delta test also applicable to small samples. Their test include delta_tilde ($\widetilde{\Delta}$) and delta_tilde_adjudted ($\widetilde{\Delta}_{adj}$) tests as:

$$\widetilde{\Delta} = \sqrt{N}\left(\frac{N^{-1}\widetilde{S} - k}{\sqrt{2k}}\right) \tag{7}$$

$$\widetilde{\Delta}_{adj} = \sqrt{N}\left(\frac{N^{-1}\widetilde{S} - E(\widetilde{z}_{it})}{\sqrt{var(\widetilde{z}_{it})}}\right) \tag{8}$$

where the mean $E\left(\widetilde{Z}_{it}\right) = k$ and the variance $var(\widetilde{z}_{it}) = 2k(T-k-1)/(T+1)$.

The results of cross-dependency and homogeneity tests are given in Table 1. Cross-dependency test results show that the null of no cross-dependency is rejected, providing strong evidence on the existence of cross-dependency across Turkish banks. The results also indicate that second generation unit root tests can be performed. Pesaran and Yamagata (2008) homogeneity test results indicate that the slope coefficients are heterogeneous, as the probability values of the test statistics are smaller than 1 and 5 % significance levels.

Table 1 Results of cross-sectional dependency and homogeneity tests

Cross-sectional dependency tests						Homogeneity tests					
$\text{Model}_{\text{pre-crisis}}$			$\text{Model}_{\text{post-crisis}}$			$\text{Model}_{\text{pre-crisis}}$			$\text{Model}_{\text{post-crisis}}$		
Test	Statistic	*p*-value	Test	Statistic	*p*-value	Test	Statistic	*p*-value	Test	Statistic	*p*-value
CD_{LM1}	342.314	0.000	CD_{LM1}	142.843	0.004	$\widetilde{\Delta}$	4.027	0.000	$\widetilde{\Delta}$	11.065	0.000
CD_{LM2}	153.756	0.000	CD_{LM2}	18.845	0.023	$\widetilde{\Delta}_{adj}$	4.238	0.000	$\widetilde{\Delta}_{adj}$	11.663	0.000
CD_{LM3}	49.132	0.000	CD_{LM3}	11.726	0.000						

4.2.2 CADF and CIPS Unit Root Tests of Pesaran (2003, 2007)

The first generation panel unit root tests of Levin and Lin (1992, 1993), Levin et al. (2002), Im et al. (1997, 2003), Maddala and Wu (1999), Hadri (2000) and Choi (2001) are based on the hypothesis of cross-sectional independency. As seen in the studies of Phillips and Sul (2003) and O'Connell (1998), this hypothesis may sometimes be restrictive and unrealistic. However, in the second generation unit root tests of Bai and Ng (2001), Moon and Perron (2004) and Pesaran (2007), the cross-sectional assumption has been relaxed. As the results of cross-dependency test provides strong evidence on the existence of cross-dependency across Turkish banks, CADF and CIPS unit root tests of Pesaran (2007) are performed to test the stationarity of the series in this study.

Pesaran (2003) deals with the problem of cross-dependency in a different approach by considering a one-factor model with heterogeneous loading factors for residuals. However, he does not base the unit root tests of deviations from the estimated common factors. Instead, he augments Dickey-Fuller or ADF regressions with the cross section average of lagged levels and first differences of the individual series (Hurlin and Mignon 2007). The regression used for the i^{th} country is as:

$$\Delta y_{i,t} = \alpha_i + \rho_i y_{i,t-1} + c_i \overline{y}_{t-1} + d_i \Delta \overline{y}_t + v_{i,t} \tag{9}$$

where $\overline{y}_{t-1} = (1/N) \sum_{i=1}^{N} y_{i,t-1}$ and $\Delta \overline{y}_t = (1/N) \sum_{i=1}^{N} y_{i,t}$.

Pesaran (2003)'s test is based on individual cross-sectionally augmented ADF statistics as denoted CADF. Though all the individual CADF statistics have similar asymptotic null distributions not depending on the factor loadings, they are all correlated due to dependence on the common factor. So, it is possible to calculate an average of individual CADF statistics. This led Pesaran (2007) to propose a cross-sectional augmented version of the Im et al. (2003) test denoted as CIPS:

$$CIPS = (1/N) \sum_{i=1}^{N} CADF \tag{10}$$

The results of CADF and CIPS tests are given in Table 2. The null hypothesis of a unit root is rejected in case of calculated test statistics being greater than critical values. CIPS statistics indicate that only $\text{PROF}_{\text{pre-crisis}}$ variable is stationary at level, while all the other variables are non-stationary at level. However, after taking the first differences of the variables, it is seen that all variables are integrated of order one, I(1).

Table 2 Results of CADF and CIPS unit root tests

Banks	CADF tests statistics							
	$PROF_{pre\text{-}crisis}$	$LIQ_{pre\text{-}crisis}$	$PROF_{post\text{-}crisis}$	$LIQ_{post\text{-}crisis}$	$\Delta PROF_{pre\text{-}crisis}$	$\Delta LIQ_{pre\text{-}crisis}$	$\Delta PROF_{post\text{-}crisis}$	$\Delta LIQ_{post\text{-}crisis}$
Ziraat Bank	−1.638	2.22	−2.304	−3.112***	−2.99***	−3.523**	−4.242*	3.264**
Halkbank	−4.558*	−2.715	−2.056	−0.395	−4.785*	−4.337*	−4.02**	−3.232**
VakifBank	−2.058	−2.165	−2.544	−1.476	−3.234***	−4.821*	−3.307**	−2.369
Adabank	−3.057***	−2.241	−2.197	−2.74	4.153*	−3.4945**	−3.529**	−3.492**
Akbank	−5.175*	−3.208***	−2.008	−4.535*	5.768*	−2.215	−4.215*	−4.63*
Anadolubank	−3.326***	−0.104	−2.364	−0.193	−3.978**	−3.647**	−4.366*	−2.954***
Sekerbank	−2.654	−1.018	−2.181	−1.942	−4.089*	−2.724	−3.016**	−3.038**
Tekstilbank	−3.513**	−3.491***	−1.406	−3.641**	−3.675**	−2.758	−4.385*	−2.113
Turkish Bank	−4.211*	−0.959	−5.76*	−1.747	−4.132*	−2.464	−4.463*	−2.77
Economy Bank of Turkey	−3.592**	−2.003	−2.373	−2.933	−2.943***	−4.101**	−4.428*	−2.139
Garanti Bank	−2.615	−4.847*	−2.439	−2.935	−3.003**	−4.785*	−3.224**	−2.432
İs Bank	−2.426	−2.928	−2.924	−0.942	−3.132**	−3.531**	−4.584*	−5.198*
Yapi Kredi Bank	−2.845	−1.644	−3.243***	−0.255	−3.654**	−3.151***	−4.589*	−3.473**
CIPS Test Statistics	−3.205*	1.931	−1.570	2.065	−3.811*	3.502*	−4.028*	3.162*

Note: *, ** and *** denote significance levels of 1, 5 and 10 %, respectively. The critical values for the CADF and CIPS tests are obtained from Pesaran (2007), Tables Ib and IIb, respectively

4.2.3 Panel Cointegration Test of Westerlund (2008)

In this study, the cointegration relationship between the series are tested by the Durbin-Hausman test proposed by Westerlund (2008). Unlike the other panel cointegration tests, this test allows the independent series to be integrated at different orders, and can be performed only in the presence of cross-sectional dependency. Westerlund (2008) has proposed two different test statistics, namely Durbin-Hausman group (DH_g) and Durbin-Hausman panel (DH_p) test statistics as calculated below:

$$DH_g = \sum_{i=1}^{n} \overline{S}_i \left(\widetilde{\varnothing}_i - \overline{\varnothing}_i \right)^2 \sum_{t=2}^{T} \overline{e}_{it-1} \tag{11}$$

$$DH_p = \overline{S}_n = \left(\widetilde{\varnothing}_i - \overline{\varnothing}_i \right)^2 \sum_{i=1}^{n} \sum_{t=2}^{T} \overline{e}_{it-1} \tag{12}$$

While the autoregressive parameter is same for all cross-sections in the panel test statistics (that is, this test is constructed under the maintained assumption that $\varnothing_i = \varnothing$ for all i), differentiation between cross-sections for autoregressive parameter is allowed in the group tests statistics. The rejection of the null hypothesis ($H_0 : \varnothing_i = 1$ for all $i = 1, \ldots, n$) indicates the existence of cointegration between the series. In order to decide to reject or accept the hypotheses of the test, calculated test statistics and the critical values in the normal distribution table are compared. When the calculated test statistics are greater than critical values, the null hypothesis is rejected, meaning that there exists cointegration.

According to the empirical results given in Table 3, for both pre and post crisis models the null hypotheses are rejected indicating the existence of cointegration between the series.

4.2.4 Estimation of Long-Run Parameters

In the existence of cross-sectional dependency, Augmented Mean Group (AMG) estimator introduced by Eberhardt and Bond (2009) is commonly used to estimate long-run parameters of cointegration. The main advantages of panel AMG compared to other estimators are that it considers both cross-sectional dependency and

Table 3 Results of panel cointegration test of Westerlund (2008)

	$\text{Model}_{\text{pre-crisis}}$	$\text{Model}_{\text{post-crisis}}$
Durbin-Hausman Group Test Statistic	22.977*	6.849*
Durbin-Hausman Panel Test Statistic	1.285***	2.136**

Note: *, ** and *** denote significance levels of 1, 5 and 10 %, respectively. The critical values obtained from normal distribution table, as 2.33 (for the significance level of 1 %), 1.65 (for the significance level of 5 %) and 1.28 (for the significance level of 10 %)

parameter heterogeneity, and can also be used even though the series are integrated of different orders. In the panel AMG estimator, the cross-sectional dependency is considered by inclusion of a "common dynamic process" in the country regression. This process is extracted from the year dummy coefficients of a pooled regression in first differences, representing the levels-equivalent mean evolution of unobserved common factors across all countries. Provided the unobserved common factors form part of the country-specific cointegrating relation (Pedroni 2007), the augmented country regression model encompasses the cointegrating relationship, which is allowed to differ across i (Eberhardt and Teal 2010). The model adopted by Eberhardt and Bond (2009) (for $i = 1, \ldots N$ and $t = 1, \ldots, T$) is as:

$$y_{it} = \beta_i' x_{it} + u_{it}\, u_{it} = \alpha_i + \lambda_i' f_t + \varepsilon_{it} \tag{13}$$

$$x_{mit} = \pi_{mi} + \delta_{mi}' g_{mt} + \rho_{1mi} f_{1mt} + \ldots + \rho_{nmi} f_{nmt} + \upsilon_{mit}\,(m = 1, \ldots, k \text{ and} f_{.mt} \subset f_t) \tag{14}$$

$$f_t = {}'f_{t-1} + \epsilon_t \text{ and } g_t = \kappa' g_{t-1} + \epsilon_t \tag{15}$$

where x_{it} is a vector of observable covariates. α_i, f_t and λ_i denote group-specific fixed effects, set of common factors and country-specific factor loadings respectively; k is the number of observable regressors, which are modelled as linear functions of unobserved common factors f_t and g_t, with country-specific factor loadings.

The panel AMG estimator is calculated in two stages:

$$Stage\,1 \Rightarrow \Delta y_{it} = b' \Delta x_{it} + \sum\nolimits_{t=2}^{T} c_t \Delta D_t + \varepsilon_{it} \tag{16}$$

$$\Rightarrow \overline{c}_t \equiv \overline{\mu}_t^{\bullet}$$

$$Stage\,2 \Rightarrow y_{it} = \alpha_i + b_i' x_{it} + c_i t + d_i \overline{\mu}_t^{\bullet} + \varepsilon_{it} \tag{17}$$

$$\overline{b}_{AMG} = N^{-1} \sum_i \overline{b}_i$$

In the first stage of calculation, by using a standard first-difference ordinary least squares regression with $T - 1$ year dummies in first differences, year dummy coefficients (relabeled as $\overline{\mu}_t^{\bullet}$) are collected. In the second stage, this variable is included in each of the N standard country regressions. Alternatively, year dummy coefficients can be subtracted from the dependent variable, implying that the common process is imposed on each country with unit coefficient. In either case, it is possible to derive AMG estimates as percentages of the individual country estimates, as the MG approach of Pesaran and Smith (1995).

Estimated long-run parameters by using the panel AMG estimator is given in Table 4. Empirical findings indicate that in the pre-crisis period, liquidity (as the independent variable) has—mostly—statistically positive effects on financial performance (in terms of profitability) of Turkish banks. The empirical findings seem not to change in post-crisis period. The effect of liquidity on financial performance is positive, similar to the pre-crisis period, indicating that the effect of 2008 crisis

Table 4 Panel AMG estimation results

	$\text{Model}_{\text{pre-crisis}}$		$\text{Model}_{\text{post-crisis}}$	
Banks	Coefficient	*p*-value	Coefficient	*p*-value
Ziraat Bank	0.047*	0.002	0.016***	0.073
Halkbank	−0.141*	0.000	0.021	0.180
VakifBank	0.101***	0.059	−0.077	0.414
Adabank	0.141	0.493	−1.363**	0.042
Akbank	0.056***	0.070	0.018*	0.003
Anadolubank	−0.034**	0.017	0.014***	0.087
Sekerbank	−0.065	0.857	−0.073	0.238
Tekstilbank	−0.138*	0.000	−0.013	0.407
Turkish Bank	0.251*	0.000	0.004	0.352
Economy Bank of Turkey	−0.053	0.566	−0.015	0.118
Garanti Bank	0.108*	0.001	0.022*	0.004
İs Bank	0.266	0.569	−0.020*	0.007
Yapi Kredi Bank	0.018	0.804	−0.007	0.590
Ziraat Bank	0.047*	0.002	0.016***	0.073

Note: *, ** and *** denote significance levels of 1, 5 and 10 %, respectively. To correct for potential autocorrelation and heteroscedasticity problems, Newey–West (1987) estimator is used

on Turkish banking sector has not been so severe, in terms of financial performance-liquidity relationship.

4.2.5 Causality Test of Dumitrescu and Hurlin (2012)

In this study, a simple Granger (1969) non causality test in heterogeneous panel data models with fixed coefficients proposed by Dumitrescu and Hurlin (2012) is employed to address the cross-sectional dependency and heterogeneity. The linear model considered by Dumitrescu and Hurlin (2012) for two stationary variables denoted by x and y observed for N individuals on T periods is as:

$$y_{it} = \alpha_i + \sum_{k=1}^{K} \gamma_i^{(k)} y_{i,t-k} + \sum_{k=1}^{K} \beta_i^{(k)} x_{i,t-k} + \varepsilon_{i,t} \tag{18}$$

with $K \in N^*$ and $\beta_i = \left(\beta_i^{(1)}, \ldots, \beta_i^{(K)}\right)'$. Here, the individual effects α_i are supposed to be fixed in time dimension. Initial conditions $\left(y_{i,-K,\ldots,}y_{i,0}\right)$ and $(x_{i,-K,\ldots,}x_{i,0})$ of both individual processes $y_{i,t}$ and $x_{i,t}$ are given and observable. The lag orders K are identical for all cross-section units of the panel and the panel is balanced. The autoregressive parameters $\gamma_i^{(k)}$ and the regression coefficients slopes $\beta_i^{(k)}$ are allowed to differ across groups.

Dumitrescu and Hurlin (2012) developed three test statistics. The first one is the average Wald statistics ($W_{N,T}^{HNC}$) associated with the null Homogeneous Non

Causality (HNC) hypothesis ($H_0 = \beta_i = 0\ \forall i = 1, \ldots N$, implying that there exists no individual causality relationship from x to y:

$$W_{N,T}^{HNC} = \frac{1}{N}\sum_{i=1}^{N} W_{i,T} \tag{19}$$

where $W_{i,T}$ denotes the individual Wald statistic for the *ith* cross-section unit corresponding to the individual test $H_0 = \beta_i = 0$.

The other test statistics are $Z_{N,T}^{HNC}$ and $\widetilde{Z}_{N}^{HNC}$ as given below:

$$Z_{N,T}^{HNC} = \sqrt{\frac{N}{2K}}\left(W_{N,T}^{HNC} - K\right) \underset{T,N\to\infty}{\to} N(0,1) \tag{20}$$

where $T, N \to \infty$ denotes the fact that $T \to \infty$ first and then $N \to \infty$.

$$\widetilde{Z}_{N}^{HNC} = \frac{\sqrt{N}\left[W_{N,T}^{HNC} - N^{-1}\sum_{i=1}^{N} E\left(\widetilde{W}_{i,T}\right)\right]}{\sqrt{N^{-1}\sum_{i=1}^{N} Var\left(\widetilde{W}_{i,T}\right)}} \tag{21}$$

Causality test results given in Table 5 indicate the existence of bi-directional causality relationship between liquidity and financial performance of Turkish

Table 5 Causality test results

	$\text{Model}_{\text{pre-crisis}}$		$\text{Model}_{\text{post-crisis}}$	
Test statistics	PROF → LIQ	LIQ → PROF	PROF → LIQ	LIQ → PROF
$W_{N,T}^{HNC}$	6.514*	6.615*	3.555*	3.233*
$Z_{N,T}^{HNC}$	5.173*	5.316*	0.865	0.344
$\widetilde{Z}_{N}^{HNC}$	3.606*	3.716*	0.204	−0.997
Banks	Wald statistics		Wald statistics	
Ziraat Bank	6.695*	8.581*	8.464*	0.318
Halkbank	21.534*	12.496*	10.177*	0.805
VakifBank	3.644*	6.669*	5.853*	4.401*
Adabank	0.594	1.148	4.383*	16.515*
Akbank	1.936**	0.379	3.065*	2.407**
Anadolubank	2.208**	15.538*	5.104*	4.737*
Sekerbank	17.588*	7.136*	1.752***	1.296
Tekstilbank	9.306*	1.287	2.841**	3.099*
Turkish Bank	0.611	3.122*	2.09	2.118**
Economy Bank of Turkey	6.168*	2.977*	8.651*	0.772
Garanti Bank	0.332	7.412*	1.735**	0.853
İs Bank	0.625	3.106*	1.392	3.659*
Yapi Kredi Bank	14.703*	14.844*	3.957*	1.023

Note: *, ** and *** denote significance levels of 1, 5 and 10 %, respectively

banking sector, in both pre and post crisis periods. The same finding is observed in terms of individual banks for most cases. In relation to individual banks, this causality relationship seems stronger in pre-crisis compared to post-crisis period.

5 Conclusion

Though 2008 financial crisis may resemble the earlier crises in terms of liquidity demand, one distinguishing feature of the crisis is that (especially) commercial banks have been in the very center of liquidity risks. During the crisis and even for some period after the crisis, most of them could not function as financial intermediaries and this situation sharply worsened their financial performance. Besides, a general sense that banks had failed to realize the importance of liquidity (risk) management and its consequences on their financial performance dominated the market.

This paper presents empirical evidence on the relationship between liquidity and financial performance for a panel of Turkish state-owned and privately-owned banks in the periods of pre and post 2008 crisis. Throughout this aim, a panel data covering the period of 2001.Q1–2015.Q3 for the state-owned and privately-owned deposit banks in Turkey is analyzed by using advanced econometric methodologies of Breusch and Pagan (1980) and Pesaran (2004) cross-dependency tests; cross-sectional Augmented Dickey Fuller (CADF) and CIPS tests of Pesaran (2007); panel cointegration test of Westerlund (2008); Augmented Mean Group estimator developed by Eberhardt and Bond (2009) and panel causality test of Dumitrescu and Hurlin (2012).

Before proceeding to panel unit root tests, cross-dependency of the series is tested by Breusch and Pagan (1980) and Pesaran (2004) test statistics. Test results provide strong evidence on the existence of cross-dependency across Turkish banks, indicating that second generation unit root tests can be performed. Among them, CADF and CIPS unit root tests of Pesaran (2007) are performed to test the stationarity of the series. CADF and CIPS test results show that all series are integrated of order one, I(1). Following, the cointegration relationship between the series are tested by the Durbin-Hausman test proposed by Westerlund (2008), indicating the existence of cointegration between the series. Long-run parameters of cointegration is estimated by Augmented Mean Group (AMG) estimator introduced by Eberhardt and Bond (2009). Estimations show that in both pre and post crisis periods, the effect of liquidity on financial performance is statistically significant and positive.

According to the empirical finding of that the effect of liquidity on profitability has remained same in both pre and post crisis periods, it can be concluded that the Turkish banking sector has not been affected much from the crisis (at least in terms of liquidity-profitability relationship), consistent to the outcomes of BSRP in terms of relatively high capital adequacy and profitability ratios, high asset quality and low currency and liquidity risks of Turkish banks. The positive relationship

between liquidity and financial performance also supports the earlier findings of Bourke (1989), Kosmidou (2008), Lartey et al. (2013), Agbada and Osuji (2013) and Kurawa and Abubakar (2014).

Another empirical finding is about the causality relationship between liquidity and financial performance. Similar to positive relationship between them, causality test results indicate the existence of bi-directional causality relationship between liquidity and financial performance in Turkish banking sector, in both pre and post crisis periods.

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Market Risk Instruments and Portfolio Inflows in African Frontier Economies

Kehinde A. Adetiloye, Joseph N. Taiwo, and Moses M. Duruji

Abstract Financial investments enable portfolio investors to earn above market returns which do not come without risks. The African frontier markets (FMs) are investigated here and this chapter brings into focus the determinants of portfolio flows into these markets. The number of FEs in African investigated is six and two key financial instruments are used as returns: stock market returns and interest rate spread. Other variables used in the study include reserve liquidity, exchange rates and national income. The method of estimation adopted is the Vector autoregression with Granger causality. The results show that the all the variables are significant with the portfolio inflows. Specifically, portfolio funds are income chasing; the liquidity of reserves is also significant for every country among the FEs to enjoy inflows of portfolio funds, impacting on the exchange rates. Stock market returns is also highly significant in the Granger causality tests. Recommendations made include the increase in productivity to increase income and exports in these economies. In addition, African FEs must reduce interest rate margins to increase real production and encourage bonds markets development and thus attract portfolio investment into the sector rather than to concentrate all attention on the equities market.

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1 Introduction

The investment world is looking out constantly for avenues to earn more and above average returns which by finance dictum must come with a higher level of risks. The level of risk is an indicator of the level of potential returns possible. The returns are not earned except with some informed knowledge and arduous task of measuring the eventual safety of the investments. Many investors engage research to bring about estimated supernormal returns that would ordinarily not be possible. The Efficient Market Hypothesis (EMH) proves that the strong form of the market indicates either an insider or deep informed knowledge is required to be profitable. Domestic investment in financial assets in mature and advanced market is surfeit and returns are entirely predictable. In addition, markets though maintaining a general trait in microstructure nevertheless differ in infrastructure and domestic practises which ultimately impacts on the performance and thus possible return that can be garnered in the market. Thus many efforts have been directed at emerging markets in order to maximise investments and returns without much attention paid to the frontier markets. A number of foreign investors have taken more than casual interest in these markets with the ultimate aim of making profitable commitments.

This is not without attendant risks in such markets. Apart from some studies on portfolio investment, many concentrate on Foreign Direct Investment, which though important is not the only form of investment in these countries that can be profitable. Frontier market by their nature have proved to be veritable outlet of funds from mature financial markets just like the emerging markets and therefore deserves to be empirically investigated.

Capital Market consultative Group (2003), a document from the IMF details so much information about Foreign Direct Investments in emerging market economies (EMEs) around the world with scanty information on Africa (all information mostly from South Africa). But the foreign inflows are often hot in nature. Investments in the financial system is being blamed for the exchange rate crisis and volatilities in stock markets. As a result of the flows of portfolio investment reaching a peak in the EME countries, attention is being shifted gradually to the frontier economies (FEs) for exploitation by portfolio institutions from mature and advanced markets. As a result of this, a number of countries in Africa become targets, where even countries like Argentina (with unstable currency), Bangladesh (with political instability) and in Africa, Kenya (politically unstable) and Nigeria (highly risky) have been in the spotlight for portfolio investment. The Morgan Stanley Capital International (MSCI) has been at the forefront of providing reliable and useful information on the EMEs and the FMs. Thus it has data that can be of help on many of the investments environments. For the African economies, investment scenarios need more attention from the developed markets for them take advantage. However, the environments of these countries make the investments to be profitable by the level of liquidity available. Nielsen (2012) thoroughly examined the portfolio investment situation in African financial markets and found that there are a number of countries where investment has been less than the economy could absorb.

Since ratings is available on some of the countries, it has become possible to put these countries in classes given the level of country or sovereign risks they face, since each of these can seriously vitiate the expected return of investments. The national risk is conceptualised in the infrastructure and institutional developments as far as country risks which seem to be main challenge to grapple with is concerned. FEs that is on focus on the African continent in this paper is as defined by the MSCI, as a number of other definitions are possible with other indices. These countries are mainly: Botswana, Kenya, Mauritius, Nigeria and Tunisia. The paper is deliberate in replacing Morocco as contained in the list of MSCI with Botswana for obvious reasons. Firstly, it is the most stable market of the Southern African countries and therefore represents the region in this paper. The inclusion of Morocco would have been counting a second MENA country after Tunisia. Secondly, the choice of Botswana provides the balance of regions that the chapter seeks to achieve.

Many analysts studying the investment situation in Africa focus on so many primordial issues that may vitiate the investments of portfolio funds and therefore offer pieces of advice, though ingratuitously. Such risks as political, market and liquidity risks are of importance for concern as these may cause unexpected losses. Political risk is seen as possibility of civil unrest occasioned by election, coups and the rest and the possibility of the risk of secession among constituent sub-nations. Liquidity risk is the risk from inability of the market to absorb the assets of investment. This is a major reason why Hedge Funds (HFs) do not go for real estate. Market risk is the risk of losses that the economy imposes which cannot often be diversified away. Market risk is a composite of some other risks that may make the investment unprofitable eventually. Investors do in-depth analysis before committing to undertake investments in most of these countries.

Market investments generating risks are mainly currency, interest rate, equities and commodities that are available in the economies of the African countries. Since the interest of the portfolio funds investors are in the economy that best maximises their returns, portfolio funds are choosy as to what countries they commit to. The instability of each these investments mean unpredictability in the possible outcomes for the investments in these economies. This is what makes portfolio flows to be as unpredictable and uncertain in the nature of the investment flows into these economies. The countries involved are variously defined with common characteristics as small open economies allowing foreign inflows and outflows and can absorb an amount of investment. Thus the sample of African frontier countries adopted for this study is picked in manner explained in the methodology.

The main objective of this chapter is to discuss the major risks of financial market investments and portfolio investments inflows into FEs in selected African countries and empirically discover the main attraction of the investors. The paper is organised as follows: Following after the introduction is the literature review on major types of financial investments and risks attaching to them. Section 3 is on the models and techniques of estimation while Section 4 discusses the results and the last section concludes and recommends for the chapter.

2 Literature Review

Following closely to the emerging markets of the world among which the BRICS are noted is the Frontier Economies (FEs) that are described as small open economies that are likely to record growth in the near future given stable development but currently less stable than emerging market economies (EMEs). The FEs also shares the main qualities of the EMs though to a reduced degree as far as governance is concerned. Insufficient information and *in* stability seem to be the basic criteria of these countries that marked them out for the qualification they are given. Thus much less is available on them from the academic world. Nellor (2008) gives three basic qualifications for these economies to be either classified as EMs or FEs. They are: there must be take-off in growth, such growth must be private sector driven and backed by the public policy, and availability of an active financial market to invest in.

Burgess and Mühlberger (2011) identify eight countries that record strong growth and thus qualified to be named among the FEs in Africa. The countries are Angola, Ghana, Kenya, Nigeria, Senegal, Tanzania, Uganda, and Zambia, though other countries such as Ethiopia are excluded where basic criterion is strong growth based on one factor or component of market risks or the other. Notable organisations that attempt to identify these countries are FTSE, Dow Jones, MSCI and Russell. While total number of countries globally amounts to 39, 10 of these countries are in Africa. Most countries in the FE class have undergone some financial liberalisation of their markets thus paving way for inflows private capital.

Since private investors are ready to invest when the risk appetites are right but the issue of premium constitute the main considerations in the investors' choice. Nature presents the male folks as being more risk loving than females (Powell and Ansic 1997) which does not inviolate their (the female folks) acumen in business strategies and ability to perform. This can be transmuted to the leadership of HFs. Risk analysis is a highly quantitative procedure that spans calculus, probability and algebra to perform complex calculations that have been simplified by the use of software by Asset Managers (AMs). Alexander (2008) contains many procedures that engage the use of the above techniques and many others. The practise is to adopt the use of software and other spreadsheet based analysis that is market-specific and tailored to meet specific needs. One very important requirement is the knowledge of what risk the software is built to overcome. With the level of development knowledge, uncertainty which is initially believed to be immeasurable can now be measured (Menezes et al. 2013). Value at Risk has been the traditional measure of risk and all other developments are now centred on it but Krokhmal et al. (2002) introduces Conditional Value-at-Risk. Beck's (Beck and Feyen 2013) analysis of gaps and political risk is highly significant in most economies while financial and economic risks feature significantly in the gap analysis.

Political risk is any event that can directly or indirectly alter the value of an economic asset (Glancy 2015) and country risk analysis and observations in literature is dominated by AMs and investor's advisors. For instance, an advertorial indicates Botswana and Tunisia as having higher level of transparency than most

Asian and Latin America countries (Cushman Wakefield, 2014). A major risk indicated for Nigeria is political, insurgency and break-up. Forward Thinking (2015) exhaustively dealt with the risks of various types especially the political risks common in the FEs around the world. While not particularly ascertaining risks common to these countries general risk remain and yet significant in the risks are political, liquidity and volatility. All these risk can be mitigated by diversification while the political risks remain. Promotion of the FEs in Africa has been strident from many of the AMs and HFs as well as the supranational bodies within the continent, for example, Economic Commission for Africa (2015). International Organization of Securities Commissions (2014) mentions the rate at which capital flows to FEs and EMs have increased such that asset under management has grown tremendously from $825 million to $2.3 trillion in over 10 years at the first quarter of 2014. The publication also notes that capital flows around the world has increased tremendously thus impacting on the capital markets in Africa. While bond market activities have increased so has crowd funding, though still a small part of the funds raised but growing at an alarming rate with the US dominating issues.

2.1 Risk and Market Instruments

Four of the risks investigated in this paper are included in Sy (2015) when the sudden rise in the interest of African countries to borrow heightened and greater international participation in international market took place. Commodities, bond investment, and interest rates suddenly made investments in African countries profitable while Africa also forayed outside to deal. Market equity risk premium indicates a relationship between risk and premium is positive and the higher the market risk the higher expected market equity premium (Maheu and McCurdy 2007). Inflation risk is common for most countries but is significant in countries with investors who invest domestically since the portfolio investors may not have a long term horizon in the market. Garcia and Werner (2010) theorises on the inflation risk premia linked (of course) to interest rate and other macroeconomic variables. Equity premium on the other hand has its roots in country risks and base premium for mature equity market plus country premium which reflect the extra risk in the specific market (Damodaran 2012). Heavy dependence on historical data is now no longer a reliable way to measure equity risk (Damodaran 2012). Highly unpredictable and volatile, the risk premium on currency and exchange rates present perplexing scenarios. Again linked to interest rate (spread) the premium is also heavily influenced by trade and supply and demand factors. For instance, currencies undergoing reforms and changes in their jurisdictions are often victims of heavy speculation. Carlson and Osler (2003) indicates the after effects of differentials lead to higher volatility in the Exchange rates (ERs), while Poghosyan (2012) show that countries who linked their currencies to others suffer the after-effects of the counterpart countries consumption and spending patterns. A recent study shows that business cycles, global risks aversion and traditional ER

fundamentals are still significant (Sarno et al. 2012). Business cycles are more influenced by trade flows between economies that are heavily dependent on commodities for foreign exchange reserves. Markets risks for holding commodities as hedge instruments are not often priced and inventories are important in both spot and future prices (Roache 2008). Commodities frequently are sensitivities to risk and investors are expected to continuously update themselves when investing in commodities as hedge instruments.

2.2 Risk Premiums on Investments

Most literature emphasises on risk free and premium on risks of the products bought and sold in the financial market place as the risk to a large extent determine the returns. The different market risks: namely have risk premiums that encourage risk loving investors to invest. For instance, the risk premium on corporate bonds differ one from another depending on the class of risk the firm; this is also replicated in the foreign exchange market, the interest rates or coupon on short term money instruments and as well as commodities. Arnott and Bernstein (2002) summarises that a complicated process to determine each of the premium on bonds and equity involves the ascertainment of expected real stock and bonds returns, bond and dividend yield and inflation. The paper concludes that the past values are unreliable to extrapolate on and assume a premium for the future for any class of assets. Therefore, the risk premiums for today are averagely less than what existed before and investors should not expect such returns as 8 and 5 % risk premiums on equity and bond stocks respectively. Duarte and Rosa (2015) believes that the current high rate of equity premium is caused by the low yield on bonds which most probably is caused by inventors' liquidity preference.

Risk premium in the foreign exchange market would be important for arbitrageurs and speculators who trade and take positions in currency markets. This would be meaningful for study when determining the depreciation level of currencies. Perhaps more dynamic than other market risks, Cheng (1993) finds that there is great degree of persistence and exchange rates premiums have high degree of co-variance and thus does not support an earlier theory of Lucas (1982). Risk premium on currency has been linked to stock market returns and that global variance risk premium has a higher predictive power on currency risks premium returns and mainly influenced by bilateral forex returns and excess equity return differentials (Aloosh 2014). In all, the risk of depreciation overtime is what investors and traders in those currencies face.

Commodities present a special case for risk premiums which is largely determined by the inventories in such commodity (Gorton et al. 2012). This is supported by the modern theory of storage which is not significantly different from Haase and Zimmermann (2013) whose study of the crude oil market show that the convenience yield that is assumed does to exist and that exchange rates and stock markets also affects the crude oil commodity sector. Interesting as this is, this chapter does

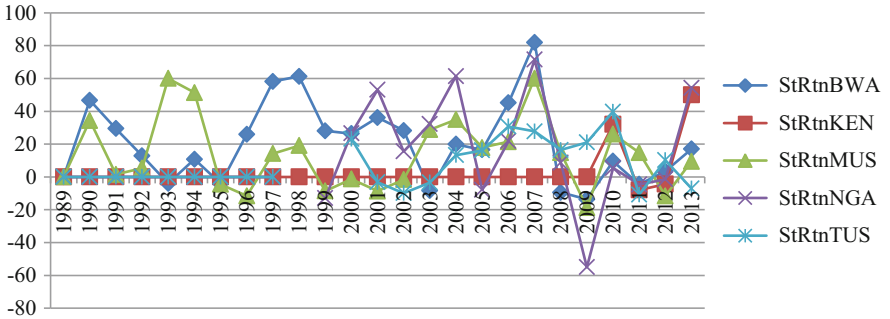

Fig. 1 The stock market returns of various FM economies in Africa. Source: Data from World Development Indicators

not look at the commodities risks in order to focus on the financial instruments that are components of market risks.

Perhaps the most important reason for the influx of HFs in African frontier markets is the uncorrelated nature between financial market returns of matured economies and emerging and frontier markets. However, can the African FMs be said to have correlated returns? Determinants of the stock market returns are many and may be country-specific. Osisanwo and Atanda (2012) opine that interest rates, liquidity, previous stock return and money supply are significant in Nigeria. The stock markets returns of the stock exchanges of the countries in this study are plotted in Fig. 1. While coordinated movements are observable there are also volatilities. Apart from the Nigerian Stock Exchange, the other stock markets are less in significance in terms of market capitalisation and traded volume of stocks.

2.3 Frontier Economies in Africa

Specifically each country has its idiosyncratic risks that mark it out among the FMs in Africa. For instance, Nigeria's stock market prices respond to interest rates changes, and Udegbunam and Oaikhenan (2012) corroborates that duration and convexity hypothesis of interest rates sensitivity to stock market prices. The study also asserts that duration and convexity exert strong opposite impacts on prices and net effect of interest rate changes on stock prices is negative, an indication that stock prices fall with increases in stock risk.

Classification of countries in the FE class appears not to be uniform. Various institutions have classified according to indexes which they have formed for own convenience. Various studies grouped such countries and a number of these countries are picked form the pool. Thus FTSE has (6) countries, MSCI (5) Standard and Poor (9) Dow Jones (4) and Russell (11) countries. Among these countries the study picks six: namely Botswana, Cote d'Ivoire (CIV), Kenya, Mauritius, Nigeria and Tunisia believed to represent a balanced spread between geography and sustained

growth over the years. Of note is Cote d'Ivoire which represents French West Africa but has little data for the study. Its stock market data is rather sketchy.

3 Methodology and Models

Market risk measurements lend themselves to many variables. Basic variables as discussed in the literature form the dependent and independent variables used in the models intend to capture the flows of portfolio funds into the FEs. The paper identifies reserve liquidity, interest rates spread, and exchange rate, for analysis in the paper. Endogenous attractions to HFs in most FEs of Africa are the rising reserve liquidity, the deregulation of the financial and foreign exchange markets. Variables representing these sectors are official exchange rates, reserve position without Gold, stock market returns and interest rates spread. Income is added as an endogenous benefit for the FM economies. The countries are abbreviated as BWA, CIV, KEN, MAU, NGA, and TUS for Botswana, Cote d'Ivoire, Kenya, Mauritius, Nigeria and Tunisia respectively.

Data sources are from the World Development Indicators (WDI) with a maximum range of 25 years to capture the last global financial crises in the case study countries from 1989–2014. The data are official exchange rates (*OEXR*), Reserve minus Gold (RG), Gross national income (*GNI*), Portfolio flows (*RPORTFL*) Interest rates spread (*INTSP*) and Stock market Returns (*STMKT*). Thus on panel basis, the data amounts to 150 observations for the six FE countries.

The study adopts Vector Autoregressions (VAR) to measure the impacts of the various data on one another. The model has been found useful in forecasting which is very important at this time of development in most FEs in Africa where emphasis has been on attraction of foreign investment. The models allow a fair impact assessment and predictability of responses. The study hypothesises that:

$$Yt = \alpha + \sum_{k-1}^{k} A_k Y_{t-k} + \sum_{1-0}^{L} B_1 X_{t-1} + e_t \tag{1}$$

Where Yt endogenous variables

- Y_t: a (nx1) endogenous variables (*stmkt*, *intsp*. . .*oexr*, *gni rg*).
- X_t: a (nx1) exogenous variable: *rportfl*.
- e_t: a (nx1) residual term.
- A_k: the matrix that measures how endogenous and exogenous variables returns react to their lags.
- B_l: the matrix that measure how *rportfl* react to the exogenous variable.

k e_t L: numbers of endogenous and exogenous observations. k and L are chosen based on the Akaike (1974) (AIC) and Schwartz (SC) information criteria. A VaR (p) model with p variables is written as follows

$$y_t = A_t y_{t-1} + A_2 y_2 + \ldots + A_p y_{t-p} + Bx_t + \varepsilon_t \quad (2)$$

Explicitly the paper generates a system of equations of VaR(p) as below

$$\begin{aligned}
rportfl_t &= oexr_t + rg_t + stmktr_t + \text{int}sp_t + gni_t \\
oexr_t &= rg_t + stmktr_t + \text{int}sp_t + gni_t + rportfl_t \\
rg_t &+ stmktr_t + \text{int}sp_t + gni_t + rportfl_t + oexr_t \\
stmktr_t &= \text{int}sp_t + gni_t + rportfl_t + oexr_t + rg_t \\
\text{int}sp_t &= gni_t + rportf;_t + oexr_t + rg_t + stmktr_t \\
gni_t &= rportfl_t + oexr_t + rg_t + stmtr_t + \text{int}sp_t
\end{aligned} \quad (3)$$

The panel estimations is done for the FEs as above and results are shown the next section. In addition, the study also adopts an individual country regression to determine the impact of the variables on each of the countries. The explicit form of the regression is as stated below:

$$RPORTFf\alpha_0 + \beta_1 GNI_{it} + \beta_2 INTSP_{it} + \beta_3 OEXR_{it} + \beta_4 RG_{it} + \beta_5 STMKTR_{it} + \varepsilon_{it} \quad (4)$$

4 Results and Discussions

The summary of the descriptives of the data in raw form is shown in the Table 1. Across the countries maximum portfolio was some $174 billion with a mean of $4.8 billion with 72 reported observations. Standard deviation for *OEXR* is 238.37 while *GNI* is $1936.3. Mean score for *RG* is $346. *STMKTR* has a higher SD than *INTSP* indicating a higher level of volatility in the stock market (Table 1).

Stationarity of the variables was undertaken on panel basis using Hadri unit root test. A stationary result was achieved after first differencing. The output is presented in the Table 2.

4.1 Vector Autoregression Results

As modelled above, the result of the VAR estimation shows that the after differencing the variables performed well in the total estimation. (The result is abridged: insignificant lags have been removed as well as all standard errors). The number of lags chosen is 4 as prescribed in lag selection criteria (this is not shown here). The dependent variable that corresponds to the most significant dependents variable with lags shows that the *RPORTF* has overall significance with the most number of lagged variables. The result shows that significant negative result in the *RPORTF* lag 4, *INTSP* lags 2, 3 and 4. Initial negative significant result is indicated by *GNI* lag 2 but positive in lag 3 and 4. Interestingly *STMKTR* is negative with its own lags

Table 1 Descriptives for the variables

	GNI	INTSP	OEXR	RG	RPORTF	STMKTR
Mean	1926.25	7.74142	196.185	3.46E+0	4834855	21.07715
Median	990	7.834221	73.82747	3.31E+09	9794350	18.45901
Maximum	7370	16.19583	733.0385	9.79E+09	1.74E+08	81.9103
Minimum	260	0.433333	2.021557	2259637	1051260	−55.0162
Std. dev.	1936.29	3.763145	238.3707	2.77E+09	60756534	26.38764
Skewness	1.401792	−0.04713	0.894905	0.49672	0.803541	0.181499
Kurtosis	3.927855	2.507688	2.129809	2.068894	1.889803	2.942285
Jarque-Bera	26.16301	0.753771	11.88195	5.561639	11.44575	0.405294
Probability	0.000002	0.685994	0.002629	0.061988	0.00327	0.816566
Sum Sq. D.	2.66E+08	1005.449	4034263	5.47E+20	2.62E+17	49437.82
Observations	72	72	72	72	72	72

Source: Output from data

Table 2 Test of stationarity (Hadri)

Null hypothesis: Stationarity				
Series: GNI, INTSP, OEXR, RG, RPORTF, STMKTR				
Method			Statistic	Prob.**
Hadri Z-stat			−2.01646	0.9781
Heteroscedastic Consistent Z-stat			−0.84256	0.8003
Intermediate results on D(UNTITLED)				
Variance				
Series	LM	HAC	Bandwidth	Obs
D(GNI)	0.0346	991847.2	5.0	142
D(INTSP)	0.0517	2.736287	7.0	91
D(OEXR)	0.0700	3426.713	4.0	143
D(RG)	0.0323	2.26E+19	7.0	143
D(RPORTF)	0.0609	2.63E+14	1.0	149
D(STMKTR)	0.0643	107.6434	11.0	104

Source: Output of the variables

through lags 1, 3 and 4. While the highest positive significant result in is indicated by *OEXR* that is beyond 0.01, but more importantly that the *OEXR* contributes more to *RPORTF* than *GNI* and *STMKTR*. The significance of the negative output shows that *STMKTR* continuously indicate negative output in lags 1, 3 and 4.

With the above result, the study undertook a Granger-causality test to examine the impacts of the variables on one another and which was sufficient enough to cause the other. Significant results of the output of the variables are stated in the Table 3. The flow or direction of causality is directly observed in the result. For the African FEs, the increase in the *GNI* has brought about the flow of *RPORTF*. The *Wald* statistic is a high 4.33 indicating the significant level is beyond 0.05. In the opposite direction of *RPORTF* does not lead to increase in *GNI* as the statistic is not significant. The *OEXR* granger-causes inflows of *RPORTF* and this is highly significant at 15.26 which is beyond 0.01. Conversely the *RPORTF* does not granger cause *OEXR*. While *RG d*oes not granger-cause *GNI*, *GNI* granger–causes

Table 3 Raw data granger causality tests

Pairwise granger causality tests			
Sample: 1 150			
Lags: 2			
Null hypothesis:	Obs	F-Statistic	Prob.
GNI does not granger cause RPORTF	141	4.33529	0.0150
RPORTF does not granger cause GNI		0.43511	0.6481
OEXR does not granger cause RPORTF	142	15.2689	1.E−06
RPORTF does not granger cause OEXR		0.08687	0.9169
RG does not granger cause GNI	141	0.02391	0.9764
GNI does not granger cause RG		2.38701	0.0957

Source: Output from raw data

RG. The positive relationship is significant only to 0.10 level. The results which generally show unidirectional flow of causality is observable and are quite significant among the few variables where they occur, utilising about 142 of 150. Thus the variables of *GNI* and *OEXR* are very important in the *RPORTF* in the FEs of Africa.

From the above the different granger-causality test results, the significant variables are *OEXR*, *GNI* and *RG*. The VAR-granger causality test result indicate that the all the variables including the *INTSP* are significant and the most significant of them is *OEXR*. This leaves the main variables of interest *INTSP* and *STMKTR* to be non-significant. The differencing of the variables indicate that the variables are in the long run significant with unidirectional causality running from the independent variables to the dependent variables. Of these, the most significant are the *OEXR* and *STMKTR* which still further indicate that the risky sectors in Africa FE does not include the bond market, but the stock market. The level of significance of the variables is beyond 0.01. While the *INTSP* is moderately significant at 0.05 levels and the least is *RG* which is beyond 0.10 levels. The *RPORTF* takes advantage of the currency rates to invest in the continent and maximise returns (Table 4).

4.2 Individual Country's Regression Outputs

Since the case study undertook an individual country regression the outputs of which are not too far from the panel results but show some countries individualistic and idiosyncratic nature in country risks. For instance, *OEXR* is positively insignificant in Nigeria, whereas it is significant in other countries especially in Kenya and Tunisia. The level of positive significance of *GNI* in all the countries is high and beyond 0.01. *INTSP* is significant in both Kenya and Tunisia. It is significant beyond 0.05 levels in Kenya and beyond 0.10 in Tunisia. The variable is negatively insignificant in Botswana and Cote d'Ivoire but positive in Nigeria and Tunisia

Table 4 VAR granger-causality test result

Excluded	df	Default Data		Differenced Data	
		Chi-sq	Prob.	Chi-sq	Prob.
Dependent variable: (RPORTF)					
STMKTR	4	37.33847	0.0000	32.63067	0.0000
RG	4	10.16752	0.0377	8.273229	0.0821
OEXR	4	152.5538	0.0000	129.7428	0.0000
INTSP	4	11.91328	0.0180	10.17572	0.0376
GNI	4	15.56921	0.0037	17.54998	0.0015
All	20	276.7056	0.0000	269.1725	0.0000
Dependent variable: D(STMKTR)					
RG	4	9.622949	0.0473	8.239769	0.0832

Source: Output from data

other countries. The variable is insignificantly positive in Nigeria and Mauritius. *RG* is positive and nearly significant in Botswana, highly significant in Cote d'Ivoire and Nigeria. The variable is negatively insignificant in Kenya, but negatively significant in Tunisia. The *STKMR* also shows various signs in the three FE countries where it features. It is positively insignificant in Botswana and Mauritius but negatively insignificant in Nigeria.

Summary statistics appear good with R^2 between 0.97 and 0.99 while Adjusted R^2 is between 0.94 and 0.98. The fit for most of the output is achieved with 23 series of data except for CIV which has 14. The *F Stat* is also very robust with a high of 373.63 for Kenya and a low of 38.47 for Mauritius. DW of the output is between 1.720 and 2.206, except for Kenya with 1.272. Observation is between 23 and 14. The complete table is shown below. Empty spaces indicate lack of data for the country. The output is shown in Table 5.

As shown in Table 5, the results indicate *GNI* is an attraction to *RPORTF* showing poor countries on their own cannot benefit from inflows of investment from overseas. This is positively significant in all the FE countries. The level of income has been one of the major attractions into the African FEs. One of the major variables for consideration is the *INTSP* which show different outputs and signs in most of the countries. The *INTSP* indicate that where positive that *RPORTF* bonds or money market instrument must important inducing *RPORTF* into these countries. This is the case of Tunisia and Nigeria. Interestingly the *OEXR* is significant tin all the countries except for Nigeria which means most of the countries have weak currencies or low values for their currencies which encourages the *RPORTF*. This is only plausible in that most the currencies depreciated all through the data series. *RG* is a reason for most *RPORTF* because the liquidity of reserves allows easy transfer of returns out of the FEs once the investors' objective is met and time horizon fulfilled. The corollary of bond investment in Tunisia is seen in the significantly negative *RG* output. Thus the three main components of market investment in Africa FEs show that currency sector is most receptive or susceptible to flows of portfolio investment as the weak nature of the currencies and rising income have been a major attraction to investors in the financial markets. The bonds

Table 5 Individual country's regression output (dependent variable = Rportf)

Variables	Botswana	Cote d'Ivoire	Kenya	Mauritius	Nigeria	Tunisia
Constant	1522200	12550605	24720178	1081934	1.21E+08	6374338
	(15.025)	(8.3294)	(8.1167)	(18.993)	(6.9323)	(14.058)
GNI	39.49334	3314.301	11765.36	13.00614	15592.61	885.9772
	(4.3580)***	(6.7038)***	(7.6284)***	(3.1235)***	(5.894)***	(7.597)***
IntSp	−9153.338	−136923.8	−274722.2	350.3688	414336.6	97293.22
	(−0.8035)	(−0.9770)	(−2.37)**	(0.3494)	(0.6389)	(1.8865)*
OERX	27552.07	2616.936	83275.16	2204.236	−90679.36	762574.2
	(2.9493)**	(2.5231)**	(3.2600)***	(1.8613)*	(−0.6050)	(2.8718)***
RG	8.80E−06	0.000364	−6.29E−05	−4.31E−0	0.000227	−9.57E−05
	(1.5641)	(4.0093)***	(−0.2667)	(−0.5610)	(2.5128)**	(−3.482)***
STKMR	178.39			120.4758	−28457.45	
	(0.7350)			(1.2409)	(−0.6127)	
R^2	0.9822	0.9881	0.9957	0.9705	0.9731	0.9769
Adj R^2	0.9670	0.9828	0.9930	0.9453	0.9463	0.9666
F-statistic	64.632	187.47	373.63	38.47	36.27	95.160
D.W.	2.206	1.923	1.272	1.720	1.959	1.790
Obs	23	14	23	23	23	23

Source: Outputs from data
***, **, * for 0.01, 0.05 and 0.1 levels of significance respectively

and equity markets show varied and less significant outputs across the countries. This is understandable as the markets are small and instruments few.

4.3 Recommendations

African FE countries must as matter of urgency address issues of high of interest rate spread in their economies which is one the main distractions from the bond markets. Firms borrowing from banks must be able to obtain loans while bonds market is developed to enable firms to take advantage of the financial market. Then portfolio flows can then be more meaningful trading in the bonds rather than taking advantage of the lack of depth in the equities market in these countries.

The FE countries must continue to work on their for the improvement of income in their countries as it is seen here that it is the most significant variable of attraction to the portfolio funds. While doing that, the countries must make policies that make portfolio fund to be less hot either by specifying minimum residency period or restricting the markets to which they can be invested. The African FE countries must expand their productive base to increase export and as such increase their

liquid reserves. Export capability would increase reserves and higher level of attraction to the portfolio investors since liquidity is important whenever there is the need to quickly exit from the market.

5 Summary and Conclusion

This chapter has discussed the issues of market instruments investments and portfolio investment in African FEs. Since returns in most financial markets of matured and EMEs have petered out, HFs have looked into investing in frontier economies and Africa is not excluded. The problem of market risks in these kinds of investment was discussed coupled with the fact that portfolio funds or HFs have been committing funds to various kinds of market instrument to ensure an above market average return. Most of the investments are in financial markets, namely equities and debt. The risks attaching to various investments are fully discussed. The method of the chapter adopted included the use of the variables that are market driven namely: bond and equity market. These variables are returns for the instruments and were used as measurements for analysis.

The paper elected to use the vector autogressive techniques to statistically estimate the impact of the adopted variables on the inflows of portfolio funds into African FEs. The paper observes that the adopted variables namely gross national income, exchange rates, stock market returns, interest rates spread, and liquid reserves were significant at various levels. The most significant was gross national income and exchange rates exerting both positive and negative impacts respectively. It is also discovered that the portfolio funds had negative impact on the stock market returns in the long term. Interest rate spread was not so significant with return perhaps because the bonds markets of African FEs are not so developed. Individual countries' regression indicate that increased income, exchange rates and liquid reserves are major attractions to the HFs and the paper consequently recommends the increase in productively to increase the income and liquid reserves of their respective countries.

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The Systemic Benefits of Islamic Banking and Finance Practices: A Comparative Study

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Abstract An emerging literature in the aftermath of the recent GFC has attempted to investigate whether growing Islamic banking and finance practices add any systemic benefit to the global economic system. This paper explores the issue by examining the determinants of systemic risk for a sample of Islamic banks and financial institutions compared with conventional counterparts. Systemic risk is defined as a function of the stock market capitalization, marginal expected shortfall, leverage ratio, correlation of return, and volatility of return. Our finding shows the impact of market capitalization on reducing the systemic risk of Islamic banks and financial institutions is relatively higher than conventional counterparts. This is consistent with the results of some previous studies on the perceived benefits of Islamic finance practices. However, the influence of leverage ratio and marginal expected shortfall on systemic risk of Islamic banks and financial institutions is not significantly different from the results for banks and financial institutions in the control samples. Overall, our result provides some support for the notion that Islamic banking and finance practices can provide more systemic benefit to the financial system than conventional counterparts.

1 Introduction

Systemic risk arises from the adverse impacts of a financial institutions' behavior on the financial system as a whole, leading to a financial crisis. Research on systemic risk has been substantially intensified since the advent of the GFC in 2007. The literature developed since then has provided more detailed explanations for the causes of this risk, with many proposals on how to estimate it, or ways of managing it. On the financial policies and practices side, regulatory and supervisory agencies have been attempting to adjust their rules and guidelines according to the

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current state of the financial system. For instance, the Basel Committee on Banking Supervision (BCBS) has revised the Basel II Accord into Basel III,[1] with recommendations to improve capital adequacy requirements, refine risk management practices, and enhance market discipline and information disclosure. The Financial Stability Board in the US has also been mandated through G-20 leaders' summits to work on methods to solve the moral hazard problem of the Too Big to Fail (TBTF) issue of the financial sector.

The post-GFC financial environment has further witnessed progress towards building a sustainable financial system, which is more resilient to systemic risk. Sustainable finance is defined as "the practice of creating economic and social value through financial models, products and markets that are sustainable over time." As an initiative to address this, several banks from Africa, Asia, Europe, Latin America and North America have formed the Global Alliance for Banking on Values (GABV). In Muslim countries, the concepts of values and sustainable finance in banking are met through Islamic inspiration for banking and financial practices. This concept is based on Shariah principles, translated into several rules, such as a ban on interest charges, restraint from taking excessive risks (Gharar), or avoiding speculation in financial transactions. It is perceived that a financial system with such qualities is more sustainable and resilient to financial crisis.[2]

The adverse impacts of the recent GFC on the livelihood of millions of people around the world created a heated debate on what elements, or who, should be blamed for this failure.[3]

In his presentation before the Financial Crisis Inquiry Commission in the United States (September 2010), the Chairman of the US Federal Reserve, Ben Bernanke, referred to sub-prime mortgages as the factor that triggered the crisis. However, he blamed vulnerabilities, or the structural weaknesses in regulation and supervision of the financial system that propagated and amplified the initial shock. The report published later by the Financial Crisis Inquiry Commission (2011)[4] listed several structural weaknesses, including widespread failures in financial regulation, breakdowns in corporate governance, and systemic and widespread breaches in accountability and ethical behavior as elements that escalated the initial shock. It may perhaps be a combination of these factors that caused misconceptions and irrational behavior by financiers who, according to *The Economist* (September 2013),[5] thought they had discovered novel methods to dispel risks, when they actually failed to understand it.

[1]Refer to Blundell-Wignall and Atkinson (2010a, b) for more details.

[2]For more information on interconnection between Islamic finance and sustainable finance, the interested readers may refer to Myers and Hassanzadeh (2013).

[3]Time magazine initiated a pole, by asking the public to nominate 25 top people who should be blamed for causing the GFC.

[4]Retrieved from: http://www.cfr.org/united-states/financial-crisis-inquiry-commission-report-January-2011.

[5]Retrieved from: http://www.economist.com/news/schoolsbrief/21584534-effects-financial-crisis-are-still-being-felt-five-years-article.

The BCSB reforms have attempted to address these issues in the Basel III Accord to strengthen the prescribed regulation, supervision and risk management framework of banks. For instance, the higher minimum Tier 1 Capital is set at 4.5 % for January 2013, increasing to 5.5 % in January 2014, and 6 % in January 2015. Or, an additional capital conservation buffer of 2.5 % of common equity Tier 1 is supposed to be held by banks during good times on top of the minimum capital requirements as a way of reducing the impacts of possible crisis on the erosion of the net worth of banks during bad times.[6]

Previous studies suggest Islamic banks were less affected by adverse impacts of the GFC because of the quality of assets held on their balance sheets, and prudent behavior to avoid taking excessive risks. For instance, before the GFC, the average ratio of total assets to equity capital for banks was more than 20:1 in the US, and more than 30:1 in Europe. It was well below 10:1 in the Middle East and North Africa (MENA) region, where many banks and financial institutions are totally or partially involved in Islamic finance activities.[7] An empirical study by Hasan and Dridi (2010) also suggests that Islamic banks were more resilient to the market meltdown during the GFC compared with conventional counterparts. This view was further corroborated by re-assessing Islamic banks' risk using external ratings agencies, which found their risks to be more favorable than—or similar to—conventional banks.[8] A recent comprehensive study by Beck et al. (2013) provides further evidence for resilience of Islamic banks and their high market capitalization during the recent crisis because of superior quality of their assets and better intermediation ratio.

Modern Islamic banking and finance has risen from almost non-existence to become an almost $US2 trillion industry in the past four decades. According to Ernst & Young,[9] global Islamic banking assets with commercial banks globally grew by 17.6 % in 4 years, crossing $US1.7 trillion in 2013. Although the market capitalization of this industry is small in global terms, the growth rate is 50 % faster than the overall banking sector. The finance industry may look at Islamic financial contracts as an alternative means of reducing the chance of a future financial crisis materializing again.

Could Islamic finance and banking can provide systemic benefits to the global economy? This question is of growing interest to academia, the finance industry as well as to supervisory and regulatory authorities. However, the answer to this question is not easy to find for several reasons. For instance, Islamic finance and banking practices my help reduce some of the systemic risk attributed to

[6]Refer to Blundell-Wignall and Atkinson (2010a, b), and Revisions to the Basel II Market Risk Framework, BIS (2009). Retrieved from: www.bis.org/publ/bcbs158.pdf.

[7]Islamic Banking, OECD Observer. Retrieved from: http://www.oecdobserver.org/news/archivestory.php/aid/2865/_Islamic_banking_.html.

[8]M. Parker, Arab News, September 2010. Retrieved from: http://www.arabnews.com/node/355547.

[9]Ernst & Young, World Islamic Banking Competitiveness Report, 2013–2014.

conventional banks' operations. However, Islamic banks generate their own unique systemic risk, which may not arise from the activities of conventional banks.[10] It is also well known that a significant proportion of Islamic banks and financial institutions' transactions deviate from the Islamic finance theory.[11] Therefore, the net impact of their activities on systemic risk depends on the magnitude of influential factors, which may be revealed through empirical investigations.

The purpose of this paper is to investigate whether Islamic banking and finance practices can add any systemic benefit to the global financial system. We use data for different samples of banks and other financial institutions in the MENA region and Asian countries to analyze the impact of the determinants of systemic risk on Islamic banks and financial institutions compared with their conventional counterparts, with either some Islamic finance activities, or no Islamic finance activities. Systemic risk is defined as the extra capital that a financial institution would need to survive if there were a financial crisis. This variable is assumed to be a function of stock market capitalization, marginal expected shortfall, leverage ratio, correlation of return, and volatility of return. Our finding shows the impact of market capitalization on reducing the systemic risk of Islamic banks and financial institutions is relatively higher than conventional counterparts. This is in line with results of earlier studies on the perceived benefits of Islamic finance practices. However, the influence of leverage ratio and marginal expected shortfall on increasing the systemic risk of Islamic banks and financial institutions is not significantly different than conventional counterparts. Overall, our result support the notion that Islamic banking and finance practices can provide more systemic benefit to the financial system than conventional counterparts.

The rest of the paper is organized as follows. Part II of the paper is allocated to data and methodology. Empirical findings are discussed in Sect. 3. The paper is concluded in Sect. 4.

2 Methodology and Data

2.1 Data

Monthly data used in this study is for a 2 year period, from October 2010 to September 2012. The data was collected from Stern School of Business V-Lab at the University of New York. These data are for seven purely Islamic banks and financial institutions located in the Middle East, 32 conventional banks and financial instructions located in Muslim countries which offer some Islamic finance

[10]Refer to Ahmad (2009), and Kayed and Mohammed (2009) for details of unique systemic risk of Islamic banks.

[11]For instance, Shariah Advisory Board may allow banks to offer limited interest bearing deposit accounts.

products or have windows of Islamic financial services, and 32 entirely conventional banks and financial institutions located in Asia. The more recent samples are essentially used as the control groups to compare their results with the result of the study on the first sample. Attention was paid in selection of the banks and financial institutions in the control groups to make sure they are comparable to Islamic banks and other financial institutions with respect to their size, capital structure, and location. The small number of pure Islamic banks and financial institutions included in our study reflects the availability of data from our data source, and must be considered as a limitation of this study.

2.2 Systemic Risk

Numerous methods of systemic risk assessment are suggested by currently developing and evolving literature.[12] Gerlach (2009) classifies these methods into three categories. (1) The estimated methods utilizing the conventional indicators of financial stability,[13] (2) techniques based on the interconnection between financial institutions;[14] and (3) the assessment based on the behavior of prices of financial assets.[15] Since the estimation and monitoring of systemic risk has become an ongoing process in the volatile financial environment in which we live, methods which rely on publicly available information to process the data have become more popular to use.

The systemic risk data used in this study is estimated according to a model proposed by Acharya et al. (2010) and Brownlees and Engle (2012). Acharya et al. (2010) perceive systemic risk as a negative externality affecting the whole economy due to capital shortfalls of some financial institutions during crisis. Since systemic risk corresponds to the expected capital shortfall of a given firm, conditional on a crisis affecting the whole financial system, firms with larger capital shortfall are expected to be more systemically risky (Benoit et al. 2013). The data on systemic risk and other relevant variables are regularly reported by the Stern School of Business V-Lab at the University of New York for most of publicly listed banks and financial institutions around the world. V-Lab estimates systemic risk in $US terms, as well as in an index called the Systemic Risk Contribution Index. This index ranks firms according to the percentage of total systemic risk each is expected to contribute in a future crisis. Both measures take into account the marginal

[12]Bisias et al. (2012) identified 31 method of estimating systemic risks. Several more have been proposed since they have published their report. Benoit et al. (2013) summarizes the theoretical and empirical comparison of these models.

[13]Refer to IMF (2011), and Indraratna (2013) as some examples.

[14]Billio et al. (2012) study is an example.

[15]Papers by Adrian and Brunnermeier (2011), and Brownlees and Engle (2012) follow this approach.

expected shortfall, the liabilities, and the size of the firms according to the following formula.[16]

$$\mathrm{SRIK}_{it} = \mathrm{Max}\ [0;\ \gamma\ D_{it} - (1-\gamma)\mathrm{MV}_{it}\ (1-\mathrm{LMES}_{it})] \quad (1)$$

where

SRISK represents systemic risk, γ is the prudential capital ratio, D_{it} is the book value of total liabilities, and MV_{it} is the daily market capitalization or market value of equities.

$LMES_{it}$ is the long term marginal expected shortfall, defined as the money needed to compensate the capital shortfall of the firms' condition on a 40 % drop in the market value of their shares within a 6 month period. It is approximated as 1-exp (-18*MES), where MES is estimated as the one day market loss if the return on shares drops by 2 %.

The systemic risk according to this model is an increasing function of the liabilities, and long term marginal expected shortfall, and a decreasing function of the market capitalization. It follows to then view the SRISK as an implicit increasing function of the leverage ratio. Since the market value of debts is constrained, the book value of debt and market value of equity are used to capture the leverage position of financial institutions. Long-run marginal expected shortfall is also interpreted as the expected loss of net worth during crisis, measuring the variability of firms' returns with the global market return.[17] In addition to the three variables discussed above, we examine the importance of the correlation of return and volatility of return in determining the systemic risk.

The regression analysis we have described in the next section relies on a set of conditions and assumptions that makes the resulting estimated model valid. To ensure that error terms produced in our regression analysis are independently and identically distributed, we calculated descriptive statistics on all three samples and did not find any significant abnormality in the central tendency of the data that affects this validity. We used Driscoll and Kraay (1998) standard errors approach to make estimated coefficients robust to heteroskedasticity and serial correlation problems. We also estimated the correlation matrix and Variance Inflation Factor (VIF) to determine which independent variable should be included in the model if a multicolinearity problem exists. As a result, we removed beta from the list of proposed independent variables because of the high degree of multicolinearity it had with marginal expected shortfall. The result of this test is consistent with papers by Benoit et al. (2013), and Guntay and Kupiec (2014), who found marginal expected shortfall measures are contaminated by systematic risk.[18]

[16]This theoretical argument is largely based on Benoit et al. (2013).

[17]For a theoretical discussion on the relationship between volatility and leverage, interested readers refer to Engle and Siriwardane (2014).

[18]This problem also extends to CoVaR, another popular systemic risk estimate attributed to Adrian and Brunnermeier (2011).

2.3 Panel Data Model

The two main groups of regression models currently applied to panel data analysis are fixed effect and random effect models. The criteria for selecting more appropriate models within these groups are based on the efficiency and consistency of the estimated coefficients. Econometric theory suggests the results from fixed effect models are always consistent. However, the random effect models are generally more efficient. The priority of application is normally granted to whichever model is statistically consistent as well as more efficient. We first estimated two fixed effect and two random effect models, then applied the Hausman test to compare the efficiency and consistency of their coefficients with each other. The P-value for all three samples suggested the coefficients for random effect models were more efficient, but not consistent. As a result, we report the result for fixed effect models in this paper. Tables 1, 2, 3, and 4 in the main body of the paper provide the outcome from the fixed (within) effect model. The results for fixed effect with dummy variables model are virtually identical to the earlier model, and for the purpose of saving the space are not reported in the paper.

The general form of defining systemic risk as a function of independent variables is described as:

$$Y_{it} = \alpha_i + \beta_1 X_{1t} + .. + \beta_n X_{it} + u_{it} \quad (2)$$

where

X_{it} = independent variables
α_i = unobservable time-invariant individual effect
u_{it} = error term
t = 1, 2,. . ...,T and i = 1, 2,. . ...N

Table 1 Result of panel data regression analysis (fixed effect) of systemic risk

Variable	Coefficients	Std. error	t value	Pr(>|t|)
COR	426.134	341.667	1.247	0.379
LMES	860.767	122.797	7.009	0.000***
LVG	102.039	8.511	11.990	<0.000***
MV	−0.994	0.026	−38.402	<0.000***
VOL	0.242	1.380	0.175	0.901

R-Squared: 0.948; Adj. R-Squared: 0.876
F-statistic: 569.320 on 5 and 156 DF, p-value: <2.22e−16
Significant codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 '# '
This table presents the result of panel data regression analysis (fixed effect) of systemic risk as a function of correlation coefficient (COR), marginal expected shortfall (LMES), leverage ratio (LVG), market capitalization (MV) and volatility (VOL) for a sample of 7 Islamic banks and financial institutions. The monthly data extends from 10/2010 to 9/2012. Total panel (balanced) observations are 168. We used Driscoll and Kraay (1998) standard errors approach to make estimated coefficients robust to *heteroskedasticity* and *serial correlation* problems.

Table 2 Result of panel data regression analysis (fixed effect) of systemic risk

Variables	Coefficients	Std. error	t value	Pr(>|t|)
COR	411.849	458.956	0.897	0.370
LMES	540.387	63.770	8.474	<2.2e−16***
LVG	60.291	11.419	5.280	1.67e−07***
MV	−0.689	0.027	−25.839	<2.2e−16***
VOL	−1.616	0.998	−1.618	0.106

R-Squared: 0.766; Adj. R-Squared : 0.730
F-statistic: 523.333 on 5 and 763 DF, p-value: <2.22e−16
Significant codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 '#'
This table presents the result of panel data regression analysis (fixed effect) of systemic risk as a function of correlation coefficient (COR), marginal expected shortfall (LMES), leverage ratio (LVG), market capitalization (MV) and volatility (VOL) for a sample of 7 Islamic banks and financial institutions for a sample of 32 banks and financial institutions with some Islamic finance activities. The monthly data extends from 10/2010 to 9/2012. Total panel (balanced) observations are 768. We used Driscoll and Kraay (1998) standard errors approach to make estimated coefficients robust to *heteroskedasticity* and *serial correlation* problems

Table 3 Result of panel data regression analysis (fixed effect) of systemic risk

Variables	Coefficients	Std. error (SCC)	t value	Pr(>|t|)
COR	91.808	406.985	0.226	0.822
LMES	500.389	42.772	11.699	<2e−16***
LVG	96.523	9.736	9.914	<2e−16***
MV	−0.570	0.029	−19.182	<2e−16***
VOL	−1.540	0.955	−1.612	0.107

R-Squared: 0.801; Adj. R-Squared: 0.762
F-statistic: 588.518 on 5 and 763 DF, p-value: < 2.22e−16
Significant codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 '#'
This table presents the result of panel data regression analysis (fixed effect) of systemic risk as a function of correlation coefficient (COR), marginal expected shortfall (LMES), leverage ratio (LVG), market capitalization (MV) and volatility (VOL) for a sample of 7 Islamic banks and financial institutions for a sample of 32 Asian banks and financial institutions. The monthly data extends from 10/2010 to 9/2012. Total panel (balanced) observations are 768. We used Driscoll and Kraay (1998) standard errors approach to make estimated coefficients robust to *heteroskedasticity* and *serial correlation* problems

The fixed effect model must satisfy following state average condition:

$$\frac{1}{\mathrm{T}}\sum_{\mathrm{t}=1}^{\mathrm{T}}\mathrm{Y_{it}} = \alpha_{\mathrm{i}} + \beta_1\frac{1}{\mathrm{T}}\sum_{\mathrm{t}=1}^{\mathrm{T}}\mathrm{X_{it}} + \frac{1}{\mathrm{T}}\sum_{\mathrm{t}=1}^{\mathrm{T}}\mathrm{u_{it}}$$

Deviation from the state average is estimated as:

$$Y_{it} - \frac{1}{\mathrm{T}}\sum_{\mathrm{t}=1}^{\mathrm{T}}\mathrm{Y_{it}} = \alpha_{\mathrm{i}} + \beta_1\left(X_{it} - \frac{1}{\mathrm{T}}\sum_{\mathrm{t}=1}^{\mathrm{T}}\mathrm{X_{it}}\right) + \left(\mathrm{u}_{it} - \frac{1}{\mathrm{T}}\sum_{\mathrm{t}=1}^{\mathrm{T}}\mathrm{u_{it}}\right)$$

then,

Table 4 Estimated difference between the coefficients of independent variables

Coefficients	Islamic vs. conventional with some IF windows	Islamic vs. conventional
LMES	320.380 (0.129)	360.378 (0.146)
LVG	41.768 (0.706)	5.516 (0.259)
MV	−0.305*** (14.734)	−0.424*** (16.718)

Significant codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 '#'

This table presents the estimated difference between the coefficients of independent variables in Tables 1–3 for Islamic banks and financial institutions vs. non-Islamic banks and financial institutions with some Islamic products window, and Islamic banks and financial institutions vs. conventional banks and financial institutions. The formula used for this statistical test is Clogg et al. (1995) Z test, $Z = \frac{\beta_1 - \beta_2}{\sqrt{SE_1^2 + SE_2^2}}$ where, $\beta 1$ and $\beta 2$ are estimated coefficients and SE1 and SE2 are their corresponding standard deviations

$$\tilde{Y}_{it} = \alpha_i - \bar{\alpha} + \beta_1 \tilde{X}_{it} + \tilde{u}_{it} = \beta_1 \tilde{X}_{it} + \tilde{u}_{it} \tag{3}$$

where

$$\tilde{Y}_{it} = Y_{it} - \frac{1}{T}\sum_{t=1}^{T} Y_{it} \text{ and } \tilde{X}_{it} = \left(X_{it} - \frac{1}{T}\sum_{t=1}^{T} X_{it} \right)$$

$\tilde{u}_{it}$ = the random error term with the expected value of: $E(u_{it}) \sim N(0, \sigma^2)$

Since in this model α_i remains constant across state averages, $\alpha_i - \bar{\alpha} = 0$.

Using Eq. (3) as the foundation formula, we estimate systemic risk ($SRISK_{it}$) as a function of the following hypothesized independent variables:

COR_{it} = correlation coefficient of the individual share price with the market. Change in this variable is expected to have positive impact on the systemic risk.

LVG_{it} = leverage ratio. Change in this variable is expected to have positive impact on the systemic risk.

$LMES_{it}$ = Long term marginal expected shortfall defined as the loss of asset value if financial institutions' share price drops by 40 % or more within 6 months period. Change in this variable is expected to have positive impact on the systemic risk.

MV_{it} = market capitalization. Change in this variable is expected to have negative impact on the systemic risk.

VOL_{it} = the volatility of stock prices. Change in this variable is expected to have positive impact on the systemic risk.

3 Empirical Findings

Table 1 presents the result of our regression analysis for the sample of Islamic banks and financial institutions. From five independent variables included in the model, the leverage ratio (LVG), marginal expected shortfall (LMES), and market capitalization (MV) are statistically significant at the conventional statistical levels. The estimated coefficients for the volatility of return (VOL) and correlation of return (COR) are not statistically significant.

The estimated coefficient for LMES indicates that every dollar increase in capital shortfall of a bank and financial institutions can cause systemic risk to increase by $860.767. The size of coefficient for LVG suggests that a 1 % increase in leverage ratio is expected to cause $102.039 increase in systemic risk. Finally, a one dollar increase in the market value (MV) of these banks and financial institutions can virtually reduce systematic risk by the same amount ($0.994). The magnitude and the sign these variables in the fixed coefficients with the dummy variables model are virtually identical to the corresponding coefficients in Table 1, suggesting that our findings are robust with respect to a different model specification. However, to save the space, these results are not reported here.

Table 2 presents the result of our regression analysis for non-Islamic banks and financial institutions that offer some Islamic financial products to customers. Similar to the results in Table 1, only coefficients for LVG, LMES and MV are statistically significant at the conventional statistical levels. The coefficients for VOL and COR are not statistically significant. The estimated coefficient for LMES indicates that every dollar increase in the capital shortfall of the banks and financial institutions can cause systemic risk to increase by $540.387. The size of the coefficient for LVG suggests that a 1 % increase in leverage ratio is expected to cause $60.291 increase in systemic risk. The estimated coefficient for MV is −0.689, indicating that a $1 increase in the market value of these banks and financial institutions can reduce systematic risk by $0.689. The result for fixed coefficients with dummy variables model (not reported here to save the space) is very similar to the corresponding coefficients in Table 2, suggesting that our findings are robust with respect to the different type of model we used.

Table 3 presents the result of our regression analysis for purely conventional banks and financial institutions included in this study. Similar to previous tables, only the coefficients for the leverage ratio, marginal expected shortfall, and market capitalization are statistically significant at the conventional statistical levels. The estimated coefficient for LMES shows that a one dollar increase in the capital shortfall of a bank or financial institution can cause systemic risk to increase by $500.389. The size of coefficient for LVG is equal to 96.523, indicating that any 1 % increase in leverage ratio is expected to cause $96.523 increase in systemic risk. Finally, the magnitude of the coefficient for MV suggests that a one dollar increase in the market capitalization of conventional banks and financial institutions can reduce systemic risk by $0.570. The magnitude and sign of the fixed coefficients with dummy variables closely correspond to coefficients in Table 3 for

each independent variable, providing evidence that our findings are robust with regard to a different model specification.

A comparison of findings in Table 1 through to Table 3 indicates that for all three data samples used in this study the estimated coefficients for LVC, LMES and MV are statistically significant at the conventional levels. However, the magnitudes of these coefficients are larger for Islamic banks and financial institutions than the other two samples. Our findings in Table 4 shows that the difference between LMES coefficient for Islamic banks and financial institutions with non-Islamic banks and financial institutions with some Islamic products and services is 320.380. The difference of LMES coefficients for Islamic and conventional banks is 360.378. However, none of these coefficients are statistically significant at the conventional levels.[19] The difference between the LVG coefficient for Islamic banks and financial institutions sample, and non-Islamic banks with some Islamic financial products sample in Table 4 is 41.768. The size of this coefficient for the Islamic bank sample v conventional banks is 5.507. Again, none of these coefficients are statistically significant at the conventional levels. For the market capitalization variable, the difference between the coefficients for Islamic and non-Islamic firms which offer some Islamic products and services is −0.305. This coefficient is statistically significant at 0.000 level (t = 14.734). For Islamic vs. conventional banks and financial institutions the difference between these coefficients is −0.424 with the t value equal to −16.718, which is highly significant at 0.000 level. This difference indicates that the asset mix of Islamic banks and financial institutions provides more systemic benefits to the financial system than their conventional counterparts. Overall, the results show more positive impacts of independent variables on systemic risk.

4 Conclusion

This paper investigates the impact of factors that influence the systemic risk of Islamic banks and financial institutions compared with conventional counterparts, with either some Islamic finance activities, or no Islamic finance activities. We use publicly available data for a sample of banks and other financial institutions in the MENA region and some Asian countries to estimate these relationships. Systemic risk is defined as the shortage of capital that a financial institution would have needed to survive if there were a financial crisis. This variable is assumed to be a function of Stock Market Capitalization, Marginal Expected Shortfall, Leverage Ratio, Volatility of Return, and Correlation of Return. Consistent with the theory,

[19] Drawing on the paper by Clogg et al. (1995), the formula used for this statistical test is: $Z = \frac{\beta_1 - \beta_2}{\sqrt{SE_1^2 + SE_2^2}}$

where, $\beta 1$ and $\beta 2$are estimated coefficients and SE1 and SE2 are their corresponding standard deviations.

our finding shows that the Leverage Ratio, Market Capitalization, and Marginal Expected Shortfall are all statistically significant in determining systemic risk in all three samples. However, Islamic banks and financial institutions are generally more sensitive to the determinants of systemic risk than counterparts in the conventional sector. This is reflected in differences of the absolute value of estimated coefficients for independent variables. However, the difference between coefficients for marginal expected shortfall and leverage ratio are not statistically significant between Islamic banks and financial institutions compare to counterparts in the conventional sector. This may arises from the fact that in contrast to the theory, there is little difference between financing practices of Islamic and non-Islamic banks in the real world. The most distinctive feature of an Islamic banks rests in the application of profit and loss sharing (Modarebah) contracts that oblige Islamic banks as a financier to a participate in asset based investments with risk sharing principles. This supposes to reduce the chance of bank's failure due to mis-match between short-term contracts on the liability side of the balance sheet, with long-term uncertain loan contracts on the asset side. However, it is well known that the share of profit and loss sharing contract in the activity of Islamic banks has dropped to as low as 5 % in recent years.[20] Instead, they use a debt-like instrument, such as cost plus (Murabaha) contracts to pass the risk of investment to borrowers, making their activities more similar to conventional banks.[21] On the other hand, our results in Table 4 show that the difference in coefficients of market capitalization is highly significant for both Islamic banks and financial institutions vs. non-Islamic banks and financial institutions with a window of Islamic banking services, and for Islamic banks and financial institutions with counterparts in conventional system. So any increase in the magnitude of market capitalization for Islamic banks and financial institutions is expected to decrease their systemic risk compare to the same increase for banks and financial institutions in the control samples. This is consistent with the result of the study by Beck et al. (2013) that found the resilience of Islamic banks during GFC to their to the superior quality of their assets and superior intermediation ratio. Overall, our result provides some support for the notion that Islamic banking and finance practices can provide more systemic benefit to the financial system than conventional counterparts.

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Determinants of the Credit Risk in Developing Countries After Economic Crisis: A Case of Turkish Banking Sector

Serhat Yüksel

Abstract The aim of this study is to define the determinants of the credit risk of the banks in developing countries after economic crisis. Within this scope, the banking sector of Turkey was tried to analyze. In this study, 23 deposit banks of Turkey were analyzed. Furthermore, annual data of 24 Turkish deposit banks for the period between 2004 and 2014 was tested by probit model. Related data were provided from the Banks Association of Turkey, OECD and World Bank. With respect to credit risk, non-performing loans ratio was used as a dependent variable. On the other hand, nine explanatory variables were included in the model so as to define the determinants of non-performing loans. As a result, it was determined that decrease in industry production index is the most important determinant of the increase in non-performing loans in Turkey.

1 Introduction

Globalization eliminated barriers in front of trade among countries. In other words, it provided countries to make investments in different markets. This situation increased the popularity of the banks. Nonetheless, this issue raised competition between banks. Owing to this condition, banks started to take higher risks in order to increase their profits.

Banks in developing economies take too much risk in order to improve their market shares. Because there is high competition in banking sector of these economies, they started to give loans without analyzing credibility of the customers efficiently in order to increase the amount of the loans. Because of taking higher risks, this situation resulted in high amount of non-performing loans (Norton and Olive 1996).

Credit risk one of the most important risks banks encounter. It refers to the potential loss of principal due to the borrowers' failure. In other words, in case of

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credit risk, banks cannot collect their receivables from the customers. Similar to this situation, credit risk was accepted the main reason of many essential banking crisis occurred in developing economies (Demirgüç-Kunt and Detragiache 2005).

Owing to the issues emphasized before, defining the determinants of the credit risk is crucial. After defining the reasons of the credit risk, it can be possible for banks to manage the risks more efficiently. Hence, by implementing proper policies, banking crisis can be prevented. Because of this situation, studies related to analyzing the reasons of credit risk are essential. However, there are limited studies that try to analyze the reasons of non-performing loss in Turkish banking sector.

Turkey is a country that suffered from two banking crisis in 1994 and 2000. The results of them were very harmful for Turkish economy. During these periods, growth rate decreased very much and unemployment and inflation rates increased dramatically. Hence, these crises showed the importance of managing credit risk in banks. Therefore, after 2003, new regulations were prepared in Turkey in order to control credit risk of the banks effectively. Therefore, the aim this study is to identify the key determinants of the credit risk of Turkish banks after crisis period. The probit analysis was firstly used in a study that explains the reasons of non-performing loans in Turkey.

This paper is organized as follows: After the introduction part, I will give information about the similar studies in the literature and empirical results of them. The third section of this paper focuses on the process of credit risk management. The fourth section gives information about the empirical results of our study. The final section reviews the conclusion of the study.

2 Literature Review

There are many studies that describe the determinants of the credit risk in the literature. Some of them were depicted in Table 1.

Klein made a study to define the determinants of the non-performing loans in Central, Eastern and South Eastern Europe. The data for the period between 1998 and 2011 was tested with GMM method. As a result, it was determined that there is a rise in non-performing loans in case of increasing in unemployment rate and depreciation of foreign currency (Klein 2013).

Espinoza and Prasad tried to analyze non-performing loans of 80 banks in Gulf Cooperation Council. VAR model was used to test the data for the period between 1995 and 2008. As a result, it was determined that NPL ratio worsens as economic growth becomes lower and interest rates increase (Espinoza and Prasad 2010).

Das and Ghosh made a study to define the determinants of credit risk in state owned banks in India. They used panel data technique to the data for the period between 1994 and 2005. In conclusion, it was determined that growth rate, growth in loans, operating expenses and bank sizes influence non-performing loans in India (Das and Ghosh 2007).

Table 1 Major studies related to determinants of non-performing loans

Author	Method	Determinants	Results
Klein (2013)	GMM	Unemployment Rate, Inflation, Exchange Rate, GDP Growth Rate, Equity/Assets, ROE, Total Loans/Total Assets	It was determined that there is a rise in non-performing loans in case of increasing in unemployment rate and depreciation of foreign currency
Espinoza and Prasad (2010)	VAR	Growth Rate, GDP, Credit Growth, Interest Rate, Inflation, Non-oil GDP growth, Total Expenses/Average Assets, Unemployment	It was determined that NPL ratio worsens as economic growth becomes lower and interest rates increase.
Das and Ghosh (2007)	Panel Data	Number of the banks, Total Assets, Total Loans, Total Deposits, Total Expenses, Total Income, Net Profit, Net Interest Margin	It was determined that growth rate, growth in loans, operating expenses and bank sizes influence non-performing loans in India.
Sinkey and Greenawalt (1991)	Regression	Loan rate, volatility in loan rate, GDP, Inflation	They concluded that when the amount of the loans increases, the rate of non-performing loans goes up as well.
Mileris (2012)	Logit	Growth Rate, Inflation Rate, Unemployment Rate, Consumption, Investment, Imports	It was concluded that unemployment rate, consumption, inflation and growth rate were the important variables that affect non-performing loans.
Kwan and Eisenbeis (1995)	Regression	Total Assets, Commercial Loans, Real Estate Loans, Consumer Loans, Investment Securities, Price of Labor	It was concluded that loans growth has a negative effect on the number of bad loans at a low growth rate.
Boudriga et al. (2009)	Regression	Credit Growth, Capital Adequacy Ratio, Loan Loss Provision/Loan Loss, ROA, Size of the banks, Foreign bank participation, Political Stability, Legal Right, Unemployment, GDP Growth Rate	It was concluded that foreign participation coming from developed countries, high credit growth, and loan loss provisions reduce the NPL level.
Saba et al. (2012)	Regression	Real GDP per Capita, Inflation, Total Loans	All the selected independent variables have significant impact on the depended variable.
Castro (2012)	Panel Data	GDP, Unemployment Rate, Interest Rate, Credit Growth, Private Indebtedness, Public Debt, House Price Index, Real Effective Exchange Rate, Term of Trade	It was defined that the banking credit risk is significantly affected by the macroeconomic environment.
Siddiqui et al. (2012)	GARCH	Interest Rate	It was defined that being listed on stock market, loan/deposit ratio and return on assets were negatively related with NPL ratio

(continued)

Table 1 (continued)

Author	Method	Determinants	Results
Ranjan and Dhal (2003)	Panel Data	Total Assets, Maturity, GDP Growth Rate, Credit Orientation, Expected Stock Return	It was concluded that credit variables have significant effect on the banks' non-performing loans.
Louzis et al. (2012)	Panel Data	ROA, ROE, Solvency Ratio, Loans to Deposit Ratio, Inefficiency, Credit Growth, Market power (Total Loans/All Banks' Loans), Size (Total Assets/All Banks' Assets)	It was determined that GDP growth, unemployment and interest rates were the main factors that influence non-performing loans in Greece.
Yağcılar and Demir (2015)	Panel Data	Capital Adequacy Ratio, Loan/Deposit, ROA, Net Interest Margin, Liquidity, Growth Rate, Inflation Rate, Interest Rate	It was defined that being listed on stock market, loan/deposit ratio and return on assets were negatively related with NPL ratio
Yüksel (2011)	Regression	Growth Rate, Inflation Rate, Interest Rate, USD/TL, Unemployment, Industry Production Index, IMKB-100 Index, Consumer Loans/GDP, Commercial Loans/GDP	It was concluded that interest rates, inflation, the ratio of credit in GDP and growth rate affects credit risk in Turkey.
Yücememiş and Sözer (2011)	Regression	Production, Foreign Exchange Rate, Previous period of NPL	It was determined that non-performing loans in Turkish banking sector were mostly caused by low industry production index and depreciated exchange rate.

Sinkey and Greenawalt tried to analyze the determinants of the non-performing loans. They used regression analysis in order to achieve this objective. The data for the period between 1984 and 1987 was used in this study. They concluded that when the amount of the loans increases, the rate of non-performing loans goes up as well (Sinkey and Greenawalt 1991).

Mileris also made a study to define the determinants of the non-performing loans. Logistic regression model was used for the data between 2008 and 2011. Moreover, 22 different European countries were included in this study. As a result, it was concluded that unemployment rate, consumption, inflation and growth rate were the important variables that affect non-performing loans (Mileris 2012).

Kwan and Eisenbeis made an analysis with respect to bank risks. Semiannual data was used for the period between 1986 and 1991 in this study. They used regression analysis so as to achieve this purpose. It was concluded that loans growth has a negative effect on the number of bad loans at a low growth rate (Kwan and Eisenbeis 1995).

Boudriga, Taktak and Jellouli also made a study to define the determinants of the non-performing loans. This study included 46 banks in 12 Middle East and North African countries. The data for the period between 2002 and 2006 was used in this study. It was concluded that foreign participation coming from developed countries, high credit growth, and loan loss provisions reduce the NPL level (Boudriga et al. 2009).

Saba, Kouser and Azeem tried to determine the reasons of non-performing loans in US. They made regression analysis to the data between 1985 and 2010. As a result, it was determined that growth rate, inflation rate and changes in total loans were the important variables that affect the amount of non-performing loans (Saba et al. 2012).

Castro made an analysis regarding the determinants of the credit risk in the banking system. Greece, Ireland, Portugal, Spain and Italy were analyzed in this study. Moreover, he used quarterly data for the years between 1997 and 2001 and this data was tested by panel data analysis. As a result, it was defined that the banking credit risk is significantly affected by the macroeconomic environment (Castro 2012).

Siddiqui, Malik and Shah tried to analyze the impact of interest rate volatility on non-performing loans in Pakistan. Quarterly data for the period between 1996 and 2011 was measured by using GARCH model in this study. As a result of regression analysis, it was determined that volatility of interest rate is an important factor that affects non-performing loans in Pakistan (Siddiqui et al. 2012).

Ranjan and Dhal tried to analyze the non-performing loans of the commercial banks in India. They made panel regression to the data for the period between 1990 and 2003. As a result, it was concluded that credit variables have significant effect on the banks' non-performing loans (Ranjan and Dhal 2003).

Louzis, Vouldis and Metaxas made an analysis about macroeconomic and bank-specific determinants of non-performing loans in Greece. Panel data method was used to achieve this purpose. The quarterly data for the period between 2003 and 2009 was used in this study. It was determined that GDP growth, unemployment and interest rates were the main factors that influence non-performing loans in Greece (Louzis et al. 2012).

Yağcılar and Demir made a study to define factors that affect the NPL ratio in Turkish banking sector. Within this scope, they analyzed 26 banks for the period between 2002 and 2013. This data was tested with panel data analysis in this study. As a result, it was defined that being listed on stock market, loan/deposit ratio and return on assets were negatively related with NPL ratio. On the other hand, it was also determined that there was a positive relationship between NPL ratios and growth rate, interest rate and capital adequacy ratio (Yağcılar and Demir 2015).

Yüksel tried to create a model which explains credit risk for Turkish banking sector. She used regression analysis so as to achieve this objective. The data for the period between 2005 and 2010 was used in this study. It was concluded that interest rates, inflation, the ratio of credit in GDP and growth rate affects credit risk in Turkey (Yüksel 2011).

Yücememiş and Sözler tried to predict the non-performing loans in Turkish banking sector. They tried to create a model by making regression analysis. Moreover, the data for the period between 2003 and 2008 was used in this study. As a result of this study, it was determined that non-performing loans in Turkish banking sector were mostly caused by low industry production index and depreciated exchange rate (Yücememiş and Sözer 2011).

3 Credit Risk Management in Banks

3.1 Definition of Credit Risk

Risk refers to any barriers that prevent you to achieve the objectives (Froot and Stein 1998). In other word, it means the possibility of the deviation from expected results. Banking sector also encounters many different risks. In the literature, these are mainly classified as three groups according to the reasons of the risks that are credit risk, market risk an operational risk. Market risk refers to the risks occurred because of the changes in the market. Interest rate and liquidity risks are the examples of the market risk. On the other hand, operational risk contains risks caused by operational activities in the bank such as, technology, workflow and environmental factors.

Credit risk means the probability of loss because of the failure of the customers to meet their obligation. In this situation, customers cannot pay their debts to the banks owing to their financial problems. The debt, which cannot be paid, affects both banks and depositors. Therefore, it can be said that credit risk is the most important type of the risks for the banks. Credit risk is composed of mainly country risk and concentration risk (Salas and Saurina 2002).

Country risk means the possibility of loss due to the problems occurred in the county of creditors. Thus, the percentage of the credits with respect to country should be taken into the consideration. If a banks gives most of the credits to a customer group in the same country, there is a possibility of high loss in case of any problems occurred in that country.

Moreover, the concentration of the customers who used the credit should be considered. If a bank gives high percentage of the credits to few customers or a single sector, it means that this bank takes high amount of risk. The main reason behind this situation is that if there is a problem for these customers or this sector, bank will have high amount of loss.

3.2 How to Manage Credit Risk in the Bank

Because of the situations emphasized above, credit risk of the banks should be controlled efficiently. By managing credit risk effectively, the financial performance of the banks will improve and high amount of loss will be prevented. Risk management means defining the importance of the risks and taking necessary precaution in order to minimize these risks. In other words, for an effective risk management, risks should be defined, measured and reported to related departments (Salas and Saurina 2002).

In order to control credit risk, first of all, the determinants of credit risk should be defined. If the credit risk of a bank is defined effectively, it can be said that this bank will be more invulnerable in case of any financial crisis. After defining the risks taken by the bank, they should be measured. For an effective measure, there should be criteria. Therefore, acceptable level of the risks should be determined so as to understand whether risks taken by the banks are at a normal level or not. The last process of the credit risk is to report important risks to the related departments. Because of this, it will be possible to follow these risks and necessary actions should be taken for them.

3.3 Responsible Departments in the Bank

So as to manage credit risks, many departments in the bank have different responsibilities. Board of Directors has the first degree responsibility regarding credit risk management in the bank. It is responsible to define necessary policies in order to manage credit risk efficiently.

Furthermore, credit allocation department has also important role in this process. It is responsible for measuring the credibility of the customers who demand loans from the banks. In addition to this situation, necessary collaterals should be obtained from the customers because in case of any problems, these collaterals will be guarantee for the banks.

Moreover, credit risk management department is also another responsible division. The main responsibility of this department in the banks is to define the risk of banks with respect to the amount of the loans given to the customers. After defining the risk, this department makes a control whether there is an excess risk regarding loans. Finally, the significant issues are reported to necessary departments or people (Salas and Saurina 2002).

4 Data and Econometric Model

4.1 The Scope and Constraints of the Study

The main objective of this study is to define the determinants of credit risk in Turkish banks after crisis period. There are totally 27 deposit banks in Turkey. However, 23 banks could be included in this study because of the following constraints.

- Bank of Tokyo-Mitsubishi UFJ Turkey, Odea Bank and Rabobank were newly established in Turkey.
- Adabank is not an active deposit bank in Turkey because of the legal problems with its owners.

The list of 23 banks, included in the study, was shown in Table 2.

4.2 Econometric Model of the Study

Probit Model

Three popular regression models are mostly used when dependent variable has two different discrete alternatives that are: linear probability method, logit and probit. In this kind of model, dependent variable is a categorical variable such as, pass/fail and win/loss. The relationship between dependent and independent variable is linear regarding linear probability model. Also, this model is created by making simple linear regression. In case of linear probability model, the dependent variable does not always have the values between "1" and "0". In order to solve this problem, the dependent variable is accepted as "1" if it is more than "1". Also, it takes the value of "0" if it is less than "0".

On the other hand, probit model is a nonlinear model. Therefore, the inverse of normal distribution function is used so as for this function to be normal. Owing to this situation, it is provided for probability value to become between "0" and "1". The only difference of logit model from probit model is that logistic distribution function is used in logit model instead of normal distribution function.

There are lots of studies in which probit model is used in the literature. Frankel and Rose made a study to predict financial crisis occurred in 105 different countries. Probit model was used in this study in order to achieve this objective. As a result of this study, it was determined that high percentage of devaluation caused financial crisis (Frankel and Rose 1998).

Esquivel and Larrain also tried to determine the early warning signals of the financial crisis. Crisis occurred in 30 different countries were included in this study. The data for the period between 1975 and 1996 was tested with probit model. It was concluded that high amount of current account deficit led to financial crisis (Esquivel and Larrain 1998).

Table 2 The list of banks analyzed in this study

Bank name	NPL/total loans 2014	NPL/total loans 2013	NPL/total loans 2012
Türkiye Cumhuriyeti ZiraatBankası	1.9	2.2	2.9
Türkiye Halk Bankası	3.6	2.6	3.0
Türkiye Vakıflar Bankası	3.8	4.1	4.0
Akbank	1.8	1.5	1.3
Anadolubank	3.1	2.6	3.3
Fibabanka	2.1	1.2	0.9
Şekerbank	5.7	5.1	3.8
Tekstil Bankası	5.6	6.4	5.1
Turkish Bank A.Ş.	0.8	0.8	2.0
Türk Ekonomi Bankası	2.5	2.3	2.2
Türkiye Garanti Bankası	2.5	2.1	2.3
Türkiye İş Bankası	1.6	1.7	1.9
Yapı ve Kredi Bankası	3.6	3.7	3.3
Alternatifbank	5.0	3.6	4.5
ArapTürk Bankası	1.1	0.6	1.2
Burgan Bank	2.0	2.4	5.7
Citibank A.Ş.	3.9	5.8	8.2
Denizbank	3.9	3.6	4.2
Deutsche Bank	0	0	0
Finans Bank	5.4	6.9	6.9
HSBC Bank	6.4	6.3	4.8
ING Bank	2.7	2.3	2.4
Turkland Bank	2.8	2.6	3.4
Average	3.12	3.06	3.36

Oktar and Dalyancı tried to analyze financial crisis occurred in Turkey after 1990. Probit model was used in order to achieve this purpose. As a result of this study, it was defined that low amount of reserves and high amount of current account deficit were the important determinants of the financial crisis (Oktar and Dalyancı 2010).

Dependent Variable: NPL Ratio

The aim of this study is to define the determinants of the credit risk of Turkish banks. Credit risk is the probability of loss due to the failure of the customers to meet their obligation. Therefore, the best indicator of the credit risk is non-performing loans. In this study, non-performing loans/total loans ratio was used as dependent variable.

First of all, NPL ratios of all banks were provided for each year. After that, the average of the NPL ratios for each year was calculated. The banks, of which NPL ratios are higher than average NPL ratio, took the value of "1". On the other hand, if

Table 3 The list of independent variables in this study

Parameters	Internal/ external	Studies
Total Credits	Internal	Boudriga et al. (2009), Castro (2012), Louzis et al. (2012), Klein (2013), Das and Ghosh (2007), Sinkey and Greenawalt (1991), Saba et al. (2012)
Consumer Loans	Internal	Kwan and Eisenbeis (1995)
Commercial Loans	Internal	Kwan and Eisenbeis (1995)
Received Credits	Internal	Klein (2013)
Net Interest Margin	Internal	Das and Ghosh (2007), Yağcılar and Demir (2015)
Growth Rate	External	Klein (2013), Espinoza and Prasad (2010), Sinkey and Greenawalt (1991), Mileris (2012), Boudriga et al. (2009), Castro (2012)
Industry Production Index	External	Yüksel (2011), Yücememiş and Sözer (2011)
Unemployment Rate	External	Klein (2013), Espinoza and Prasad (2010), Mileris (2012), Boudriga et al. (2009), Castro (2012), Yüksel (2011)
Inflation	External	Klein (2013), Espinoza and Prasad (2010), Sinkey and Greenawalt (1991), Mileris (2012), Saba et al. (2012), Yüksel (2011)

the NPL ratios of the banks are less than or equal to average rate, they got the value of "0".

Independent Variables: NPL Ratio

There may be internal or external factors that can cause for a normal loan to be a non-performing loan. Internal factors refer to the elements that are under the control of the banks. On the other side, external factors mean macroeconomic variables which cannot be controlled by banks. Similar to these issues, both internal and external independent variables were used in this study. Our explanatory variables and related studies for these variables are depicted in Table 3.

In this study, there are five internal and four external explanatory variables that were also used in similar studies in the literature. The change in total credit amount is the first internal variable. Any increase in this amount is generally expected to raise non-performing loans amount. However, in the literature, there were also some studies which show positive relationship between them (Yağcılar and Demir 2015). The main reason is that when banks increase in the size of total credits, they can establish a developed system to define the credibility of the customers. Thus, this situation minimizes the risk of default.

In addition to total credits, using the variables of "consumer loans" and "commercial loans" separately is considered appropriate in order to see the effects of each of them. Consumption ratio of Turkey is very high by comparing the average of the world. Thus, it is possible to say that Turkish people mostly finance this consumption with credits or credit cards. Because of this situation, positive

relationship between consumer credits and non-performing loans is expected. Besides the credits given to the customers, the variable of received credits by banks was also used in this study.

The last explanatory variable of this study is net interest margin. It refers the difference between interest income and interest expenses of the bank. This amount was also divided to total asset amount in this study to see the differences between the years. If the net interest margin is high, it is expected to increase non-performing loans of the bank. The main reason behind this situation is that only the customers who have low credibility are willing to accept to pay high credit interest rate. Hence, net interest margin is positively related to non-performing loans.

Moreover, four macroeconomic variables were also used in this study so as to see the effects of external factors on non-performing loans. Growth rate is the first external variable of this model. Because it shows the improvement in the economy, negative relationship between growth rate and non-performing loans is expected. Furthermore, industry production index is another independent variable. Because it is the indicator of the performance of industrial development, negative relationship between this index and non-performing loans is expected. Additionally, inflation and unemployment rates were also used in this study as explanatory variables. Because they show the unfavorable conditions in the economy, positive relationship between them and non-performing loans is expected.

4.3 Results of the Model

We made a probit analysis in order to define the determinants of the credit risk of Turkish banks. First of all, we controlled whether our explanatory variables are stationary or not. For this purpose, Augmented Dickey Fuller (ADF) unit root test was used in EViews 7.1 program. It was determined that some of these variables were stationary at their first or second difference series. Therefore, for these variables, new series were used. Because of this situation, spurious regression risk was eliminated. After stationary analysis, muticollinearity problem among explanatory variables was also controlled. During this analysis, some of the variables were excluded from the model due to multicollinearity problem. The results of the probit analysis were shown in Table 4.

This table shows the situation in which dependent variable changes from the value of "0" to "1". In other words, it gives information about the condition that the percentage of non-performing loans increases. Because of the multicollinearity problem, the model was created only with six independent variables.

It was determined that significance value of industry production index is 0.0258 which is less than 0.05. This refers that the explanatory variable of industry production index is statistically significant at 5 % level. On the other hand, it was also defined that the significance value of other five independent variables are more

Table 4 Probit results

Dependent variable: NPL				
Method: ML - Binary Probit (Quadratic hill climbing)				
Date: 10/16/15 Time: 20:25				
Sample (adjusted): 2006 2014				
Included observations: 207 after adjustments				
Convergence achieved after four iterations				
Covariance matrix computed using second derivatives				
Variable	Coefficient	Std. error	z-Statistic	Prob.
Industry Production Index	−0.037761	0.016936	−2.229601	0.0258
Total Credits	0.000003	2.68E-05	1.149933	0.2502
Growth Rate	−0.010402	0.013809	−0.753325	0.4513
Unemployment Rate	−0.088633	0.070105	−1.264300	0.2061
Consumer Loans	−0.000123	0.000100	−1.222042	0.2217
Received Credit	−0.004998	0.011695	−0.427397	0.6691
Mean dependent var	0.410628	S.D. dependent var		0.493140
S.E. of regression	0.499332	Akaike info criterion		1.412277
Sum squared resid	50.11578	Schwarz criterion		1.508878
Log likelihood	−140.1707	Hannan-Quinn criter.		1.451341
Deviance	280.3413	Restr. deviance		280.3137
Avg. log likelihood	−0.677153			
Obs with Dep = 0	122	Total obs		207
Obs with Dep = 1	85			

than 0.05. This situation shows that these variables are not statistically meaningful in order to explain non-performing loss.

The coefficient of the industry production index is −0.037761. Because this value is less than "0", it can be said that there is a negative relationship between industry production index and non-performing loans. This is to say, if there is a decrease in industry production index, the ratio of non-performing loans will increase. In addition to this situation, any increase in the amount of industry production index leads to the decline in non-performing loans.

Industry production index is the indicator that shows real production output of manufacturing, mining, electricity, water and oil sectors. It provides the data to see the changes in the production amount of these sectors. If there is an increase in this index, it refers that this country made more production in that year. Therefore, any increase in industry production index means the development in the economy. As a result, it is an essential indicator that reflects the performance of and improvements in national economy (Kızılca 2007).

According to the result of the model, there is a negative relationship between industry production index values and non-performing loans. In other words, when the production output decreases, non-performing loans ratio of Turkish banks goes up. It was seen that this result is also similar to the results of some other studies in the literature (Yüksel 2011; Yücememiş and Sözer 2011).

Low amount of production affects both owners of the firms and employees work in these firms. Decline in production leads lo decrease in the profit of the firms and some of them starts to make a loss. Owing to this situation, these owners have to close their firms or lay off employees in order to decrease their costs. This situation causes unemployment rate to increase in the country. As a summary, if the decrease in the industry production index is high, this leads to recession for this economy. Therefore, owners who went bankruptcy or made a loss and unemployed people cannot pay their credit debts to the banks. As a result, the ratio of non-performing loans will increase.

5 Discussion and Conclusion

In this study, we tried to identify the determinant of credit risk in developing countries. Within this framework, Turkish baking sector after 2001 crisis was analyzed. The annual data of 23 Turkish deposit banks for the period between 2004 and 2014 was used in this study. This data was provided from the Banks Association of Turkey, OECD and World Bank. Moreover, probit model was used in order to achieve this objective.

Furthermore, non-performing loans ratio of the banks was chosen as the dependent variable of this study because this ratio is the best indicator that shows the probability of loss due to the failure of the customers to meet their obligation. Average NPL ratio was calculated for each year. The banks, of which NPL ratio is higher than the average ratio, took the value of "1" and other banks got the value of "0" ad a dependent variable.

Additionally, nine explanatory variables were used in the model to define the reasons of non-performing loans. Five of them were internal variables which banks can control whereas four of them were external variables that cannot be controlled by banks. The stationary forms of the independent variables were used in this study. Moreover, three of them had to be eliminated from the model because of the multicollinearity problem.

According to the results of the model, it was determined that industry production index was the only variable that affects the ratio of non-performing loans in Turkey. Other explanatory variables were not statistically significant in our study. It was defined that there is a negative relationship between industry production index and non-performing loans. In other words, decrease in the number of industry production index leads to increase non-performing loans.

Industry production index gives information about the real production output of manufacturing, mining, electricity, water and oil sectors. Therefore, if there is a high amount of decrease in this index, recession will be occurred in this economy. This situation also causes the bankruptcy or high amount of loss for companies. In addition to this problem, employees in these companies will be lost their jobs. These people will have a difficulty to pay their debts to the banks and as a result, non-performing loans ratio will increase.

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Credit Risk Evaluation of Turkish Households Aftermath the 2008 Financial Crisis

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Abstract The objective of this study is to determine which demographical and financial features affect consumer credits risks of Turkish households aftermath the 2008 global financial crisis. Our analyses are built on the data from Turkish Statistical Institute (TURKSTAT) on an unbalanced panel of 13,979 households between the years 2008 and 2012. We apply our estimations on two stages. First we use logistic regressions to detect which features are likely to lead to default. Second we make robustness test with Survival Cox Analysis and evaluate the impacts of these features again. Our verified results show that the features that affect the default are; household income, volatility of the household income, being a home owner, age, education and gender.

1 Introduction

It was clearly revealed by the US mortgage crisis in 2008 that financial institutions have considerable weaknesses in evaluating consumer credit risk. The ensuing economic effects spilled over globally and attention turned to consumer credit in emerging markets (Küçüktalasli et al. 2012). Thanks to financial innovations during the last two decades, households in emerging markets have gained easier access to consumer loans (Livshits et al. 2014). Therefore it has become more significant for banks to tailor the consumer credits according to the risk characteristics of households. Perraudin and Sorensen (1992)'s explicitly show that banks mainly depend on demographic characteristics of consumers while assessing credit applications and constructing the consumer loans. Swain (2008) also emphasizes the role of these characteristics on household default risk because they provide useful information in times of change. Consequently, the objective of this study is to determine

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the impact of demographical and financial attributes of Turkish households aftermath the 2008 global financial crisis.

This paper aims to increase the information for financial institutions that target to be lenders for the consumer loan market for Turkish households, hence contribute to the well functioning of the Turkey's credit market. In other words, through the results of the publicly available survey in Turkey, we aim to determine the risk profile of Turkish consumers. Therefore, this paper informs banks, building societies, credit card institutions and large retailers about the risk characteristics of their potential borrowers. In specific, the institutions are acknowledged about particular socioeconomic and demographic features of Turkish households and informed on which households they must either target or avoid. Moreover, our work also contributes to efforts for maximizing wealth of Turkish consumers given that borrowers face credit constraints when lenders are not able to obtain sufficient or necessary information to evaluate their credit risks correctly. Nonetheless, this improvement in the demand side of the credit market is called as the democratization of credit lending by Lyons (2003).

In recent years, banks have increasingly been using credit-scoring techniques based on these characteristics to evaluate the loan applications they receive from consumers (Blöchlinger and Leippold 2006; Karan and Arslan 2008). For Turkey, Küçüktalasli et al. (2012) examine the 5120 Turkish households during the economic expansion period of Turkey, which is 2006 and 2007 and right before the global crisis, and point out the importance of socioeconomic and demographic characteristics of consumers on quality of services in the financial sector.

However, in Turkey, the global financial crisis caused dramatic restrictions on the supply side of the consumer loans. Banks started to build reserves and hoard cash and hence limit the pool for extending consumer loans. Right after the global financial crisis Turkey experienced a significant rise in household liabilities reaching up to 10.8 % and the saving rate has declined to the historically low level (Duman 2013). This has caused Turkish Banking Regulation and Supervision Agency (BRSA) to restrain private credit growth in Turkey aftermath the global crisis followed by this sharp drop in the household savings rate and simultaneous explosive growth in private credit in Turkey. Alarmed by such a trend BRSA decided to take action to curb the unsustainable credit growth, and in December 2010, it officially announced a set of steps to be implemented as a part of credit restraint policy. Agarwal et al. (2015) indicate that the credit tightening policy has an immediate and economically strong effect on consumer spending in Turkey.

Altogether, we need to understand which socioeconomic and demographic characteristics of households are likely to lead to default at a specific time period when access to external finance for households are more restricted however household spending (saving) markedly rises (falls) compared to the pre-crisis period.

Being one of the world's leading emerging economies and a candidate for the European Union membership, Turkey's consumer credit market offers vast opportunities to foreign financial institutions. Besides, Turkey's consumer finance industry has been rapidly growing since the end of the domestic financial crisis in the year 2001. This outcome is mainly owed to the rising disposable income on back of

robust economic growth and increasing employment since the end of the crisis. Moreover, since the last quarter of the year 2002, foreign banks have been intensely merging, taking over or acquiring Turkish domestic banks. Specifically, the equity ownership of foreign banks in the Turkish banking system rose from less than 4 % in 2002 to more than 40 % by 2013. The swift entry of foreign banks into Turkish financial system has instantly escalated competition in domestic financial market, particularly in consumer lending. Thus, the quantity of increase in Turkish consumer credits since the last quarter of the year 2002 aligns with the rise of the share of foreign banks in the Turkish banking system (The Banks Association of Turkey 2014).

As indicated by Getter (2006), a well functioning credit market is constituted once borrowers are treated differently in terms of credit availability and charged rates. Consequently, the well functioning of the consumer credit market in Turkey depends on the amount of information that enables financial institutions to differentiate good quality borrowers from bad quality ones. Nevertheless, in the theoretical framework of Cutts et al. (2000) the expansion of consumer credit markets is shown to depend on the availability of information about borrowers.

Our analyses targeting at detecting demographic and financial characteristics of Turkish households are applied on two stages. First we use logistic regressions to detect which features are likely to lead to default. Second we make robustness test with Survival Cox Analysis and evaluate the impacts of these features again. Our verified results show that the features that affect the default in consumer credit are; household income, volatility of the household income, being a home owner, age, education and gender.

The remainder of this paper is as follows. In the next section we review the related literature. After that, we describe the data and methodology, followed by the explanation of the results. In the final section our paper provides the concluding remarks.

2 Literature

Demographic and socioeconomic characteristics of households are extensively studied in the previous literature. One of the most elaborated characteristics is the gender of the household head. The literature generally stresses on the fact that women have a lower disposable income compared to men (See, among others, Bajtelsmit and Bernasek 1996). Besides, Anbar and Eker (2009) stress on that, compared to women, man are more knowledgeable about financial concepts. Despite earning a lower income and being less informed about the financial issues, the literature has not found a significant difference in financial risk taking between women and men (Embrey and Fox 1997; Harrison et al. 2007; Schubert et al. 2000). Overall, we expect to find women in our analyses to be more susceptible to consumer credit default.

Age is also one of the characteristics highly studied in the previous literature. Ardehali (2004) show that financial risk tolerance falls as the age of an individual increases. Wagner (2011) explicitly indicate that wealth of an individual increases as his age and he becomes more financially savvy as well. Consequently, we expect the likelihood of default to be higher for households with younger heads.

Education is also found to be an important attribute influencing the probability of consumer credit default. Initially, as the education level of an individual rises, thanks to the enhanced skills, the likelihood of being employed in a high-income job increases as well (Hallahan et al. 2003; Sultana and Pardhasaradhi 2011). Besides, education also contributes to the enhancement of valuation and assessment skills and therefore individuals become more disciplined and efficient in their investments and spending (Grable and Lytton 1999 and Ardehali 2004). As such, we expect the education to be adversely related with consumer credit defaults.

For the period before the global financial crisis, Arslan and Karan (2010) finds that being a home owner in Turkey imposes not only a discipline on spending but also stabilizes the household income. That home is also a collateraziable fixed asset for a household. We also expect that owning the house, which is actually lived in by the household, is negatively related with consumer default during the post-crisis period as well.

Finally household income is a very important determinant of borrower credit-worthiness (See, Getter 2006 for a detailed discussion). Consumer's income not only extends the borrowing capacity but also repayment potential (Arslan and Karan 2010). Therefore we expect the households in the lower income brackets to be more prone to credit defaults. We also take into account of the stability of the household income and extend our prediction that a higher volatility in household income has a positive influence in credit default.

3 Data

The data on this study is obtained from the "Income and Living Conditions Survey" conducted by the Turkish Statistical Institute (henceforth; TURKSTAT) between the years 2008 and 2012. The survey covers the entire members of the households that live within the borders of Turkey. The survey is conducted consistently each year between April and July. The surveys are carried out through face to face interviews. The survey employs the rotational design whilst a group of households stay in the sample frame from one year to another, new households enter the sampling frame. Around 75 % of the sample stays in the panel from year to year.

Individuals that are 13 years and older in the selected basic sampling household are monitored for 4 years. The variables on income, house-ownership and financial failure belong to the entire household. However the data on age, education and gender belong to the household head. The total number of observations is based on an unbalanced panel of 13,979 households between the years 2008 and 2012

Table 1 Variables

Panel 1			
Variable	Explanation		
Time	Number of years a household is monitored		
Default	Dummy variable taking the value of 1 if a household fails a payment of consumer credit. credit card. installment. loan or rent. and zero otherwise		
Income Deviation	Standard deviation of the household income within the sample period		
Age	Average age of the household head		
Education	Average education of the household head		
Gender	Dummy variable taking the value of 1 if a household head is a woman and zero if man		
Household Income	Natural logarithm of the total household income		
House Owner	Dummy variable taking the value of 1 if the household owns the house currently being lived. and zero otherwise		
Panel 2: Details on the age variable			
Age group	Age range	Education group	Explanation
4	15–19	0	Illiterate
5	20–24	1	Literate but no degree
6	25–29	2	Primary school degree
7	30–34	3	Secondary school degree
8	35–39	4	High school degree
9	40–44	5	Vocational school

Definitions of each variable are provided in Table 1. All variables are the arithmetic mean of the sample.

The first variable is "Time" and it shows the total number of years a household is monitored. This is the critical variable in the Survival Analysis as it follows the financial failure of households within the years. If a household fails its financial obligations, its monitoring is ceased. As such, for the households with no financial failure, "Time" represents the total number of years it is followed since the beginning of our time period. "Default" is a dummy variable taking the value of 1 if a household fails a payment of consumer credit, credit card, installment, loan or rent, and zero otherwise. 1274 households in our data set is found to be "Default" whereas 12,704 households have not defaulted any of their financial obligations between 2008 and 2012. "Household Income" is the natural logarithm of the total household income. "Income Deviation" is the standard deviation of the household income within the sample period and it measures the variability of the income. "Age" and "Education" are the average age and education categories of the household head, respectively. "Gender" is a dummy variable taking the value of 1 if a household head is a woman and zero if man. Lastly "House Owner" is a dummy variable taking the value of 1 if the household owns the house currently being lived, and zero otherwise.

Table 2 shows descriptive statistics of the variables. On average a household is followed for 2.73 years and majority of the sample has not defaulted in any of the

Table 2 Descriptive statistics

	N	Minimum	Maximum	Mean	Std. deviation	Variance
Time	13.979	1.00	4.00	2.76	1.01	1.02
Default	13.979	0.00	1.00	0.09	0.29	0.08
Income Deviation	13.979	0.00	11.39	8.95	2.271	5.16
Age	13.979	3.03	10.85	5.13	1.39	1.94
Education	13.979	0.00	6.00	2.62	1.73	2.97
Gender	13.979	0	1	0.15	0.36	0.13
Household Income	13.979	8.05	11.73	10.26	0.29	0.08
House Owner	13.979	0.00	1.00	0.62	0.48	0.23

Notes: N stands for the total number of observations. Definitions of variables can be found in Table 1

financial obligations. On average, the age group of the household head falls between 20 and 24 years and a middle school graduate. Moreover 62 % of the households in our study own their own houses. Finally, a female heads 15 % of the sample household.

Table 3 provides the correlation coefficients across the variables. The results in the table show that the correlation between the variables does not exceed 50 % and therefore we are under no threat of multicollinearity.

Table 4 reports univariate results on the differences between default and non-default group. As expected, compared to the non-default group, default households have a higher deviation in their income during the sample period and their household head is younger. The education level of default-group is slightly lower than the non-default group. This can be suggested by the lower spending discipline or lower income with lower number of schooling of the household heads. It is also observed that more of the non-default group's head is female than that of the default-group. Lastly, household income is significantly lower in default group as the home ownership is less as well.

4 Methodology

For our multivariate analyses we first employ logistic regression methodology followed by the survival analysis for validation of the findings from the previous estimations. Specifically, logit model is used for estimating the probability of participants failing in financial obligations included in the TURKSTAT database given that most of the econometric models are usually thought of as only being suitable for target variables that are continuous. With logistic regression, we are estimating a divided outcome. This condition creates problems for the assumptions of ordinary least squares that the error variances (residuals) are normally distributed. Therefore at a usual linear regression equation, an algebraic conversion is needed.

Table 3 Correlation matrix

	Income deviation	Age	Education	Women	Household income
Income Deviation	1.000				
Age	−0.059	1.000			
Education	0.068	−0.384	1.000		
Women	−0.065	0.229	−0.249	1.000	
Household Income (log)	0.150	−0.120	0.475	−0.169	1.000
House Owner	0.023	0.358	−0.160	0.013	0.073

Notes: N stands for the total number of observations. Definitions of variables can be found in Table 1

Table 4 Univariate tests

Variables	Statistics	Default = 0	Default = 1	F-Test
Income Deviation	Mean	8.94	9.086	4.768*
	St.Dev.	2.292	2.05	
	S.E.	0.02	0.057	
	N	12.704	1.275	
Age	Mean	5.206	4.341	462.401*
	St.Dev.	1.401	0.99	
	S.E.	0.012	0.028	
	N	12.704	1.275	
Education	Mean	2.607	2.724	5.320*
	St.Dev.	1.746	1.471	
	S.E.	0.015	0.041	
	N	12.704	1.275	
Gender	Mean	0.157	0.118	13.547*
	St.Dev.	0.364	0.323	
	S.E.	0.003	0.009	
	N	12.704	1.275	
Household Income	Mean	10.269	10.189	91.139*
	St.Dev.	0.289	0.253	
	S.E.	0.003	0.007	
	N	12.704	1.275	
House Owner	Mean	6.945	0.9	1936.968*
	St.Dev.	4.816	2.93	
	S.E.	0.043	0.082	
	N	12.704	1.275	

Notes: * denotes significance at 99 % level. Definitions of the variables can be found at Table 1. St. Dev., S.E and N stand for standard deviation, standard error and number of observations, respectively

Linear regression models are similar with other general linear equations like;

$$Y = a_0 + a_1X_1 + a_2X_2 + ... + a_nX_n + e$$

Where, Y is regressing for the probability of a categorical outcome. In simplest form, this means that we're considering just one outcome variable and two states of that variable—either 0 or 1. The following is the equation for the probability of Y=1;

$$P(Y = 1) = \frac{1}{1 + e^{-\left(a_0 + \sum a_i X_i\right)}}$$

Independent variables (X_i) of logistic regression can be continuous or binary and perfectly fits our approach, which is aimed to identify personal variables (continuous and binary) of two groups namely early leavers and faithful participants of pension company.

Survival analysis is special technique dealing with the time it takes for something happen or failure. The main goal of the survival analysis is to explain the proportion of cases, which are observed at various times (Tabachnick and Fidell 2013). Similar with the logistic regression, survival analysis use hazard rates, which is the probability of any event occurring at any point in time. Despite many advantages of logistic regression, survival analysis deals with time dependent variables better than logit models (Wang et al. 2013). If some of the variables change over time, using survival analysis leads more precise estimations. One of the most interesting characteristics of the analysis is that survival time is unknown for many cases. Predictor variable of the survival analysis is always the time. The criterion variable, which is often called as the status variable is the *Default*, which is the dependent variable of the logistic regression. In this case, there are two possible outcomes: Default (1) or not default (0).

5 Results

Here we first present results from logistic regression analysis. The results are demonstrated in Table 5.

The table shows that as the variability of a household's income increases it is found that the household is likely to default. The variability of household income increases the risk of the cash inflows and therefore increases the probability of not being able to service consumer debt obligations. Households headed by younger individuals are also likely to end up with a default. The result on the age is the reflection of the fact that right after the 2008 global crisis, youth unemployment has entered into a rising trend in Turkey. For instance the percentage of youth unemployment in the country in 2009 was 25.3 % and has not changed considerably as of

Table 5 Logistic regressions

Variables in the equation	B	S.E.	Wald	df	Sig.	Exp(B)
Income deviation	0.062	0.016	14.515	1	0.000	1.064
Age	−0.262	0.031	71.841	1	0.000	0.770
Education	−0.108	0.025	19.334	1	0.000	0.898
Women	0.265	0.101	6.895	1	0.009	1.303
Household Income	−0.684	0.141	23.430	1	0.000	0.505
House Owner* Household Income	−0.282	0.010	762.001	1	0.000	0.755
Constant	6.407	1.378	21.603	1	0.000	606.099
Log Likelihood	6596.897					
Nagelkerke R Square	0.130					
Cox & Snell R Square	0.283					

Notes: The definitions of the variables can be found in Table 1

now. Put differently, having an older household head increases the odds of cash flow security. We also find slight evidence that having a woman led household is likely to be associated with default. Woman's participation to work force is 12 % of the population and it is the lowest among OECD countries. Moreover in Turkey women has the lowest leading role such as CEO, CFO or vice president etc., in corporations among OECD countries. Therefore being led by a female household head is likely to be associated with more volatile and lower income. Expectedly, household income and being a home owner is likely to be negatively related to the default. In Turkey, being a homeowner is also likely to be associated with not only having better saving propensity but also disciplined spending behavior (Arslan and Karan 2010). Lastly, lower is the education level, it is more likely that the household will end up with a default. This result for the after-crisis period in Turkey also holds for the pre-crisis period as well (Arslan and Karan 2010).

In order to verify our findings, we apply the Survival Analysis and the results are presented in Table 6. In the first model, the results for all the variables, except for the standard deviation of household income, are consistent with our previous findings. Figure 1 the survival rate falls faster in the first year and has been decreasing each year.

In the second model, age of the household head is used as the grouping variable. The ones older than 30 are denominated as old and the rest as young. Then it is found that the results for "Education", "Gender", "Household Income" and "House Owner" go hand in hand with the previous findings. Survival rates belonging to this group are presented at Fig. 2 showing that survival rate is lower in the younger population and has been falling through the years.

In the third model, education of the household is used as the grouping variable. Households are grouped as; the ones with at least a college degree and those with a high school degree and less. Results for all the usual four variables are consistent with that of the logistic regressions except for the gender. This result can be attributed to the fact that women in Turkey usually have a homogenous level of education, being typically lower than that of men. Figure 3 contains the survival

Table 6 Survival analysis

Models	Variables	B	SE	Wald	df	Sig.	Exp (B)
Model 1	Age	−0.223	0.028	63.848	1	0.000	0.801
	Education	−0.094	0.022	18.306	1	0.000	0.911
	Gender	0.206	0.091	5.144	1	0.023	1.229
	Household income	−0.541	0.125	18.810	1	0.000	0.582
	House owner* Household income	−0.266	0.010	709.361	1	0.000	0.766
Model 2	Education	−0.066	0.021	10.153	1	0.000	0.936
	Gender	0.233	0.089	6.812	1	0.009	1.262
	Household income	−0.709	0.122	33.574	1	0.000	0. 492
	House owner	−0.275	0.010	789.927	1	0.000	0.760
Model 3	Age	−0.205	0.027	58.486	1	0.000	0.814
	Gender	0.146	0.091	2.602	1	0.107	1.157
	Household income	−0.506	0.117	18.575	1	0.000	0.603
	House owner* Household income	−0.265	0.010	708.399	1	0.000	0.767

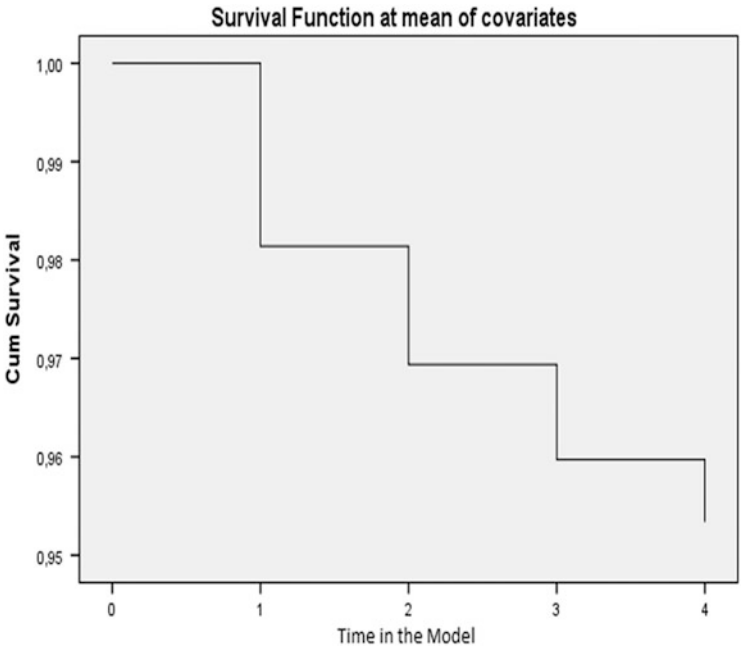

Fig. 1 General survival function of the model with all variables

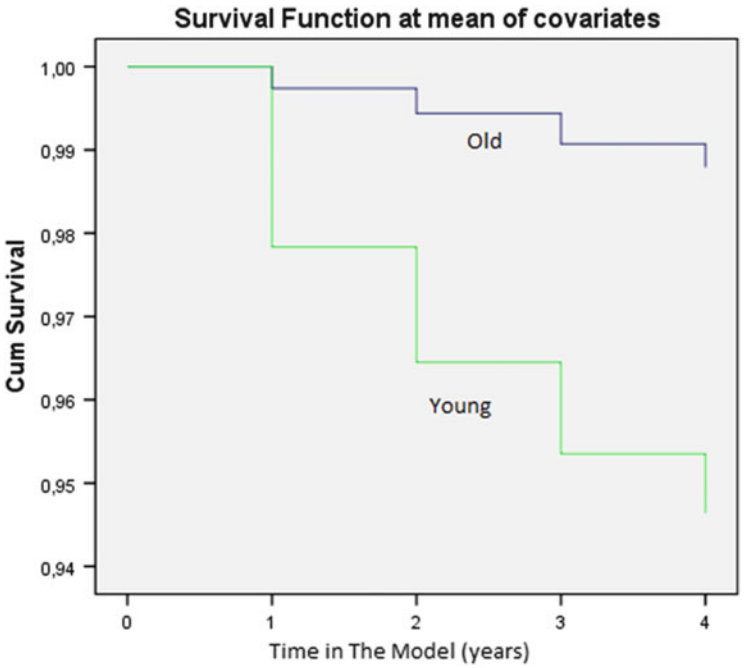

Fig. 2 Survival function—age of the household head is the grouping variable

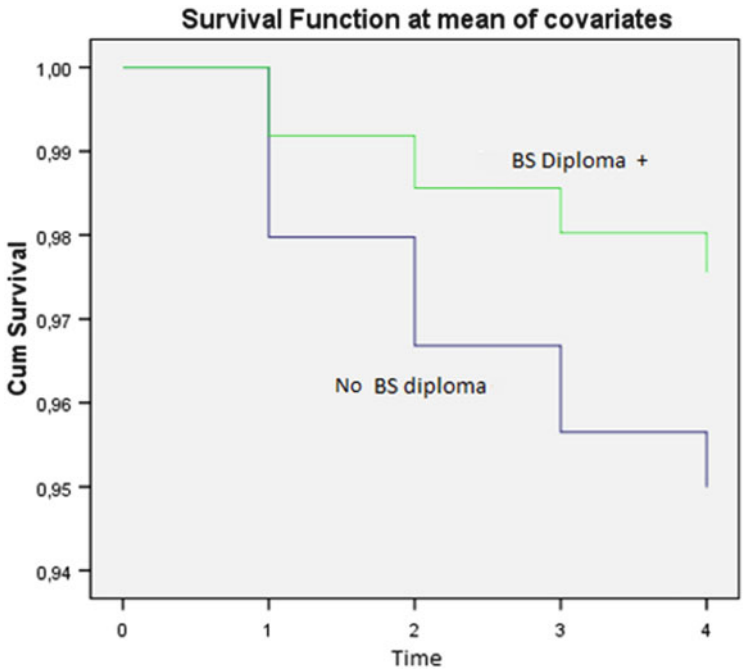

Fig. 3 Survival function—education of the household head is the grouping variable

rates related to this model. The figure shows that survival rate is particularly lower for the ones that have a lower level of education and has been decreasing through the years.

6 Conclusions

Right after the global financial crisis, Turkish consumer loan market is characterized by a demand side that contributed to the high growth of the market yet hand in hand with a significant drop in the household savings rate. Alarmed by such a trend, BRSA decided to take action to curb the unsustainable credit growth immediately after the crisis by officially announcing a set of steps to be implemented as a part of credit restraint policy. This situation also intersects with the stricter lending policies of banks for building reserves.

The objective of this study is to determine which demographical and financial features affect consumer credits risks of Turkish households aftermath the 2008 global financial crisis. This period had significant characteristics in terms of the forces of expansionary demand yet a contraction prone supply side of the Turkish consumer market.

Our analyses are built on the data from Turkish Statistical Institute (TURKSTAT) on an unbalanced panel of 13,979 households between the years 2008 and 2012. We apply our estimations on two stages. First we use logistic regressions to detect which features are likely to lead to default. Second we make robustness test with Survival Cox Analysis and evaluate the impacts of these features again. Our verified results show that the features that affect the default are; household income, volatility of the household income, age, being a home owner, education and gender.

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International Credit Default Swaps Market During European Crisis: A Markov Switching Approach

Ayben Koy

Abstract This study investigates whether nonlinear relationship resulted from mutual regime switching mechanism exists in the European CDS's markets during crisis. Multivariate Markov Switching Autoregressive Model that captures the switching mechanism is used. We analyzed the daily CDS spreads of Ireland, Italy, Portugal and Spain those most affected in European Debt Crisis. The data used in this study, belongs to the time period including 2010 and 2014 (1241 observations). The model have got three different regimes as depression, moderate growth and expansion. The results of the tests indicate that (1) CDS markets are governed by a long run relation, (2) volatility have an importance role in determining the regimes, (3) the shocks that applied to Italy and Spain are more effective than others, (4) Portugal is the more affected country between all, (5) the biggest response to the shocks are in the third regime.

1 Introduction

The credit derivatives became a second important reason after presence of non-performing credit loans in the 2008 Global Economic Crisis. Especially Credit Default Swaps'(CDS) which are one of the main kinds of credit derivatives, are leading indicators for foreign investors during investment decisions. Besides, CDS's have the most liquid markets among credit derivatives (Hull 2012) and give information about the country risks, that have an important role in international financial markets.

By a CDS agreement, the seller will compensate the buyer in the event of a loan default or another credit event. At the same time, CDS's constitute a guarantee against fluctuations in the performance of the issuer and allocate the total risk into small individual pieces. There is a reference entity which CDS is linked. This

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reference entity is generally a corporation bond or a government bond. The buyer of the CDS (protection buyer) makes periodic payments until the maturity of the reference entity to the seller (protection seller). This periodic payment is called *spread*. Payments might occur in different periods as quarter or month. Protection seller, is the party who earns fee for selling protection against credit exposure of a reference entity. The protection seller is obligated to purchase bonds from the nominal value when a credit event occurs.

If the reference entity defaults, two kinds of settlement may occur. First of them is physical settlement. In the physical settlement, the CDS buyer delivers a defaulted asset to the CDS seller for payment of the par value. The other one is cash settlement which pays the difference between the par value and the market price. When the credit event occurs, the market price of the reference entity is created by the bids applied simultaneously. The pricing process is performed by the *Creditex, Markit (Financial Information Service), ISDA (International Swaps and Derivatives Association)* and credit derivatives' dealers. At the end of the process, the accuracy and reliability of the process is published on the website of *Markit*.

CDS spread is affected by the factors like; the maturity of the swap, the probability of default of the reference institutions , the expected asset recovery rate of the reference entity, risk-free interest rate, the credit rating of the protection buyer (Ersan and Günay 2009). There is a positive relationship between the credit risk and CDS spread. If the credit risk increases, CDS spread increases; conversely if the credit risk decreases, CDS spread decreases. Any factor which increases credit risk such as the maturity of the swap or the probability of default of the reference institution, that factor increases the CDS spread too. Especially political risk have important effects on CDS spreads (Gun et al. 2016).

As many developing and developed countries have damaged from 2008 Global Economic Crisis, some of the European countries contrarily more effected than others. Thus, a new crisis called European Sovereign Debt Crisis had been occurred. While sovereign debt initially began with Greece, Ireland and Portugal, with time it became to affect all Eurozone countries negatively. CDS spreads of the European countries began to rise, Greece had been default, Portugal and Ireland spreads had been increased more than ten times than their values before the crisis.

Figure 1 shows the CDS spreads of Ireland, Italy, Portugal and Spain. 2011 and 2012 were the years in which CDS spreads reached their highest values. Beginning with the last quarter of 2012, CDS spreads began to decrease fast. This study investigates the nonlinear relationship resulted from this mutual regime switching behavior that existed in the selected European CDS's markets.

In finance, there is a literature on regime switching models driven by observable economic variables, sometimes in the form of *thresholds*, by unobservable stochastic variables as *Markov Regime Switching Models* or test for the presence of structural breaks in parameters, which are unpredictable break-points by using *Bayesian Techniques*. However, the Regime Switching and Markov Regime Switching models are known as the most important example of non-linear time

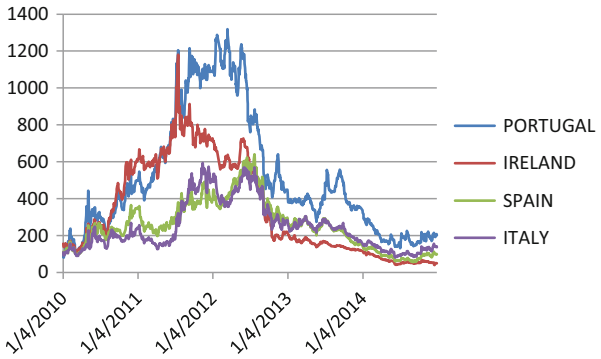

Fig. 1 Credit Default Swap's spreads

series models (Guidolin). In the study, we assume that all the CDS's spreads are regime dependent. Accordingly, Multivariate Markov Switching Vector Autoregressive models are used to extract the regime switching behavior of the four European countries. We used the MSI(M)-VAR(p) model in which the regime shifts are explained with the intercept and the variance.

2 Literature

With the ongoing development of derivative markets, the literature on CDS is growing either. There are several areas that CDS are studied as pricing models (Realdon 2008), market integration (Chan et al. 2009; Kapadia and Pu 2012; Coudert and Gex 2010; Yenice and Hazar 2015) hedging strategies (Caporin 2013) and informational efficiency (Zhang 2009; Cornett et al. 2014). As finance keeps a growing scope in studies including non-linear models, the recent studies in CDS market also have the same growing importance.

One of the previous studies examining the nonlinear behavior of CDS spreads was studied by Huand and Hu in 2012. To extract the regime switching behavior of corporate CDS, the smooth transition autoregressive (STAR) models are applied. The study includes over the period January 2007 to October 2009. Two regimes are found as the low price and high price regimes by the STAR model. By using the Markov regime switching model, Chang et al. (2012) examine the existence of regime switching between CDS spreads and stock returns. Where both positive and negative correlation results are found in the study, the negative correlations are more significant under multifactor switching conditions. In another study, Guo and Newton (2013) found statistically significant and time varying relation between firm leverage, volatility, risk free interest rate, liquidity and CDS. They used daily CDS spreads from January 2004 to June 2010.

Dong et al. (2014) studied the counterparty risk on CDS. They indicate that they can calculate the CDS spread and the first-to-default swap spread by a Multivariate Regime Switching Mean Reverting Process. Apergis and Ajmi (2015) measured the direction of the effects related to CDS prices on a number of asset prices in Greece, Ireland, Italy and Spain in the sovereign debt crisis over the period January 2007 to September 2012. By using time-varying vector autoregressive modeling and the asymmetric causality test, they found that the presence of CDS derivatives have effects on the prices of many assets.

Especially, the Markov regime switching models are studied by Liang et al. (2014), Chan and Marsden (2014), Calice et al. (2015) and Qian and Luo (2016). Liang et al. (2014) assume that the default intensities depend on the economic state described by a Markov chain and that default dependence comes from common shock. They derive some closed-form expressions for the joint distribution of the default times and a pricing formula of CDS with bilateral counterparty risk. Using the Markov regime switching model, Chan and Marsden (2014) examine factor loadings on macroeconomic, market sentiment and other variables that may explain North American investment-grade and high-yield credit default swap indices (CDX). The results of the study over the period 2003–2011 suggest the need to consider regime dependent hedge ratios to manage credit risk exposure. Both 10Y and 5Y CDS spreads are used in Calice and the others' (2015) study in which the dynamics of the sovereign CDS term premium are investigated. The daily CDS premiums of five European countries are decomposed into two unobserved components of statistically different nature. One of the results of the Markov regime switching model indicates that the investor sentiment plays the main roles in sovereign risk evaluation and the CDS term premium response to shocks is regime dependent. After all, one of the newest studies analyzing CDS spread in a regime switching framework is studied by Qian and Luo (2016). The results provide strong evidence for cross-asset-class contagion over the period September 2008 to October 2012, however any contagion from sovereign CDS markets of European Union, Japan, United States to China could not found.

The summary of the literature review is shown in the Table 1.

3 Data and Methodology

3.1 Data

Credit default swaps' spreads of Ireland, Italy, Portugal and Spain are acquired from Bloomberg. We obtain 5 year CDS's spreads between years including 2010 and 2014 (1241 observations). 1.240 daily observations are used as logarithmic differentials.

Table 1 Summary of literature

Study	Period	Model	Variables	Nonlinear model Significance
Huang and Hu (2012)	January 2007 to October 2009	STAR	Corporate CDS	Yes
Chang et al. (2012)	January 2004 to September 2010	Markov Regime Switching	CDS and stock returns	Yes
Guo and Newton (2013)	January 2004 to June 2010	Markov Regime Switching	leverage, volatility, risk free interest rate, liquidity and CDS	Yes
Dong et al. (2014)	Mathematical Computation	Multivariate Markov Regime Switching	Mathematical Computation	Yes
Liang et al. (2014)	Mathematical Computation	Markov Regime Switching	Mathematical Computation	Yes
Apergis and Ajmi (2015)	January 2007 to September 2012	Asymmetric Causality Test	to CDS prices on a number of asset prices in Greece, Ireland, Italy and Spain	Yes
Chan and Marsden (2014)	2003 to 2011	Markov Regime Switching	North American investment-grade and high-yield credit default swap indices (CDX).	Yes
Calice et al. (2015)	September 2007 to February 2012	Markov Regime Switching	5 years and 10 years CDS spreads of Spain, Portugal, Ireland, Czech Republic and Poland	Yes
Qian and Luo (2016)	September 2008 to October 2012	Regime Switching	First study: cross-asset-class contagion Second study: CDS markets of European Union, Japan, United States to China	Yes

3.2 The Multivariate Markov Switching Vector Autoregressive Model

A markov chain is composed of independent random variables. The basic idea for the Markov Regime Switching Model, is to describe a situation or stochastic process which determines the change from one regime to the other via a Markov chain. Markov chain is used to model the behavior of a state variable or combination of variables which cannot be directly observed but determines the regime. In a Markov Regime Switching, the state of the economy (s_t) cannot be directly observed, although the time series variable (v_t) can be observed. Any period of economy whose properties depend on the observation values, is obtained as

probability. At the same time those observations are supposed to be dependent on the properties of the regime. When the state of the economy in the Markov regime is determined, the next regime can be expressed as a probability.

In the markov regime switching models, there is a K-dimensional vector time series process (y_t) depends upon an unobservable regime variable. The probability of being in a particular state of the economy is represented by s_t (Krolzig 2000).

$$p\left(yt\middle|Yt-1;Xt;\ st\right)\ =\ \begin{cases} f\left(yt\middle|Yt-1;Xt;\theta 1\right) & ;\ st=\ 1 \\ f\left(yt\middle|Yt-1;\ Xt;\theta M\right) & ;\ st=M \end{cases} \tag{1}$$

Xt: exogenous variables; θ is the parameter vector associated with regime M.

The regime-generating process in the Markov Switching models is an ergodic Markov chain. Finite number of states is defined by the transition probabilities (Krolzig 2000).

$$pij\ =\ \Pr\left(st+1\ =\ j\middle|st\ =\ i\right);\ \sum\nolimits_{j=1}^{M} Pij=1\ \text{i,j}\ =\{1,..,\text{M}\} \tag{2}$$

s_t follows an ergodic M-state Markov process with an irreducible transition matrix:

$$\mathbf{P}=\begin{vmatrix} p_{11} & \cdots & p_{1M} \\ \cdots & \cdots & \cdots \\ p_{M1} & \cdots & P_{MM}^{z} \end{vmatrix} \tag{3}$$

The probability of the regime which is effective at time *t,* conditional on the information at time $t-1$, and only depends on the statistical inference on $st-1$:

$$\Pr\left(st\middle|Yt-1;Xt;\ St-1\right)\ =\ \Pr\left(st\middle|st-1\right) \tag{4}$$

Markov Switching time series analysis is firstly implemented by Hamilton (1989) in the business cycle. Hamilton investigates the possibility that macroeconomic variables progress on a cyclical time scale between calendar time and economic time. The variables observed on the nonlinear transformation of the economic time scale, known as calendar time. The relationship between economic and calendar time, depends on the economic history of the process.

The main different kinds of the Markov Switching model, are *MSM* and *MSI* models. In *MSM* Model, the regime switches according to the *conditional mean* (μ_t), on the other hand in *MSI* Model, the regime switches according to the *constant* (c_{st}).

$$\text{MSM Model}:\ \ \text{y}_\text{t}-\ \mu_\text{t}=\ \Phi(\text{y}_{\text{t}-1}-\ \mu_{\text{t}-1})\ +\ \text{u}_\text{t} \tag{5}$$

$$\text{MSI Model}: \; y_t - c_{st} = \Phi y_{t-1} + u_t \tag{6}$$

In financial time series, *MSIH* models' results are generally the most significant. MSIH model is derivative from MSI model. An added factor $\Omega^{1/2}$ to the MSI model represents *variance covariance matrix of variable (y)* $\Omega\, s_t$:

$$\text{MSIH Model}: \; y_t - c_{st} = \Phi y_{t-1} + u_t + \Omega^{1/2} \tag{7}$$

Φ is an n × n matrix of regime-dependent autoregressive coefficients
u_t is an (n*1) unobservable zero mean white noise vector process
Matrix $\Omega^{1/2}$ represents

$$\Omega s_t = Var\left[y_t \middle| \varsigma_{t-1}, s_t\right] \tag{8}$$

ς_{t-1}: denotes time t−1 information of all past observations and states.

To define the nonlinear relationship between multiple variables, we can use the Markov switching vector autoregressive model. A Markov switching vector autoregressive model also allows asymmetric (regime dependent) inference for causality (Balcilar and Ozdemir 2013). The basic p lagged VAR(p) model process is:

$$y_t = c + \left[A_1 y_{t-1} + \ldots + A_p y_{t-p}\right] + u_t \tag{9}$$

A_n is (n*n) coefficient matrices

The general form of a Markov-switching vector autoregressive (MS-VAR) model is (Krolzig 1998, 2000):

$$y_t = c(s_t) + \left[A_1(s_t) y_{t-1} + \ldots + A_p(s_t) y_{t-p}\right] + u_t \tag{10}$$

A VAR with regime shifts in the *mean* is called a MSM(M)-VAR(p):

$$y_t = \mu(s_t) + A_1(s_t)(y_{t-1} - \mu(s_{t-1})) + \ldots + A_p(s_t)\left(y_{t-p} - \mu(s_{t-p})\right) + u_t \tag{11}$$

$$u_t \sim \text{NID}\left(0, \sum(s_t)\right)$$

If the regime shifts affect the *intercept* of the VAR, this is called a MSI(M)-VAR (p):

$$y_t = c(s_t) + A_1(s_t) y_{t-1} + \ldots + A_p(s_t) y_{t-p} + u_t \tag{12}$$

The transition in the MSI-VAR, is smooth comparing to the MSM-VAR model. These models are the subclass of MS-VAR models (Krolzig 1998, 2000).

If the regime shifts affect the intercept of the VAR and the model includes a variance covariance matrix, this is called a MSIH(M)-VAR(p) process:

$$y_t = c(s_t) + A_1(s_t)y_{t-1} + \ldots + A_p(s_t)y_{t-p} + u_t + \Omega^{1/2} \quad (13)$$

MSIH(M)-VAR(p) model means *Markov switching*, *Intercept regime dependent*, *Vector autoregressive and heteroskedastic* model (Guidolin).

3.3 Empirical Results

We applied models with three regime switching and different lags (0–4) to the logarithmic returns of CDS's spreads, thus we found five models which show nonlinear characteristic.

The information criterions indicate different models. MSIH(3)-VAR(2) has the minimum Akaike's (AIC) (−18.4007) and Hannan-Quinnn (HQ) (−18.2762) criterions. MSIH(3)-VAR(0) has the minimum Schwarz (SIC) (−18.1471) criterion and maximum LR linearity (2306.6315). We choose to proceed with the model MSIH(3)-VAR(2) to show the results of impulse response analysis with lags (Table 2).

MSIH(3)-VAR(2) model have three regimes. The first regime is depression with high volatility, the second regime is moderate growth with low volatility and the third regime is expansion with high volatility.

These definitions are econometrical. If a CDS spread is econometrically in depression regime (first regime), it means that risk premium is decreasing. Thus the state of the economy or financial markets is in expansion or growth. Contrarily is a CDS spread is econometrically in growth regime (third regime), it means that the risk premium is increasing. Thus the state of the economy or financial markets is in depression.

The coefficients of the model are shown in the Table 3.

In the regime 1 (that is econometrically depression, economically expansion), the minimum constant (−0.0014) belongs to Ireland's CDS spread. If there is a systematically effective good new comes to CDS market, it might be more effective on Ireland's CDS spread.

Table 2 Information criterions

Model	Log-likelihood	AIC	HQ	SIC	LR linearity	Davies
MSIH(3)-VAR(0)	11422.1430	−18.3454*	−18.2708*	**−18.1471***	**2306.6315**	0.0000
MSIH(3)-VAR(1)	11461.1231	−18.3973*	−18.2978*	−18.1327*	2170.9129	0.0000
MSIH(3)-VAR(2)	11470.0130	**−18.4007***	**−18.2762***	−18.0697*	2174.8888	0.0000
MSIH(3)-VAR(3)	11469.6143	−18.3890*	−18.2396*	−17.9916*	2151.3191	0.0000
MSIH(3)-VAR(4)	11478.2300	−18.3920*	−18.2175*	−17.9280*	2142.3657	0.0000

Note: * Denotes 5% level of significance

Table 3 Coefficients

	Portugal	Ireland	Spain	Italy
Constant (Reg.1)	0.0001	−0.0014	−0.0005	−0.0004
Constant (Reg.2)	−0.0010	−0.0005	−0.0004	−0.0007
Constant (Reg.3)	0.011634	0.001439	0.004032	0.007813
PORTUGAL_1	0.050395	0.064609	0.041170	0.009251
PORTUGAL_2	0.052524	−0.015311	−0.041538	−0.009217
IRLAND_1	0.077819	0.040772	0.000372	−0.028484
IRLAND_2	0.030537	0.059326	0.014673	−0.021188
DLSPAIN_1	0.110434	0.061779	0.001762	0.127217
DLSPAIN_2	0.013661	0.002406	0.041485	0.027762
DLITALY_1	−0.025304	−0.047443	0.104107	0.027863
DLITALY_2	−0.101769	−0.017204	−0.049789	−0.024350
SE (Reg. 1)	0.036630	0.029721	0.042139	0.038768
SE (Reg. 2)	0.018063	0.013671	0.020599	0.021059
SE (Reg. 3)	0.098805	0.083013	0.094888	0.090947

Table 4 Matrix of transition probabilities

Model	Regime	Regime 1	Regime 2	Regime 3
MSIH(3)-VAR(2)	Regime 1	0.7026	0.1944	0.1029
	Regime 2	0.2055	0.7845	0.0100
	Regime 3	0.5315	0.0036	0.4650

In the regime 2 (that is econometrically expansion, economically depression), the maximum constant (0.007813) belongs to Italy's CDS spread. If there is a systematically effective bad new comes to CDS market, it might be more effective on Italy's CDS spread.

The next table shows the probabilities of regime transitions. If in any day CDS market is known as it is in regime 1; the following day the market is expected to be 70.26 % in regime 1, 19.44 % in regime 2 and 10.29 % in regime 3. If the market known as it is in regime 2; the following observation is expected to be 78.45 % in regime 2, 20.55 % in regime 1 and 1 % in regime 3. If the market is known as it is in regime 3; the following observation is expected to be 46.50 % in regime 3, 53.15 % in regime 1 and 46.50 % in regime 2.

Table 4 shows the transition possibilities for the whole model. However, Fig. 2 shows the transition probabilities between regimes visually and for all variables separately.

In the 5 years period, the maximum number of observation (586) and the highest probability (0.47) belongs to the depression regime. The minimum number of observation belongs to the expansion regime. The durations of all regimes are very low, those points to the high volatility of the CDS market during the period (Table 5).

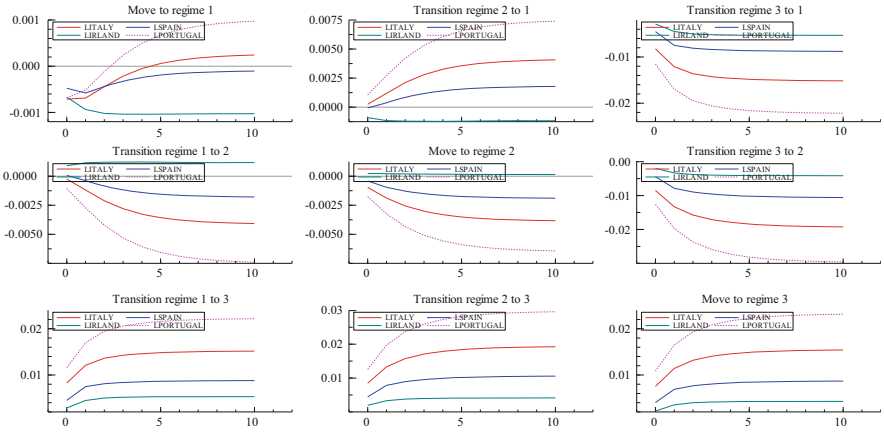

Fig. 2 Transition probabilities

Table 5 Number of observations

Model	Regime	N. Obs.	Prob.	Duration
MSIH(3)-VAR(2)	Regime 1	586	0.4728	3.36
	Regime 2	529	0.4283	4.64
	Regime 3	123	0.0989	1.87

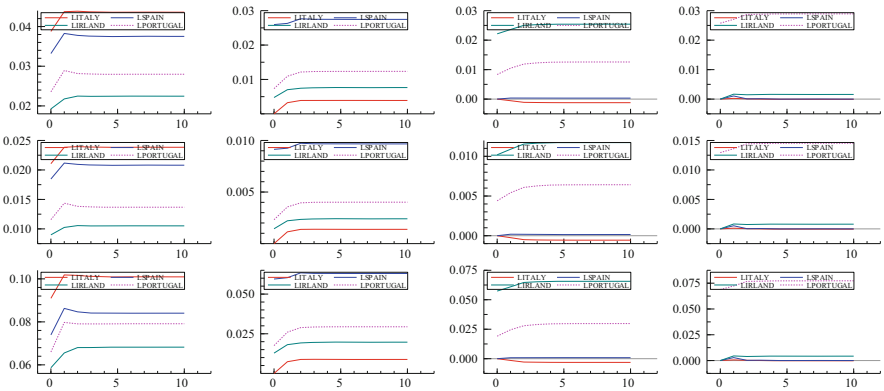

Fig. 3 Impulse response tests

The results of the impulse-response tests are shown in Fig. 3. The first line is regime 1, the second line is regime 2 and the last line is regime 3. In the first column the shock is applied to Italy, second column to Spain, third column to Ireland and the last column to Portugal CDS's.

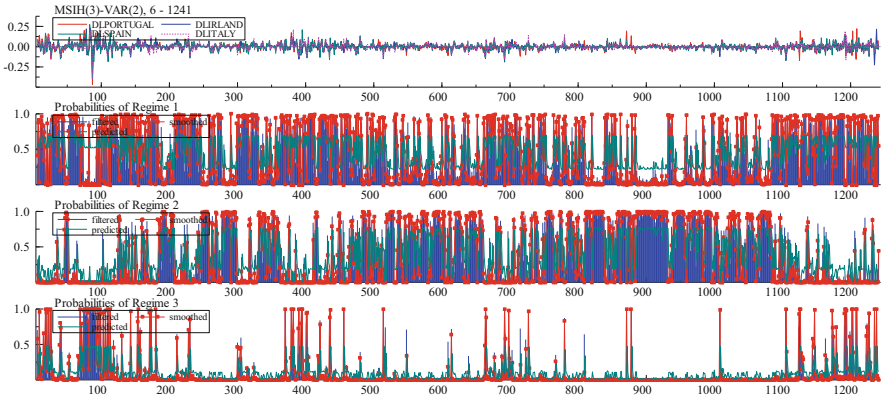

Fig. 4 Regime probabilities

Shock to Italy: All other countries responses to the shock to Italy are in the first day. Spain is the most effected in all regimes. The biggest response is given in the third regime.

Shock to Spain: All other countries responses to the shock to Spain are in the first day. Portugal is the most affected then others in all regimes. The biggest response is given in the third regime.

Shock to Ireland: Portugal gives a significant response in the first day to the one standard shock which is applied to Ireland.

Shock to Portugal: Any of the countries responses are not significant to be a proof enough.

The regime probabilities of the model are shown in Fig. 4. It appears on the figure that in the 5 years period the market is more been in the first (depression) regime. In this regime, the CDS spreads are decreasing. The first and third regimes have high volatility, the second regime have low volatility.

4 Conclusion

The findings of the study have evidence that the daily CDS spreads' of Ireland, Italy, Portugal and Spain those most affected in European Debt Crisis have a nonlinear relationship. These countries CDS markets have got a mutual regime switching behavior. The model MSIH(3)-VAR(2) explain these CDS markets by a three regime switching mechanism and two lags.

Between the 5 years period (2010–2014), Ireland, Italy, Portugal and Spain move together in three regimes called depression, moderate growth and the third regime is expansion. These regimes called econometrically. For instance, if CDS spread is increasing, economically means depression.

In the 5 years period the market is more been in the first (depression) regime. In this regime, the CDS spreads are decreasing and probability is the highest (0.47). The durations of all regimes are very low (1.87–4.64 days) points to the high volatility of the CDS market during the period.

Additionally, the results of the impulse-response tests indicate that (1) the shocks that applied to Italy and Spain are more effective than others, (2) Portugal is the more affected country between all, even though the shocks applied to Portugal do not affect the others', (3) the biggest response to the shocks are in the third regime.

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Does Reputation still Matter to Credit Rating Agencies?

Serkan Cankaya

Abstract The purpose of this study is to analyze and critically review the role of credit rating agencies in financial markets. The remarkable disappointment of top-rated structured finance products in the subprime crisis has placed renewed attention on credit rating agencies. As a result of this development, the ongoing debate about whether market forces provide sufficient control of rating agencies or whether regulation is necessary has been rekindled. The discussion focuses on the argument that the reputation of a credit rating agency is sufficient to discipline them. This essay contributes to this debate by providing a behavioral perspective. The introduction provides a brief historical overview and examines the role of credit rating agencies in financial markets. The second section addresses the role of rating agencies in the subprime crisis by highlighting the conflict of interest problem, ratings quality and regulation. The next section analyzes the effects of US- and EU-based regulations. The main contribution of this paper is made in the last section, which points out the behavioral perspective on credit ratings.

1 Introduction

Some of the most notable institutions in the current global financial system are the credit rating agencies (CRAs). The CRAs possess exceptional power. The source of this power stems from the information they provide to the system. They offer judgment in the form of letter grades which they attach to debt instruments. Credit ratings basically suggest the likelihood of defaulting on a debt instrument. CRAs can declare a corporation or even a government to be "creditworthy" or to be "junk". The key question is "How could they possibly achieve this kind of power?" We might also wonder why we need CRAs, and where and when were they first established?

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In order to answer these questions, we need to take a glimpse into the world's financial history. The roots of the modern financial system go back to 1600s Amsterdam. At the end of the seventeenth century economic and financial power shifted from the Dutch to the English. After that the United States succeeded the English in the nineteenth century. It was not until the twentieth century that we first heard about CRAs. Before the introduction of CRAs, the financial system had managed to perform its operations for centuries. Dun and Bradstreet was one of the first companies to start collecting the credit records of individuals and businesses, in the mid-1800s, but it was not until 1909 that the first publicly available bond rating was announced by John Moody. That the originator of the bond-rating agency was an American should be no surprise, because the corporate bond market can be seen as an American financial innovation which later spread to the rest of the world (Sylla 2002). In 1916, the Standard Statistics Company started assigning ratings, followed by the Fitch Publishing Company in 1924 (Neal 1990).

According to Sylla (2002) three historical developments led to the innovation of agency ratings; the emergence of credit reporting agencies, a specialized financial press and the rise of the investment banker. The need for credit reporting agencies first surfaced during the expansion stage of American businesses around the 1830s. Before that period most transactions took place between individuals who knew each other and was based on mostly trust. Considering the small size and limited number of market participants, these informal channels were satisfactory. The growth in economic activity and the increase in the number of market participants made it impossible to continue with these conventional methods. Credit reporting agencies were established as a result of the demand for extensive information. The second development was the specialized financial press, which included specialized journals containing financial information such as assets, liabilities and the earnings of specific companies. In 1868, Henry Varnum Poor started publishing statistical financial information, targeting railroad industry investors. In 1941, the Poor company merged with Standard Statistics and became Standard & Poor's (S&P). The third group of businesses that effected the creation of CRAs was investment banks. Investment banks played the role of financial intermediaries by underwriting, purchasing and distributing corporate securities. Each time they supported this kind of activity the investment banks put their reputation on risk. As a result of this, they required every kind of operational and financial information possible about the company in question. The possession of this kind of privileged information by investment banks was increasing the cause of complaints from other financial market participants. The result of this pressure was the emergence of agencies such as John Moody's and others which eventually presented publicly available information in the following years.

2 Globalization of CRAs

The CRAs actually did a decent job and built a good reputation until the 1930s. The game changing event occurred in 1936 when the US Office of the Comptroller of the Currency prohibited banks from investing in "speculative investment securities" as determined by "recognized rating manuals" (White, October 2009). The upshot of this was that banks could only invest in bonds which had "investment grade" ratings. The rating scales included the highest rating for Standard and Poor's, and Fitch, (AAA), followed by AA, A, BBB, BB, B, CCC, CC, C and D, with D described as defaulting (Standard & Poor's 2016; Fitch Ratings 2014). For Moody's, the highest rating is Aaa, followed by Aa, A, Baa, Ba, B, Caa, Ca, C. "Investment grade" ratings needed to be BBB or Baa or higher (Moody's, February 2016). The US regulators incorporated CRAs into their regulations. The effect of globalization fueled similar demands from CRAs and they became one of the largest powers in the world. As Thomas Friedman states for Moody's (Friedman 1995):

> *In fact, you could almost say that we live again in a two-superpower world. There is the U.S. and there is Moody's. The U.S. can destroy a country by leveling it with bombs; Moody's can destroy a country by downgrading its bonds.*

According to Partnoy (2002) the rapid growth of CRAs was due to the regulatory change in 1930s, not the quality of ratings. The second wave of regulatory change arrived in 1973 with the Securities and Exchange Commission (SEC), which incorporated credit ratings and designated seven CRAs, including Moody's, S&P and Fitch as nationally recognized statistical rating organizations (NRSROs). In 2003, only Moody's, S&P and Fitch remained after several mergers. This market structure, with only three big participants, became an oligopoly. After a recent SEC resolution, the number of NRSROs has increased to ten (SEC 2012). At this point, one might argue about SEC's intervention regarding the increase in the number of CRAs. Becker and Milbourn (2011) studied the effect of increased competition among CRAs and found that it caused the quality of ratings to decrease, ratings levels to go up, the correlation between ratings and market-implied yields to fall, and the ability of ratings to predict default decline.

Another key issue in the globalization of CRAs is the change in their business model during 1970s. The model that was created by John Moody around 1909 was an "investor pays" model which was based on the payments made by the investors for the information provided by the CRAs. In the 1970s the model changed to an "issuer pays" system where the issuer of a security became the main revenue source. This change in the business model boosted the development of CRAs but also led to a potential conflict of interest problem. The problem was that on one hand the CRAs needed to protect their credibility and the reputation of their credit ratings and remain objective; on the other hand a CRA might be inclined to be sympathetic to keep the issuer rating of the high. A client always has the option to choose another CRA for its business. This incentive conflicts with CRA aim of collecting and assigning objective ratings.

3 Role of Rating Agencies in the Subprime Meltdown

In the subprime mortgage crisis of 2007–2008, the CRAs played a central role with their favorable ratings and by masking the true risk of "structured finance products". When the period prior to the crisis is examined, it can be seen that a typical subprime mortgage backed security (MBS) was assigned the highest rating of AAA, which made these instruments appealing to investors. Actually, the regulatory obligations forced some fund managers to buy highly rated structured financial products. The criticisms of the problem in the credit rating process can be explained in three ways: by the conflict of interest due to the "issuer pays" model, by ratings quality and by the lack of significant regulation.

3.1 Conflict of Interest

One of the key concerns regarding the conflict of CRA interest is associated with the "issuer-pays" model. It is ironic that one of the reasons for the existence of the rating agencies was to help resolve the conflict of interest between the owners of the financial assets (principals) and the asset managers (agents). The idea was to prevent asset managers being tempted to invest in high risk assets and thus cause loss in value. The credit ratings system and the agencies were expected to prohibit asset managers from investing in high risk assets. The system worked for a long time and was constrained by their own reputational concerns, however, rapid structural change and innovation in the financial markets and instruments prompted dramatic change. Traditional instruments such as bonds were issued by both corporate and government debt markets and did not need to work withy sophisticated models. There were fewer issuers for structured finance products such as mortgage-backed securities, but these had high volume and profit margins. The limited number of strong issuers had the ability to switch to other CRAs if they were not happy with their ratings. Twelve underwriters controlled almost 80 % of the CDO and MBS issuance market. According to Mullard (2012) this shift in power from CRAs to the issuers was one of the breaking points and made it more difficult for the CRAs to walk away from a rating. Mullard (2012) also supports the argument of the Congressional Inquiries, which shows analysts were unable to question the quality of a rating and those found to be displeasing by the issuers were replaced by the CRAs. Fracassi et al. (2013) showed that the identity of the credit analysts affects a firm's ratings significantly, at around 30 % of the within variation. The authors claim that this significant variation in credit ratings can be explained by the biases of the analysts. These effects even extend to a firm's outstanding debt and the terms of their new public debt issues. In other words, an optimistic analyst rating might provide more debt issue and decrease the need for more cash and equity finance, compared to a pessimistic analyst rating. The study also reports that the quality of ratings varies with the observable traits of analysts. Analysts with MBAs

and greater experience were found to be less optimistic and make more accurate ratings; however, ratings become more optimistic and less accurate as the tenure covering the firm increases.

Another aspect of conflict of interest is the complexity of the structured products that encourage other revenue generating business channels for CRAs, such as the security design, debt restructuring and market forecasting. Ashcraft et al. (2010) explains that during the MBS market peak between 2005 and mid-2007, the ratings increased substantially, even after the necessary risk adjustments. They also show that the opaque MBSs, which contain loans with low documentation performed worse than the rest of the MBSs. Benmelech and Dlugosz (2010) give a detailed explanation of empirical evidence that shows the impact of "ratings shopping" in the recent 2007–2008 crisis. Skreta and Veldkamp (2009) also note that competition increases "ratings shopping". Bolton et al. (2012) find that competition between CRAs may reduce market efficiency since it facilitates ratings shopping by issuers.

Covitz and Harrison (2003), however, found contradictory results, showing that the CRAs rating decisions were not influenced by the conflict of interest due to the issuer-pay model, and instead found that rating agencies were more responsive to their reputational concerns. Mathis et al. (2009) examined the validity of the argument that reputational concerns were sufficient to discipline rating agencies and found that reputation only works when the majority of a CRA's revenue comes from non-structured finance product ratings.

3.2 Ratings Quality

Another aspect of the problem was the quality of the ratings. Complex structured financial products were quite difficult to model. The criticisms of the quality of ratings mostly focused on flawed rating methodologies, data problems and trouble in retaining qualified staff. In his testimony before the Committee on Oversight and Government reform, Deven Sharma (2008), president of S&P, said "events have demonstrated that the historical data we used and the assumptions we made significantly underestimated the severity of what has actually occurred."

The methodologies and the data used to evaluate complex structured financial products, especially for the home market, had serious insufficiencies. There was no track record for subprime mortgages. Even the history of home price data between 1987 and 2006 was modest compared to corporate debt data, which went back almost a century. Studies by Griffin and Tang (2012) found that methodologies and the data used to rate MBSs were inaccurate and overestimated the quality of assets. The CRA's defense for these critiques was based on the unexpected shocks and declines in real estate markets in the US.

Another aspect of rating quality is the timeliness and accuracy of rating changes. The focus during the post-crisis regulations was especially on the timeliness of rating changes. The argument was that the CRA's reaction to the structured

products information flow was too slow. From the CRA's perspective, however, sudden and massive rating downgrades endanger the efforts of governments, central banks or corporations by decreasing the confidence levels of investors. Reversals in ratings are quite costly due to the regulatory restrictions and transaction costs. Some studies, even prior to the crisis period, showed that the investor's perception of the slow reactions of rating agencies was due to the through-the-cycle methodology they used. This method is based on the measurement of default risk on long investment horizons and only changes when the risk profile is permanent (Altman and Rijken 2004). The accuracy of the ratings is also an important concern for CRAs. Moody's defines accuracy as the correlation between ratings and the risk of defaulting (Cantor and Mann 2006). If a rating agency frequently upgrades or downgrades a particular financial asset, the investors' level of confidence in the asset, and in the accuracy of that agency's forecasting ability, will eventually decrease. Cheng and Neamtiu (2009) found that rating agencies not only improve rating timeliness but also increase rating accuracy. The authors claim that the increased regulatory intervention and reputational concerns force CRAs to improve their methodologies. There is certainly an unavoidable tradeoff between ratings accuracy and stability.

3.3 Regulation

After the 2007–2008 subprime mortgage crisis, the credit rating agencies, which had managed to remain almost unregulated throughout their history, faced regulatory obligations both in the United States and other countries. On 21 July 2010, President Obama signed the Dodd-Frank Act, which contained a subsection titled "Improvements to the Regulation of Credit Rating Agencies". In Europe, a legal framework for credit rating agencies was introduced for the first time by Regulation 1060/2009.The ongoing debate about whether market forces provide sufficient restraints on rating agencies or whether regulation is warranted has been examined in several studies (Schwarcz 2002).

The main argument of opponents of regulating credit rating agencies is based on the reputational concerns of CRAs. The Basle Committee on Banking Supervision (1998) defines reputational risk as "risk of significant negative public opinion that results in a critical loss of funding or customers". Adherents of this view believe that the credit rating agencies will have enough motivation to provide accurate and efficient ratings from the threat that they will lose their reputation and accordingly lose money as well (Choi 1998). Eatwell and Taylor (2000) warn of the potential costs of regulation in general; "*. . .regulation can be expensive and oppressive or even downright wrongheaded. Overly fastidious regulation may result in risks being overpriced and hence will stifle enterprise....A balance needs to be struck. . .*"

The proponents of regulation obviously do not believe that reputation alone can be sufficient to ensure credit rating agencies are more accurate and transparent. Over the past decade, the regulators focused their attention on promoting

competition, increasing transparency and reducing conflict of interest through measures such as forbidding the rating agencies to rate financial products that when they had helped in the structuring process, or forbidding analysts to be involved in fee negotiations (White, Credit-Rating Agencies and the Financial Crisis: Less Regulation of CRAs is a Better Response, 2010). Bolton et al. (2012) argue that regulatory intervention requiring upfront payments for rating services combined with mandatory disclosure of any rating can significantly reduce the conflict of interest between CRAs and issuers. Hunt (2008) has a more profound approach to reputational concerns, and argues that even a well-functioning reputation mechanism would not generate optimum rating quality. The solution to the incentive problem at this point could be corrected by requiring a credit rating agency to return the profits on ratings that are recognized as low quality.

4 The Aftermath of Reforms in the US and EU

In response to the financial crisis, both the United States and European governments have taken a regulative approach and major pieces of legislation have been passed. Reforms on both sides of the Atlantic took several approaches, including greater internal controls, more accessible disclosure of ratings, increased liability for CRAs and more independence for corporate governance. One of the most commonly discussed issues about the Dodd-Frank Act were the procedures dealing with the reduction of conflict of interest in credit rating agencies. Studies by Altman et al. (2011), Coffee (2011) and Marandola and Sinclair (2014) give a detailed analysis of these regulations. This paper aims to address the impact of these regulations on the quality of credit ratings after the regulations.

One of the few solid solutions proposed to the conflict of interest problem resulting from the issuer-pays model is known as the Franken-Wicker Amendment to the Dodd-Frank Act. This amendment was intended to create an independent, self-regulatory credit rating agency review board in which the initial ratings of the issuers are assigned by the board. The assignment process would be based on a CRA's capacity, expertise and track record. The structure of the board would be composed of credit rating agencies, the issuers and at least one independent member. To achieve transparency the amendment requires the assignment methodology to be publicly available. Another important element is that it only covers the initial assignments and does not include non-initial ratings or unsolicited ratings. Last but not least, it is only intended for problematic structured financial products and does not include the government or corporate bond market (Franken and Wicker 2011). Although the amendment received strong support from the Senate, with a 64-35 margin, it did not make it to the final version of the Dodd-Frank Act, although they commissioned the SEC to issue a study of the potential effects of the Board. The study was finally released more than two and a half years after the Act, in December 2012 (SEC 2012). The result mainly comprised more paperwork requirements, targeting the risk management controls of CRA past

performance. Recent US regulation examples include questionable success stories, such as the Sarbanes-Oxley Act of 2002. Despite its challenges, Dyess (2014) argues that the implementation of the Board is a viable solution to the conflict of interest problem and even encourages competition between CRAs.

Dimitrov et al. (2015) analyzed the impact of the Dodd-Frank Act on corporate bond ratings issued by CRAs and found no indication that Dodd-Frank increased the accuracy of the credit ratings. On the contrary, CRAs issue lower ratings, give more false warnings and issue downgrades that are less informative. Regarding the previous discussion about the effect of reputation on informational efficiency, these results suggests that the CRAs became more protective of their reputation in the post-Dodd-Frank period. Another study by Baghai et al. (2014) investigated the corporate bond market over the last 25 years, and showed that rating agencies have become more conservative in corporate bond ratings. The results reveal that the firms that are subject to more conservative ratings will issue less debt, have lower leverage and experience lower growth. Bedendo et al.'s (2016) recent study points out that the regulatory efforts might not have the intended effects on the information efficiency of markets, and investors expect credit rating agencies to rebuild their reputation by increasing rating quality.

Regulation 1060/2009 in the EU is the major legal framework for the regulation of credit rating agencies within the EU. Similar to events in the US, the European Commission's proposal of November 2009 for the amendment of Regulation 1060/2009 was published in the official journal of the European Union on 31 May 2013. The new legislation was mostly aimed at mitigating the risk of overreliance on credit ratings by market participants, reducing the use of credit ratings for regulatory purposes, creating additional disclosure requirements, reducing conflict of interest and enhancing competition. Amtenbrink and Heine (2013) argue that the EU regulatory framework does not succeed in effectively tackling failures in the CRA market. They offer a completely different perspective and claim that in order to fully understand the market failures and how market participants perceive credit rating, one should include insights from behavioral economics.

5 Behavioral Approach to Credit Ratings

The main contribution of this section is to introduce a behavioral perspective to the credit ratings. Reiss (2009) claims that in order to understand the financial crisis we first need to take a step back from the technical approach, listen to our "gut" and focus on the following visceral topics; lying, cheating, stealing, trust, honor and the difference between right and wrong. Walter (2008) gives these topics a more academic and measured name: "reputational risk". For financial markets, and for rating agencies in particular, one of the most important elements of reputation is that it is built on *trust* (Reiss 2009). For rating agencies, reputational harm leads to increased regulation. The question at this point is whether regulators are exempt from systematic psychological biases. Hirshleifer (2008) describes the way

irrationality on the part of participants in the political process impacts regulatory outcomes. He calls this framework the *psychological attraction* approach to regulation, because particular parties advocating increased regulation exploit psychological biases to attract attention and support. He explains the ways individual biases and social processes that may affect regulation through seven concepts:

1. *Salience and Vividness Effects*: As discussed by Hirshleifer (2008) important events and touching stories affect regulatory decisions. There are several recent examples from US financial history; the Sarbanes-Oxley Act of 2002 is a reaction against the Enron and WorldCom scandals. The Dodd-Frank Act of 2010 is no different from the previous examples. Psychological studies show that this phenomenon could be explained by availability bias. According to availability bias, events that are easier to remember or readily available are believed to have a greater possibility of occurring. Salience and vividness are two factors that enhance availability. One of the widely accepted definitions of salience and vividness is made by Nisbett and Ross (1980); *salience* is the tendency that makes a stimuli easy to notice and *vividness* is defined as the emotional interest of information, the concreteness and imaginability of information, and the sensory, spatial and temporal proximity of information. For example, extensive media coverage of the salient erroneous ratings of CRAs after the outbreak of the subprime mortgage crisis and the losses incurred as a result of these ratings helps create a negative perception of CRAs. This kind of effect increases the pressure on policy makers and regulators to impose regulations on CRAs.
2. *Omission Bias:* Ritov and Baron (1990) define omission bias as "the tendency to favor omissions (such as letting someone die) over otherwise equivalent commissions (such as killing someone actively)". Extreme regulations imposed by governments or regulatory authorities to protect unsophisticated investors from CRAs might reduce the efficiency of financial markets.
3. *Scapegoating and Xenophobia:* According to scapegoat theory people tend to direct their anger and blame someone or a specific group for an unpleasant event. Hirshleifer (2008) claims that economic and stock market downturns increase pressure for regulation and gives the Securities Acts of 1933 and 1934 and SOX legislation as examples. The CRAs were scapegoats in the subprime mortgage crisis and the regulatory reaction was the Dodd-Frank Act of 2010. Lannoo (2008) examines the role of credit rating agencies, and whether they were scapegoats or free-riders.
4. *Fairness and Reciprocity Norms:* Hirshleifer (2008) contends that reciprocity, equality and charity are three critical behavioral norms. Reciprocity is the act of mutual giving and receiving. Equality is the equal division of resources. Charity involves actions aimed to relieve stress. In addition to Hirshleifer's three norms, we believe that trust is also a prerequisite, and one of the most important factors, for an efficiently functioning economy.
5. *Overconfidence:* Overconfidence is a bias in which people overestimate their knowledge, ability and their access to information. Hirshleifer (2008) suggests that overconfidence might help explain the excessive activism in regulatory

strategies. Overconfidence manifests itself in other ways in addition to the faulty precision of knowledge. Many people unrealistically believe that their knowledge and skills are *better-than-average*. Regulators believe they are more skilled than the average investor. Another strain of overconfidence is called *illusion of control*, which is based on the notion that people think they have more control over outcomes than they objectively might have. Hirshleifer (2008) argues that illusion of control leads regulators to believe that they are able to avert bubbles and crashes. Schroeder (2015) presents another concern, that embedding ratings within regulations has led to overconfidence in the ability of agencies to accurately assess the risk of default. Shefrin (2009) underlines the importance of *excessive optimism* bias and defines it as the overestimation of the probability of favorable events and underestimation of the probability of unfavorable events. The analysts excessively optimistic ratings of structured products in credit rating agencies could indicate an unrealistically optimistic behavior. Shefrin (2009) also specifies *extrapolation bias*, which basically leads people to develop unwarranted forecasts that recent changes will continue into the future. Extrapolation bias could at least partially explain the analysts' continuing optimistic ratings during the real estate bubble formation period. From a different perspective, extrapolation bias might also clarify the behavior of investors during this period.

6. *Mood Effects and Availability Cascades:* A mood is an emotional state, however, the distinction between emotion and mood is important. An emotion is about something specific, whereas a mood is a general feeling that does not focus on anything particular (Ackert and Deaves 2010). Hirshleifer (2008) suggests that short-term moods even affect judgments and decisions relating to long term prospects. With the development of social media, people are more connected, and it is much easier for them to effect each other's decisions. The effect of mood can also spread to a societal level through informational cascades and might cause support for a belief in greater regulation. Informational cascades has often been considered as a theory characterizing herding behavior, where informed traders ignore their own private signals of information and trade in response to observed trades in the market (Banerjee 1992). Lugo et al. (2015) evaluate how the presence of rating actions and different credit evaluations by a competing CRA affects the timing of downgrades and the likelihood of rating convergence in the aftermath of the subprime crisis. In other words, the study centers on the role of reputation and informational cascades in explaining herding behavior for CRAs. Their results are in line with previous work about the role of reputation in explaining herding behavior among CRAs. In a European Commission public consultation on credit rating agencies (2010) one of the important findings involves the potential for credit ratings to cause herd behavior in investors and debt instruments. Ferri and Morone (2008) experimentally studied the effect of rating agencies on herding in financial markets and found that credit ratings may not prevent the herd behavior of agents. A detailed literature survey of the herd behavior of credit rating agencies can be found in the study by Amtenbrink and Heine (2013).

7. *Ideological Replicators:* Hirshleifer (2008) explains how ideologies—religious, political, and economic—shape financial regulation by word of mouth.

Avgouleas (2009) suggests product complexity, the impact of socio-psychological factors, herding and cognitive biases as the reasons for failure in the 2008 crises. Specifically, availability and representativeness heuristics helped spread overreliance on credit rating agency judgements. Financial regulation is still based on the disclosure model curing market failure, however, a recent promising development is the executive order signed by the US President, Barack Obama, organizing a group called the Social and Behavioral Sciences Team. The team aims to apply insights from behavioral economics in order to design government policies. Section 1c of the executive order underlines the regulatory benefits expected from the behavioral science: "For policies with a regulatory component, agencies are encouraged to combine this behavioral science insights policy directive with their ongoing review of existing significant regulations to identify and reduce regulatory burdens. . ." (Obama 2015).

6 Conclusion

Authorities introduced a wide range of regulatory measures for CRAs in response to the latest financial crisis. Although there is no consensus about the proper action regarding the prevention of future potential market failures, most of the measures focus on direct government regulation. Shefrin (2009) claims that regulation of financial markets is like a dynamic tug-of-war between parties, with differing views of which relative strength shifts from side to side. History tells us that people overreact by pushing government officials and legislators to impose regulations when they are fearful, and that they pull toward libertarianism when they are exuberant (Statman 2009). Beyond this regulatory perspective we need to remember that the financial markets are built on confidence and trust. Hopefully, the use of a behavioral approach to economic and regulatory decisions will improve the quality and effectiveness of future policy decisions. There is no doubt that changing a century-long tradition is challenging, and credit ratings agencies serve an important function within the financial system. However, when we go back to our initial question, "Has the reputation of CRAs been repaired after the latest financial crisis?", the answer is "Not exactly" according to the evidence so far. The next question is "Does reputation still matter to credit rating agencies?". The answer is to this question is "Certainly, yes". The main concern for credit rating agencies is not regulation or government interventions, the only value that matters is the trust of the market participants, which is synonymous with reputation for CRAs. Hopefully, CRAs received the necessary message from the latest crises, otherwise the market and its participants will have to move to a more independent and trustworthy method of credit ratings.

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Price Fluctuations in Econophysics

Tolga Ulusoy

Abstract The object of this research is to produce perspective to deal with the challenge that can surpass boundaries and limitations of scientific acceptance of the theory in social sciences and economics. The main spots of activity in Econophysics has been the financial markets, and having to accept the stock market as a complex network of natural events for physicists by navigating through its terabytes of well-defined time series data. The evidence for the fat-tailed distribution of asset price changes has now been established beyond doubt as a truly universal feature of economic souk. Field of Physics consists of theoretical foundations of several types of research, obtained through multi-disciplined instruction that can help make scientific and objective experiments with reference to predictive facts. As a result of this, the required experiments could administrate in different areas.

1 Introduction

Econophysics—the study of behaviour of Economics—was prescribed by Prof. Stanley in 1997 and formally in 1999 (Mantegna and Stanley 1997, 1999). Basic tools of Econophysics are probabilistic and statistical methods are often taken from physics. Intra-Physics and Economics models that have been applied in chaotic models self-organizing criticality as well as other models developed for earthquake prediction (Mantegna and Stanley 2000). Econophysics has already made a number of important empirical contributions to our understanding of the social and economic world. These fall mainly into the areas of finance and industrial economics, where in each case there is a large amount of reasonably well-defined data. More recently, Econophysics has also begun to tackle other areas of economics where data is in short supply and much less reliable (Gallegati et al. 2006). In addition,

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econophysicists have attempted to apply the theoretical approach of statistical physics to try to understand empirical findings. The philosophy behind the Econophysics perspective will be laid out and assessed. Researchers will think whether it is practically necessary to move to new approaches (Rickles 2007). Econophysics is an evolving enterprise; whatever it is and whoever is doing it is not going to stop in the near future, whatever its longer term evolution (Rosser 2006).

Ecological pressures force physicists out of physics and into complex systems. A good research presumes that you have already thought long the project and have devoted some time and effort in gathering information, reading and organizing your thoughts (Ismail et al. 2011). The approach is to define mottled approaches which are concerned with the way data is collected to react to the proposed research questions further developed herein. The research method has been classified by glancing through approaches adopted by other researcher's analyzed quantitative and estimated qualitative approach. Often quantitative or qualitative method is employed in the same research project, qualitative methods being employed to elaborate or to validate the quantitative dimension of the research.

Following the rise of the Physics formulas for Financial Derivatives, which is closely tied mathematically to path integrals of Gaussian processes, there has been a lot of demand for physicists in the financial industry especially in stock market processes. These processes have made physicists interested in complex phenomena.

2 Literature Review

For many years physicists have been working on breaking the monopoly of economists on financial theories. "Complex structures" theory, depending on the basic rules of physics', has been included in macroeconomics and finance literature. Some theorists argue that as in many other disciplines of fundamental sciences, this theory would be able to explain the structure of nonlinear relationships' under certain conditions in financial analysis. Complex structures are the systems within which many parts interact with each other in coordination; that have many degrees of freedom (that may present many different patterns of behaviour); and usually exchange substance and energy with outside (open), which are very difficult to analyses. How can the components of a stock exchange be compared to the nucleus of an atom? If this question had been asked to an economist in the past, she would have probably answered that it is impossible. However, these issues that have been ignored in the past are now becoming reality and physicists are trying their best to put their preponderance in economics (Gabaix et al. 2007; Plerou et al. 2000, 2003; Stanley et al. 1996, 1999; Stauffer 2000).

In previous years, transitions (from physics to economics) have been provided by quantum mechanics. *(The failure of Newtonian mechanics to explain the events at the microscopic level gave birth to quantum mechanics at the beginning of the 20th century. Newtonian mechanics assumes that, under a specific force, at time t,*

any particle's position, velocity and acceleration can be estimated precisely. Even though in the macro level Newtonian mechanics works very well, when we take our experiments to the microscopic level, it loses its reliability. Quantum mechanics, on the other hand, argues that at a microscopic level a particle's position and velocity cannot be calculated with precision) With the help of these transition studies, physicists started to discover unexplored rules of finance on the one hand, and to evaluate the existing rules in the same framework but with different logical dimensions on the other. They have also gained from these studies in their own field. In his studies on Econophysics, Boston University physicists H. Eugene Stanley focused on behaviours of different molecules and particles in his studies, and argued that the economic studies could gain a solid and ideal ground when economic problems are analysed using these models. "Father of Econophysics" argues that economics is an individual research subject in statistical physics and therefore it is not enough to stay in the realm of economics alone, and it must be supported by other disciplines as well when doing research in this field. In addition, Stanley emphasizes that physicists are acquiring strong mathematics backgrounds while getting physics education; and he thinks that with the help of improving computer technology, individual efforts and education in informatics allows researchers to process large financial datasets very easily. He also manifested that, this in turn allows the physicist to construct models, to create new disciplines combining physics, mathematics and finance; and to simplify and model these disciplines. He added that geophysics, astrophysics and biophysics allowed physicists to create new fields of research by using these tools (Table 1).

The financial institutions in Wall Street have opened their doors to physicists for the last 15 years. Well educated physicists provide services in numerical analyses to at least half of these institutions. Career hunters in New York claim that the number of physicists exceeds the number of economists in this field. Physicists on Wall Street have been after finding modern methods constructed by new transformations to analyse financial instruments that have been studied with traditional methods. In the frontiers of the field, a few physicists have been trying to develop traditional trading elements (Ouellette 1999).

The mutual acknowledgement of physics and economics has been carried to strong academic levels. Physicists affiliated with universities have started to share ideas about specific issues based on certain foundations with their counterparts in the market, while doing research on new research subjects. For example, more than *centum* academic papers on Econophysics are published in physics journals in a year. People in these structures provide a greater invasion of physics in economics compared to its invasion of other disciplines and try to give support with symposiums, conferences and colloquiums. Physics theories used in earthquake predictions as well as turbulence, radioactivity, fractals and the energy levels of nucleus are considered as the most effective issues for explaining the distribution of interest rates and stock prices. The Econophysicist's views of the events are different from classical views. Some econophysicists are still sceptical about their new theories in economics. They are feeling isolated, as they know how economists are approaching to this relatively novel subject.

Table 1 Major studies on econophysics

Author (s) (Date)	Article	Research	Results
Bachelier (1900), Boness (1964), Haberman and Sibbett (1995)	Theorie de la speculation. Annales Scientifiques de l'Ecole Normale Superieure, III-17, 21–86.	Price fluctuations in Paris Bourse	Brownian motion
Mandelbrot and Fama	Mandelbrot and the stable Paretian hypothesis. The journal of business	Fluctuation of prices and universalities in the context of scaling theories, etc	Open the way for the use of a physics approach in Finance, complementary to the widespread mathematical approach
Black and Scholes (1973)	The pricing of options and corporate liabilities. The journal of political economy, 637–654.	Theory of option pricing	Black-Sholes option pricing formula with a Nobel Prize. Uses in derivative markets
Bouchaud and Potters (2000)	Theory of Financial Risks: From Statistical Physics to Risk Management, Cambridge University Press: Cambridge.	Determining financial risks by statistical physics	Theories for a better overall control of financial risks
Mantegna and Stanley (1999)	Introduction to econophysics: correlations and complexity in finance. Cambridge university press.	First uses of concepts from statistical physics in the description of financial systems	The term Econophysics, concepts and the details of Econophysics was met

Bouchaud, argues that not every physicist can be qualified as Econophysicists due to the fact that many physicists are not investigating the economy intensely and are not spending much time to learn about the basics of economics while they are doing economic research (Bouchaud et al. 2004; Bouchaud 2009). He also emphasizes in his speeches that nobody should have a misunderstanding that this newly shaping discipline is easy to deal with. Bouchaud argues that other than the aforementioned studies (lacking the knowledge of economics), should be seen by the economists as deserving consideration. Namely, he claims that econophysicists are improving their studies with every new piece of data they have acquired and moreover, time to time they are trying to use their scarce resources to analyze these data in a computing environment. Bouchaud conducted a study with Stanley and his team in 1998 (Gopikrishnan et al. 1998). The Securities Dealers Automated Quotations) team analyzed *mille* shares quoted in NYSE (New York Stock Exchange) and NASDAQ (National Association of spanning a period of 2 years. All the quotations are noted with the frequency of five minutes and the researchers collected approximately forty million price observations and based their analysis of these. The team became one of the first in this field with the most extensive dataset thus far. In the analysis of *mille* shares recorded with a frequency of five minutes

intervals, Stanley and his team constructed a histogram to follow the results. They concluded that the listing of prices is positively related with the size. They investigated how many of the share prices fall into the predetermined intervals and how prices changed in response to the changing sizes. The shape of the histogram was bell-shaped, and as it is well known, the formed shape gives the researcher the idea of how the random values distributed in his study. The fact that the curve was wide on both sides and that is it was pressed down, is a requirement for normal distribution, and in the traditional approach, normal distribution constitutes the basis for the statistical estimation methods. Stanley and his team are not the only team who are interested in tail statistics and trying to relate it to physics. As mentioned earlier, the researchers at the Econophysics conference in Dublin worked on similar studies and found an opportunity to present their statistics-based estimations to other researchers. When these studies are evaluated, it can be seen that all of them have a strong mathematical background, as Stanley asserts. These studies are used while investigating market behaviour. Besides, as Bouchaud explains in his studies, even though most of the findings change from one market to another, there are some variables and findings that remain unchanged across countries and markets. One can conclude from here that findings from studies concerning different markets in the world stock exchanges can be evaluated on the same basis. It is emphasizes that, in all of the articles in this field, the results inferred by the econophysicists can actually enlighten the researchers whose main professions finance, and if research is done, especially in the subject of risk management, which is the most difficult to reach conclusions on, these results can produce more effective results. The main approach here is related with the dynamics of normal distribution in statistics. Basically econophysicists share each other's' views and they agree on the idea of how to produce revolutionary studies on risk estimation techniques. Also, they note how important it is to be open to new ideas, and how some researchers ride on side issues by spending their time and effort with fruitless data because of the fact that they do not attach importance to the existing studies (Baker 1999).

3 The Microscopic Environment and System Entropy

When observing the workings of world markets, the shared attribute is that they mostly have the same dynamics. The price of a financial instrument in the market is based on the data and information available to the public and reflects the joint relationship reached among those buying and selling the related instrument. When there is new numerical data and verbal information introduced into the environment, they are analyzed by the buyers, the sellers and the individuals called intermediaries. Interpretations and points of reconciliation, on the other hand, lead to a new market price for the related instrument. This price is reviewed in the following stage and maintains itself until decision-making processes act on it, or until new price equilibriums are formed. The individuals and legal entities who buy

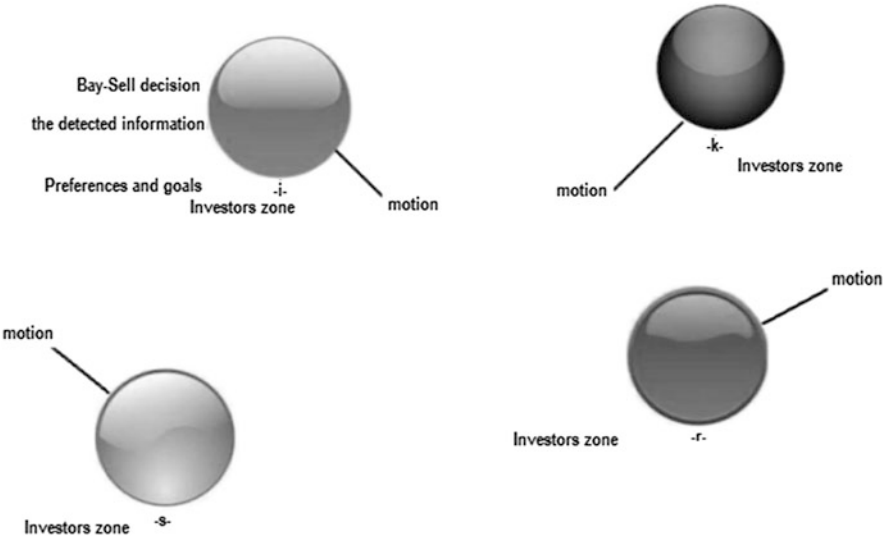

Fig. 1 Investors container

and sell financial instruments and shares within an environment that operates as such are considered to be the main components of what is termed a microscopic environment. The organized form a specialized market where a specific number of investors operate is considered to be a market micro-structure. In a micro-structure, the similarities and differences in the decision making processes of investors, as well as in the interpretation of information, and the capacity investor groups have for acquiring and interpreting information, are evaluated in context and emerge as variables (Fig. 1).

The segmentation of the risks, which need to be tolerated by investors, and the movements, in time slices, in turn lead to the diversity of movements within the micro-structure. This brings to mind such concepts as heat and entropy, used in physics. There is one point for which attention must be paid within our studies overall. During microscopic observations being performed with the model, molecules are treated as investors and energized investments, and the environment in which fundamental Econophysics experiments are conducted is termed the financial container. The above sections discussed in detail the theory of entropy. Entropy, a measure of the disorder of a system, is a fundamental and the most significant measure of the microscopic system, along with heat. Entropy is such a physical concept within an internal system that for disciplines with separate financial containers, separate definitions of entropy are required, such as thermodynamic entropy and financial entropy. As the irregularity of a financial system increases, so does entropy. Consider another example where in the financial container any amount of investors, investments and portfolios exist. Then consider that placing a drop of newly issued stock shares into this container to observe the outcome. Then try to imagine what is taking place inside. The newly issued stock molecules

(shares), after initially holding together briefly, will start to disperse through the existing portfolio, and spread around in various directions by the "investor, investment and portfolio" molecules that collide with them.

Assume that all possible states can be enumerated. The given state of the system means a configuration where a molecule has a specific coordinate and a specific velocity, and indeed, a certain elevation and acceleration, and another molecule has yet other specific coordinate and velocity. As in the example for the supplied molecules, the high number of such cases is obvious. However, the majority of these correspond to disorder, that is, to situations with high entropy, where the supplied stock share molecules spread randomly within the container. These are all homogeneous cases, as when the mixture is observed, the supplied stock shares, without regard for where the molecules are positioned, spread with the highest probability within the homogeneity of the market. That is, an exceptionally high number of diverse microscopic states transform into a single macroscopic (i.e. homogeneous) state. In the end, the known laws of physics at the microscopic level are sufficient, in principle, to understand macroscopic systems, using the microscopic infrastructure. To be able to understand macroscopic systems with multiple particles in such states, and to decipher their complex structures, new concepts must be generated. These concepts, which will have to abide by the fundamental laws of microscopic physics, must have the following properties:

- They must reveal the parameters that can provide an explanation for macroscopic systems.
- They must be able to state the fundamental properties and the orderly structure of the said systems.
- Finally, they must be able to provide sufficiently systematic methods that will allow us to be able to specify the numerical properties of such systems.

In fact, this is the reason why the shares spread each time newly issued shares are dropped into the container. The abundance of microscopic states that correspond to a homogeneous macroscopic state increase its probability, as statistical laws of physics indicate that the probability of a macroscopic state is proportional to the microscopic states to which it corresponds. However, the probability that the existing portfolio molecules will reform the new issue into a drop, or to gather the new issue into a corner, while being very close to zero, is not exactly zero. This is only possible in cases where the molecules possess very special velocity and coordinates, and the number of such cases is next to nothing, with their creation under effective market conditions not being probable.

4 The Macroscopic Environment

The Second Law of Thermodynamics states that all systems in the universe left to their own accord under natural conditions will in time tend towards disorder, disorganization and decay. It is known that the transition of a system from an

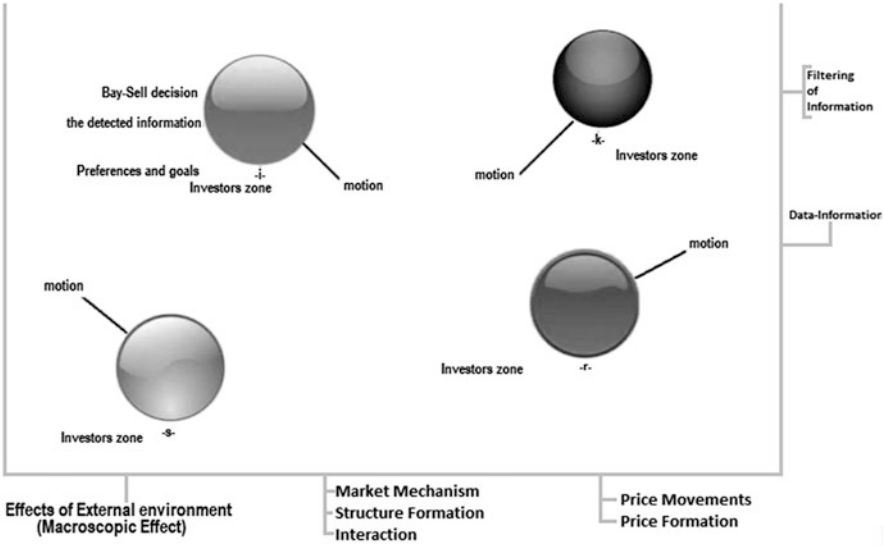

Fig. 2 Financial container

orderly, organized and planned state to a disorderly, disorganized and non-planned state increases that system's entropy, and that in the case of the rise of disorder in a system, that system's entropy will also increase. This is frequently encountered all through life if an article is placed in storage, and its condition is checked several years later, it will be observed that it has aged, and indeed languished. It is evident for rooms left to their own accord to become disorganized and disorderly with each passing day. The only method for reversing the process is through intervention to the disorder without fail. Such general interventions lead us to what is called the macroscopic environment. This in turn is called, as a generalized expression, the financial universe, or in other words, the financial container (Fig. 2).

When emphasized with respect to the similarities with laws of physics, instead of describing the financial universe as a mass that is closed to all intervention, as is the case for the universe, it would not be incorrect to state that at the macroscopic level, there is an obvious order and that there are laws. So much so that the laws of the financial universe itself may be inclined to disrupt this order. Examining the market as such, environmental factors formed at the macroscopic level can be listed as follows: economic factors, political conditions, market psychology, economic policy, and governmental fiscal policy. The previously listed are the determining factors. Other environmental factors include: the impact of dividends, long-term trends, value of exchange rates, the banking sector, asset prices, commodity prices, interest rates, weather, and earthquakes. It is known that these variables individually affect not only stock markets but also US interests, repo interests, bond prices, and currency and gold prices. The ascents and descents that constitute the market

movements as described above, as well as variables such as repos, bonds, currency, gold, have effects on the financial environment. These movements and variables affect the temperature of the financial container and therefore determine variables for its entropy.

5 The Statistical Foundations of Model

The great complexity of financial prediction problems has provided the opportunity to use mathematical and statistical solution techniques in order to solve these problems. However, these techniques are not sufficient in themselves for providing solutions, necessitating the use of models that can be solved by computers. All simulation models follow the same sequence encountered in mathematical models. The modelings are not only based on mathematical equations, but also on trial-and-error. The intention is to allow for computers to gain by trial-and-error the ability to solve these problems correctly.

However, it is first necessary to analyze the different types of particle statistics that form the basis of a macroscopic system. First of all, before moving on to the relevant sections, it will be helpful to provide a brief description as to why certain definitions are used and how they are distinct from one another. It can be said that there are essentially three types of particles that form the basis of Quantum. This has allowed for the development of three types of statistical approaches, along with their relevant calculation techniques. The statistical foundations and definitions for these particles differ from one another according to the particles' behavior in occupying energy levels. For this reason, the concept of energy levels will first be briefly described in this section, and definitions regarding the various types of particle distribution will later be provided (Fig. 3).

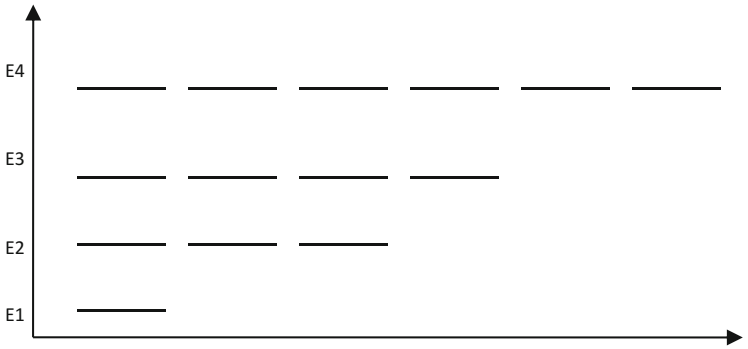

Fig. 3 The energy levels a particle can occupy

5.1 The Varieties of Particles in Microscopic Contexts

Within the realm of statistical physics, the principal feature of macroscopic systems in equilibrium is the most probable random distribution observed in the energy states of particles that constitute the system. Under these circumstances, the first problem that needs to be addressed is the condition under which the particles will distribute to the various energy states and how these distributions will occur.

As mentioned earlier, the most probable random distribution of any system of particles also determines the macroscopic state of that system. A macroscopic state is actually constituted of numerous microscopic states. As a definition, the "statistical weight" of a macroscopic state is the number of equal probability microscopic states that correspond to any given macroscopic state of the system.

Now let us take into account the basic principles that need to be considered when demonstrating the statistical weight, which is also frequently referred to as the thermodynamic probability. To perform this, let us consider the four energy levels designated by ε_1, ε_2, ε_3 and ε_4, as shown in the figure. The energy level of each energy state is shown by horizontal lines. For example, ε_1, which reflects the base energy level, has a single layer, the ε_2 energy level has three layers, the ε_3 energy level has 4 layers and the ε_4 energy level has five layers that are all overlapping. In other words, the energy ε_1 level has one, the ε_2 energy level has three, ε_3 energy level has four, and ε_4 energy level has five energy states.

Let us assume that we are attempting to place only 16 out of a total of N identical particles at these energy levels. Without taking into account the distinguishable or indistinguishable features of these particles, there are undoubtedly numerous ways in which these 16 particles can occupy these energy levels. One way to achieve this is demonstrated in the figure below. This figure reflects the random collection of 16 particles from a N number of particles, and the distribution of these particles between the energy states. In this case, the macroscopic state of the system is determined by the set of the number of particles sent to each energy level. That is to say, ($N_1 = 4$, $N_2 = 4$, $N_3 = 5$, $N_4 = 3$) reflects the macroscopic state of this system, and it can be said that there are four particles at energy ε_1, four particles at energy ε_2, five particles at energy ε_3, and three particles at energy level ε_4 (Fig. 4).

As shown in the figure above, in a system of indistinguishable particles, these are the microscopic states that correspond to the macroscopic state.

There are four particles at the ε_1 energy level. At the ε_2 energy level, there are two particles at state 1 and one particle in each one of states 2 and 3. At the ε_3 energy level, there are two particles at states 1 and 3, and one particle at state 4. State 2 is unoccupied. At the ε_4 energy level; there is one particle in each one of states 1, 2 and 5, and states 3 and 4 are unoccupied. To be able to identify the microscopic states when the particles are distinguishable, it is necessary to determine which particle was sent to which energy state, in addition to determining the total number of particles sent to the energy states. One way to achieve this is to designate the particles with letters such as a, b, c, in a manner similar to designating

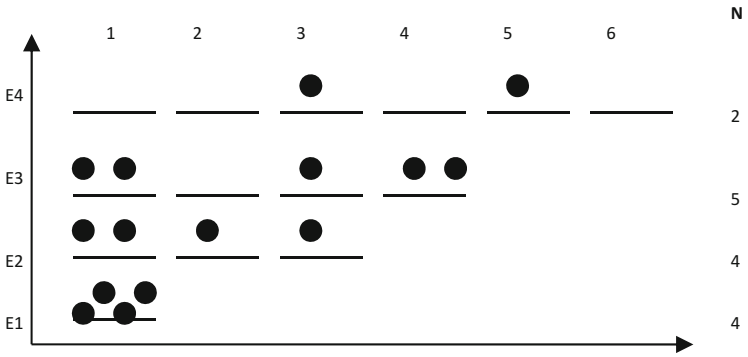

Fig. 4 Energy level positions of indistinguishable particles

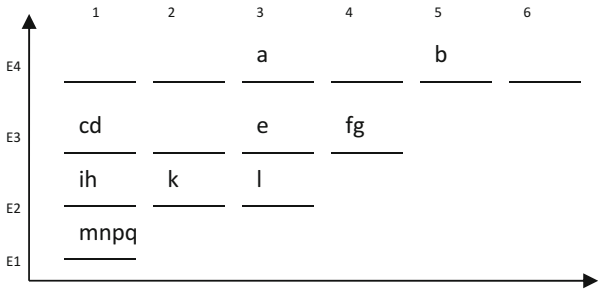

Fig. 5 Energy state positions of distinguishable particles

the energy states by numbering them as 1, 2, 3. Accordingly, the energy state positions of 16 distinguishable particles will take place as follows (Fig. 5).

According to the figure above, at the ε_4 energy level, particle a occupies the energy state 1, particle b occupies the energy state 2, and particle c occupies the energy state 5. The energy states 3 and 4 are unoccupied.

Following these observation, we can categorize the particles that constitute a macroscopic system into three different groups:

Maxwell-Boltzmann Particles: These particles are distinguishable. There are no constraints to the number of particles that can occupy any given level or state of energy.

Bose-Einstein Particles: These particles known as boson are indistinguishable particles. Similar to Maxwell-Boltzmann particles, there are no constraints to the number of particles that can occupy any given level or state of energy.

Fermi-Dirac Particles: These particles known as fermions are indistinguishable like bosons. However, unlike bosons, it is not possible for more than one fermion to occupy an energy state.

5.2 Volatility and Effects of Financial Temperature

Although it is a proved fact that physics and money have many common points, the point of departure can be considered in this way: When management of money is considered as a physical test, both requires involving with equations and numbers. Physics is based on developing some physical events in the world utilizing mathematical equations. Scientists have worked on how to implement the models developed on physics to "financial world" during recent years and they are focused on how to adapt some mathematical models obtained in "molecular world" to financial literature. Models are created utilizing processes where random results are formed and some research are carried on pricing of financial instruments, future movements of money and capital markets, trend of market and starting from there researches efforts are made to make it possible to utilize these results by investors to reach profitable investment strategies (Ulusoy and Dönmez 2016).

The main phenomenon on the center of investment is the valuation of the exchange of financial assets and their prices and the management of the risks of these. Risk is distributed between the person and institute carrying the trade of the subject asset in an optimum manner. The scientists engaged in physics are stepping in this matter making calculations on possible interest rates and prices of future. Division of risks and movements that investors should bear to time slots is clarifying the variety of the movements within micro structure. This is reminding the concepts like temperature used in physics. While microscopic observations are carried in physical models the molecules are considered as investors and energetic investments, the environments where main Econophysics tests are called as "financial vessel". Temperature is such a physical concept within internal system that separate temperature definitions are made in disciplines formed from separate financial vessels, for instance, thermodynamic temperature, financial temperature and so on. Let's think that all possible conditions can be counted. The thing to be understood when talking on a condition of system is the configuration where a molecule has a certain coordinate and speed while another molecule has another certain coordinate and speed.

Any of calendar time stock's returns of volatility denoted by is multiplied by square-root of stock's trading frequency. This brings us the notion temperature of stock denoted by (Derman 2002; Ulusoy and Dönmez 2016).

$$Xixi = \pi i\sqrt{\delta i} \tag{1}$$

The right side of this equality denotes multiplication of calendar time volatility with trading frequency. This multiplication shows a stocks temperature. Furthermore, in this research an assumption is thrown out for consideration under this formula if we can take a calendar time hypothesis with calculation of formula as a temperature of stock market using volatilities; will the results be significant? This is providing that trading times of stock market are taken out to be firstly; within a basis of daytime and secondly; stock market trading frequency is discussed as a

normalized volume of stock market. Will it be possible for the research to give out significant results? (Derman 2002; Ulusoy and Donmez 2014).

In addition to this; the investor buys significant amount of securities from the market corresponds negative temperature while the homogenous structure formed by inability of investors to hold significant portion of any share corresponds to positive temperature. Under separation of temperature formula, we have two parts. The one is calculation of volatility of calendar time returns of index, the other one is production of trading frequency of stock market. Assumptions under a number of investors are constant, during the specific time t, every investor of financial system denoted by i has a $W(t)$ variable, which is accreted or alleviated the investor wealth. Then cumulative wealth or in other words direction factor in market players' investments is built up denoted by variable.

$$W(t) = \sum_{i=1}^{n} W_i(t) \tag{2}$$

During changeovers from t_0 to t_1, each investor's wealth wealth changes from $W_i(t) \rightarrow W_i(t+1)$ (Ulusoy and Dönmez 2016). From this point every investor has $W(t)$ variable in fact, even if an economic coefficient such as the growth rate, taxes, social yields and interest rates, which is the same for each $W_i(t)$ is at work. During these transitions, they have been excluded from the study. If the value $W_i(t)$ which represents the increases and decreases statistically is considered as index value in the study, then market yield over t time will be $r(t) = \ln\left(W_{(t+1)}/W_{(t)}\right)$ Variation of W within each trading time range is very small. Then, the volatility will be:

$$\text{Volatilitiy} = \left[\ln\frac{W_{(t+1)}}{W_{(t)}}\right]^2 /N \tag{3}$$

When one takes the average of squares of yields over a certain time range and if it is considered as N step and transition step is taken as $N = 1$, a new calculation formula of volatility will be

$$\text{Volatilitiy} = \left[\ln\frac{W_{(t+1)}}{W_{(t)}}\right]^2 \tag{4}$$

Constitute the basics of calculation; temperature formula has been formed as two parts. If one rewrites the volatility of calendar time returns, the first one of the two parts of temperature formula which is subject to the calculation, then the outcome is

$$\text{Volatilitiy} = \left[\ln\frac{\text{Index\_Value}_{(t+1)}}{\text{Index\_Value}_{(t)}}\right]^2 \tag{5}$$

We need for a variable called trading frequency of market in the section which constitutes for the secondary part in calculation of temperature. According to intrinsic time hypothesis, trading frequency means the number of trades through which related stocks pass over a certain time period. According to calendar time hypothesis on the other hand; it means trades experienced within a certain session since calendar time hypothesis constitutes for the basis of the assessment here.

$$\text{Trading Frequency of Market}_{t+1} = \sqrt{\text{Market\_Volume}_{t+1}} \tag{6}$$

To sum up, temperature of the market during $t + 1$ time, λ_{t+1}, will be

$$\text{Temperature of the market} = \lambda_{t+1} = \left[\ln \frac{\text{Index\_Value}_{(t+1)}}{\text{Index\_Value}_{(t)}}\right]^2 \text{x} \sqrt{\text{Market\_Volume}_{t+1}} \tag{7}$$

Like human beings and other substances, assets traded in financial markets have also a life-span. Forward movement of assets, i.e. towards a positive direction or their backward movement that is in a negative direction, can account for these life-spans. When physical temperature is applied to equity market, it proves an indicator of the fact that movement of a financial instrument in one direction has ended and goes towards another direction (Ulusoy and Dönmez 2011).

6 Conclusion

The stock purchase and sale event in Financial Systems is defined as a "*bosonic system*" with partially consistent and partially random properties. Entropy calculations are performed accordingly. The statistical distributions above were developed according to two fundamental properties.

- The individual investor endeavors to act in unison with the other investors, and demonstrates behavior that is in parallel with the large majority of investors in the market.
- Regardless of the circumstances, the individual investor endeavors to maximize profits, rather than minimizing losses.

It was demonstrated that molecules receiving energy above a certain level emitted vibrations in a collective way. These molecules continue to assume such behavior until they attain the most ordered and condensed state possible. The most important aspect of the Bose-Einstein Condensate is the fact that the parts which constitute the system not only behave as a single entity, but actually "*form a single entity*." The particles coalesce in such a manner that they entirely lose their individual identities. It is possible to draw a parallel between the condensate and the market player who is constantly motivated to make a profit.

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Forecasting Emerging Market Volatility in Crisis Period: Comparing Traditional GARCH with High-Frequency Based Models

Abdullah Yalaman and Shabir A.A. Saleem

Abstract This chapter discusses the topic of modeling and forecasting volatility in emerging market and presents the strength and weakness of the several high-frequency based approaches available in the literature. We compare the forecasting performance of traditional GARCH with high-frequency based models namely, HAR-RV, HAR-RV-J, and HAR-RV-CJ under the financial crisis and non-financial crisis periods. We extend our study scope by focusing not only on general market index BIST-30, but also on each constituent of market index. Our empirical results indicate that the global financial crisis does not affect the forecasting performance of the models in emerging markets. All high-frequency based volatility forecasting models perform better than the traditional ARCH-class models in both non-crisis and crisis periods. We conclude our paper with the statement that high-frequency based models do not affect the structural break in the underlying process. The best outperforming model among the high-frequency based volatility models for both stable and turmoil period is HAR-RV-CJ model. The empirical findings for the individual stocks are consistent with the general market index ISE-30.

1 Introduction

Modeling and forecasting volatility in both developed and emerging market received a lot of attention of practitioners and academics throughout many years. There are many academic works concentrate on the forecasting performance of

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different volatility models (e.g., Andersen and Bollerslev 1998a, b; Patton 2011; Hansen and Lunde 2006). A good forecast of the volatility is important for investment decisions, asset allocation, securities pricing, monetary policy making and risk management (Poon and Granger 2003).

According to Engle and Patton (2001, p. 238): "*A risk manager must know today the likelihood that his portfolio will decline in the future. An option trader will want to know the volatility that can be expected over the future life of the contract. To hedge this contract he will also want to know how volatile this forecast volatility is. A portfolio manager may want to sell a stock or a portfolio before it becomes too volatile. A market maker may want to set the bid ask spread wider when the future is believed to be more volatile*."

The simplest method to forecast volatility is to use historical standard deviation, however, throughout the time, many developments been taken place on volatility measurement and a lot of advanced volatility models have been introduced. After stating the importance of volatility, it is worthful to discuss how to model and forecast volatility. The commonly known ways to model and forecast the volatility rely on ARCH-class models; however, those models have poor out-of-sample forecasting performance despite good fitting performance (Andersen and Bollerslev 1998a, b). Recent advances in high frequency literature make it possible to model volatility in a new way not been previously undertaken. The new approach, so-called realized volatility allows us to model volatility directly rather than depending on parameter estimation. It is possible to model volatility as an observable variable through the summing the squared intraday returns (Andersen and Bollerslev 1998a, b). Moreover, volatility can be split into continuities and discontinuities. We can use any of volatility components that contribute to our forecasting performance. Andersen and Bollerslev (1998a, b) reported that usage of high frequency data increase the forecasting ability of volatility models in developed countries. So far no such certification is reported for emerging countries.

The paper fills the gap in the literature by discussing the topic of modeling and forecasting volatility in emerging economies. We compare the strong points and limitation of the high-frequency based approaches (HAR-RV, HAR-RV-J, HAR-RV-CJ) with traditional volatility models (ARCH and GARCH). Our study differs from previous studies by focusing on individual stocks in addition to the aggregate market index. We do comparison between the forecasting ability of these volatility models over the non-crisis and crisis periods aiming to determine which model perform better in turmoil period. To assess the forecasting performance of these models, RMSE and realized volatility are our chosen loss function and volatility proxy respectively (see Patton 2011; Diebold and Mariano 2012; West 1996). Our findings indicate that high-frequency based models make superior forecasts over traditional GARCH models in both non-crisis and crisis period. The best performing volatility forecasting model among the other high frequency based volatility models for both related sub periods is HAR-RV-CJ model. According to our findings, the global financial crisis does not affect the forecasting performance in emerging markets. The high-frequency based models do not affect

the structural break in the underlying process. Furthermore our findings for individual stocks are consistent with the findings for general market index.

The rest of the chapter is designed as followings: In Sect. 2, we discuss the summary of literature and present the developments in volatility modeling. The importance of using high-frequency financial data in volatility modeling is also discussed in this section. Followed by Sect. 3 theoretical framework where we discuss the theories pursued in our study. In Sect. 4, we present the models we use to forecast the stock prices and Sect. 5 offers and discusses our empirical findings. Section 6 summarizes the paper and concludes our empirical findings.

2 Summary of Literature

2.1 Developments of Volatility Models Advantage of High-Frequency Based Models

In finance, volatility plays an important role in determining the risky asset. Valuation of any asset involves measuring the riskiness of its future payoffs. The talent in precisely pricing securities, derivatives, and hedging stems from the ability to forecast volatility from available information. With the availability of increasingly shorter horizons data over the time, volatility modeling and volatility forecasting start to play important role in finance, especially in field of asset pricing, asset allocation and risk measurement.

Engle's autoregressive conditional heteroskedasticity model (ARCH) is the first to extract time-varying volatility process from financial returns data Engle (1982). Later Bollerslev (1986) improved ARCH model and introduced the so-called generalized autoregressive conditional heteroskedasticity (GARCH). ARCH model is simply generalized through allowing for the long-term volatility into the model. The afterward volatility models are mostly considered as variants of GARCH models. In early days, ARCH, GARCH and Taylor's stochastic volatility (SV) were the dominant approaches to model the volatility. With the emerging of new high-frequency based volatility models, they lost their popularity but still significantly used in forecasting volatility (Ma et al. 2014). To overcome the weakness of ARCH and GARCH and SV models at that time and make them compile with different conditions, scholars extended new version of these models, i.e. EGARCH (Nelson 1991), NGARCH (Engle and Ng 1993), APARCH (Ding et al. 1993), TGARCH (Zakoian 1994), QGARCH (Sentana 1995), FIAPARCH (Tse 1998), COGARCH (Klüppelberg et al. 2004) HYGARCH (Davidson 2012) and so forth. Nevertheless, the issue of only performing with low-frequency still remains. Volatility is latent and not directly observable like prices or volume. GARCH model depends on specific parameterizations and distributional assumptions. When an assumption is invalid, it is unclear how robust. Moreover, GARCH

and SV models and their extended models are based on low-frequency data, especially, daily data to characterize and forecast future conditional volatility.

With the accessibility to high-frequency data over the time, scholars started to think about model volatility with new techniques compiling with high frequency data (Andersen et al. 2001; Barndorff-Nielsen and Shephard 2002). One of their tireless efforts outcomes was the so-called realized volatility (RV), the squared intraday returns' sum. Andersen et al. (2001) and (2003) are first to proposed RV. They stated that realized volatility is an efficient and unbiased estimator of integrated variance under suitable conditions such as no microstructure noise and jump. Barndorff-Nielsen and Shephard (2002) also gave the same statement in concurrent work.

Soon later, Barndorff-Nielsen and Shephard (2004) came up with a new volatility associated estimator called Realized bipower variation (BV). BV as defined in Liu and Maheu (2005) is a consistent estimate of integrated volatility. It draws a range of estimators that are constructed of the sum of powers of the absolute value of high frequency return, $|r_t|p$, $p > 0$. Many academicians emphasize that BV can increase the forecasting ability of volatility because of containing the absolute value of returns. The absolute values are less sensitive to big fluctuations in prices. Furthermore, Ding et al. (1993) evidence that the absolute value of returns compare to the squared returns shows greater persistence. The absolute value of high frequency returns increase the forecasting performance of lower frequency realized volatility (Ghysels et al. 2006).

Andersen et al. (2003), Koopman et al. (2005) use realized volatility to build the so-called Autoregressive Fractionally Integrated Moving Average-Realized Volatility (ARFIMA-RV). ARFIMA-RV model is expected to capture the realized volatility's long memory. Studies indicate that ARFIMA-RV shows superior performance in term of predication to the low-frequency data volatility models (GARCH and SV). However, the economic explanation is missing in the fractional integrated model. Moreover, it was required to build a fractional difference filter that would lead to losses of a large number of observations Corsi (2009). Due to abovementioned problems with ARFIMA-RV model, Corsi (2009) propose a simple Heterogeneous Autoregressive model of Realized Volatility (HAR-RV) which is an autoregressive form of the volatilities realized on different time intervals. The new HAR-RV model not only solved the problems of ARFIMA-RV, but also outstandingly reproduced the typical characteristics of financial return series, i.e. long memory, fat tails. The economic interpretation of HAR-RV stems from the Heterogeneous Market Hypothesis of Müller et al. (1993). HAR-RV received more attention of researchers and continued studying it in depth. Andersen et al. (2003) realized that incorporation of the discontinuities to volatility models improves the forecasting ability of models so they disentangle the realized volatility into continuous components and discontinuities-jumps and employed the HAR-RV-J by inserting discontinuity jump component into HAR-RV model. Becker et al. (2009) employed the same S&P 500 sample of Becker et al. (2007) after allowing the jump component of underlying asset, his previously finding overturned

indicating that allowing jumps to volatility models increases the forecasting ability of volatility models. Andersen et al. (2007) went further by inserting discontinuity (jump) and continuity individually in HAR-RV model and introduced the so-call HAR-RV-CJ model. They concluded that the predictability of volatility is derived mainly from the continuous component. Haugom et al. (2010) also stated that the involvement of both continuous component and discontinuous jump component of the total variation into HAR-RV improves the forecasting performance of HAR-RV-CJ model.

Recently, Chan et al. (2008) in their study compare the forecasting performance of EGARCH with high-frequency HAR-RV-CJ model. They employ HAR-RV model with the continuous Brownian motion and the jumps to forecast one-day ahead price volatility. Their findings do not presented any strong evidence suggesting that HAR-RV-CJ better performance over the EGARCH model, which opposes the findings by Haugom et al. (2010) who compare the volatility prediction performance of GARCH and HAR-RV-CJ for day ahead forecasting of forward prices. Moreover, Zhou and Zhu (2012) also employ RV model with both continuous Brownian motion and the jumps using 5-min interval of returns for a sample of 47 Chinese stocks, three stock indices, and a government bond index. They concluded that the HAR-RV-J and HAR-RV-CJ models continuously outperform the HAR and HAR-RV models.

In this chapter we compare the volatility forecasting performance of traditional ARCH models (ARCH or GARCH) with high frequency models for both general market index and each constituent of the index in spot stock markets. Based on our empirical results, we introduce the most outperforming volatility forecasting model.

2.2 Advantage of High-Frequency Based Models

High frequency data is used to facilitate and improve the estimation of stochastic volatility. A lot of researches certifies that the realized volatility is estimated more precisely with intraday returns than with daily returns (Liu et al. 2015). Moreover, high-frequency intraday data holds important information useful for forecasting daily volatility. Hence, high-frequency intraday data improves the performance of forecasting models (Andersen et al. 2001). Many researchers have extended their hand to introduce new volatility estimators that compile with high-frequency data (Andersen et al. 2001; Barndorff-Nielsen and Shephard 2002). Some argues that theoretically the realized volatility estimates should be free from error measurement as the sampling frequency of the returns approaches infinity.

3 Theoretical Framework

The price of an individual asset can be described by a semimartingale process (Barndorff-Nielsen and Shephard 2006; Aït-Sahalia and Jacod 2010).

$$dX_t = \mu_t dt + \sigma_t dW_t + JUMPS_t \tag{1}$$

where dX_t denotes logarithmic price, $\mu_t dt$ is a continuous component which is consists of locally bounded sample paths, σ_t is positive and càdlàg stochastic volatility and W_t is independent standard Brownian motions. $JUMPS_t$ is a discontinuous component.

Let discretely sampled be $\Delta - period$. One period returns be denoted by $r_{t,\Delta} = p(t) - p(t-\Delta)$. Following Andersen et al. 2007, we normalize the daily time interval to unity and label the corresponding discretely sampled daily returns by a single time subscript, $r_{t+1} \equiv r_{t+1,1}$ for ease of notation. The standard definition of *the realized volatility* is summing the related $1/\Delta$ high-frequency intraday squared returns as follows:

$$RV_{t+1} = \sum_{j=1}^{\frac{1}{\Delta} r^2_{t+j.\Delta,\Delta}} \tag{2}$$

and the standardized realized *bi-power variation* (henceforth: BV) is defined as:

$$BV_{t+1}(\Delta) = \mu_1^{-2} \sum_{j=2}^{1/\Delta} \left| r_{t+j.\Delta,\Delta} \right| \left| r_{t+j-1.\Delta,\Delta} \right| \tag{3}$$

where $\mu_1 = \frac{\sqrt{2}}{\pi} = E(|Z|)$ denotes the mean of the absolute value of standard normally distributed random variable, Z. $\mu_p \equiv 2^{\frac{p}{2}} \left(\frac{\Gamma\left(\frac{p+1}{2}\right)}{\Gamma\left(\frac{1}{2}\right)} \right) = E(|Z|^p), Z \sim N(0,1), 0 < 0 < 2.$

The realized volatility is the total of both continuous and jump components. Thus the jump component is consistently estimated by

$$RV_{t+1}(\Delta) - BV_{t+1}(\Delta) \rightarrow J_{t+1}(\Delta) \tag{4}$$

Following Barndorff-Nielsen and Shephard (2004), we truncate the actual measurements at zero,

$$J_{t+1}(\Delta) = \max[RV_{t+1}(\Delta) - BV_{t+1}(\Delta), 0] \tag{5}$$

4 Methodology

The aims of this study is to forecast volatility using both traditional volatility models namely ARCH or GARCH and high-frequency based models namely, HAR-RV, HAR-RV-J, and HAR-RV-CJ. In this section we discuss each model briefly as follow.

4.1 Traditional GARCH Model

Following the same notation with Reider (2009), we first briefly introduce traditional volatility models. The first and the simplest conditional volatility model is an ARCH model which stands for Autoregressive Conditional Heteroscedasticity. The next period's volatility is conditional on information of this period.

$$y_i = \alpha + \beta x_i + \epsilon_i$$

Homoscedasticity occurs when the variance of residuals, ϵ_i is constant, and we use ordinary least squares to estimate α andβ. On the other hands, heteroscedasticity occurs when the variance of the residuals is not constant and we use weighted least squares to estimate the regression coefficients. Suppose return on an asset is

$$r_t = \mu + \sigma_t \epsilon_t \tag{6}$$

where ϵ_t is a sequence of N(0,1) i.i.d. random variables. Suppose the residual return at time $r_t - \mu$, is

$$a_t = \sigma_t \epsilon_t \tag{7}$$

In Engle (1982) ARCH model is,

$$\sigma_t^2 = a_0 + \alpha_1 a_{t-1}^2 \tag{8}$$

where $a_0 > 0$, and $a_1 > 0$ to ensure positive variance and $a_1 < 1$ for stationarity.

Generalized ARCH model is formulated as follows (Bollerslev 1986). In a GARCH(p,q) model,

$$\sigma_t^2 = \alpha_0 + \sum_{i=1}^{q} \alpha_i a_{t-1}^2 + \sum_{j=1}^{p} \beta_j \sigma^{t-j^2} \tag{9}$$

where $\alpha_0 \geq 0$, q and p > 0, $\alpha_1 \geq 0 \; \forall_i \geq 1$, $i = 1,.,.,.$p, $\beta_j \geq 0 \; \forall_j \geq 1$, $\alpha_1 + \beta_j < 1$

4.2 High Frequency Based Model

ARCH-class models somehow have problems with volatility forecasting. Firstly, parameters of ARCH-class models provide inconsistent results if we use different time scales. Secondly outliers reduce the forecasting performance. Lastly GARCH models do not differentiate between large movements connected to firm specific or other news, when forecasting single stocks (see Reider 2009). Based on these points, we are motivated to compare the forecasting ability of traditional ARCH class models (ARCH or GARCH) with high frequency based models (HAR-RV, HAR-RV-J, and HAR-RV-CJ).

4.2.1 The HAR-RV Model

The HAR-RV model is formulated as follows (see Corsi 2004)

$$RV_{t+1} = \beta_0 + \beta_D RV_t + \beta_w RV_{t-5,t} + \beta_M RV_{t-22,\,t} + \varepsilon_{t+1} \tag{10}$$

where RV_t, $RV_{t-5,t}$, $RV_{t-22,\,t}$ are daily, weekly and monthly realized volatilities.

The calculations are shown as follows:

$$RV_{t,t+h} = \frac{1}{h}\left[RV_{t+1}, RV_{t+2}, + \ldots + RV_{t+h}\right. \tag{11}$$
$$h = 1, 2, \ldots, RV_{t,\,t+1} = RV_{t+1}$$

In this paper, we take $h = 5$ and $h = 22$ as the weekly and monthly volatilities, respectively.

The motivating idea of HAR-RV-class models is derived from the Heterogeneous Market Hypothesis of Müller et al. (1993), which identifies the existence of heterogeneity among traders.[1] There are many different practitioners who have a large spectrum of trading frequency in the financial markets, i.e. the dealers, market makers, and intra-day speculators who trade very frequently, and the institutional investors. The main idea of the HAR-RV class model is that agents with different time horizons perceive, react to, and cause different types of volatility components (Corsi 2009).

[1] In financial markets, heterogeneity may arise for many different reasons, e.g., differences in the time horizon, agents' endowments, institutional constrains, risk profiles, and geographical locations (Corsi 2009).

4.2.2 The HAR-RV Model

The HAR-RV model is expanded by inserting a jump component as an additional explanatory variable (see Andersen et al. 2007). The HAR-RV-J model is formulated as follows:

$$RV_{t+1} = \beta_0 + \beta_D RV_t + \beta_w RV_{t-5,t} + \beta_M RV_{t-22,\,t} + \beta_j J_t + \varepsilon_{t,t+1} \tag{12}$$

4.2.3 The HAR-RV Model

We can decompose realized volatility into its base components as continues sample path variability and jump variation that appear as independent variables on the equations' right-hand side. The daily HAR-RV-CJ model is formulated as follows:

$$\begin{aligned} RV_{t,t+1} = {} & \beta_0 + \beta_{CD} C_t + \beta_{Cw} C_{t-5,t} + \beta_{CM} C_{t-22,\,t} + \beta_{jD} J_t + \beta_{Jw} J_{t-5,t} \\ & + \beta_{JM} J_{t-22,\,t} + \varepsilon_{t,t+1} \end{aligned} \tag{13}$$

Daily (1days), weekly (5days), and monthly (22days) components are determined as follows:

$$J_{t,t+h} = \frac{1}{h}\left[j_{t+1}, j_{t+2}, + \ldots + j_{t+h}\right] \tag{14}$$

$$C_{t,t+h} = \frac{1}{h}\left[C_{t+1}, C_{t+2}, + \ldots + C_{t+h}\right] \tag{15}$$

4.3 *The Loss Function for Comparison of Forecasting Performance*

In this chapter we use root mean square (RMSE) as a loss function for comparison of forecasting performance of mentioned models (Aït-Sahalia and Mancini 2008; Corsi 2009). The loss functions is formulated as follows:

$$\sqrt{\frac{1}{N}\sum_{i=1}^{N}\left(RV_{t,t+1} - \widehat{RV}_{t,t+1}\right)^2} \tag{16}$$

where $RV_{t,t+1}$ represents actual realized volatility whereas $\widehat{RV}_{t,t+1}$ represents the predicted values of realized volatility. N represents the number of total values in the data set.

5 An Empirical Example

5.1 Data

This chapter attempts to highlight the similarities and differences between volatility forecasting pattern of general market index and its constituent stocks. We extend our study scope to cover all the 25 individual stocks (see the codes of company in Table 1) in addition to the general market index BIST-30. We have to eliminate five individual stocks that had not enough observation to evaluate forecasting model. To evaluate the performance of high-frequency based model, we arranged the data in 5-minute intervals from January 1, 2005 to December 31, 2013, including 2268 trading-days. The intraday interval is 5 minutes from 9.15–12.30 to 14.00–17.40, 85 observations per day. The regular lunch time is 12.30–14.00. BIST-30 index is one of Borsa Istanbul indices that consist of value weighted top 30 individual stocks. Our study observations comprise of a total number of 5,012,020 observations, 192,770 observations for each 25 individual stock and the market index (26*192770). The data is received from Borsa Istanbul. Data cleaning process was performed based on the existence literature, specifically the deleting entries related to weekends and public holidays and when the market does not trade full days (Hansen and Lunde 2006; Barndorff-Nielsen et al. 2009). To estimate the traditional GARCH model, we use the daily closing prices for all companies listed on BIST-30 index and the index itself. Detecting crisis period in the empirical data set is controversial. Some studies recommend to use the distributions of data (Favero and Giavazzi 2002), some others recommend using threshold models (Lowell et al. 1998) or regime switching models (Hamilton 1989; Hansen 1992). While it is possible to detect crisis period based on econometric methodology, many researchers prefer to identify crisis periods based on the news framework (Kaminsky and Schmukler 1999; Dungey et al. 2005). Following the existing literature, the crisis period considered in this paper is from July 19, 2007 to May 29, 2009 (Yalama and Celik 2013; Dungey et al. 2014; NBER 2010). The beginning date of crisis period is consistent with the date on which Bear Stearns announced the collapse of its hedge funds and the end of crisis period is approximately equivalent to both the US and Turkey recession end date (NBER 2010; Rodrik 2009). For robustness check, we additionally performed the Chow-test (1960) to test our priori decision about the non-crisis and crisis periods.

5.2 Evaluation of Forecasting Performance

In finance, it is very difficult to detect just one model that is consistently making good forecasting for financial market returns. Empirical studies are often controversial in this aspect (Witt and Witt 1995; Chatfield 1988; Haugom et al. 2010; Rather et al. 2015; Poon and Granger 2003).

Table 1 RMSE for comparison of models: non-crisis and crisis period

no	BIST-30	no	AKBNK	no	ARCLK	R	ASELS	no	ASYAB	no	BIMAS	no	DOHOL	no	ENKAI	no	EKGYO
RMSE for non-crisis period																	
1	0.000333	3	0.003104	1	0.000854	1	0.018165	1	0.000835	1	0.016317	1	0.01237	1	0.012559	1	0.013169
2	0.000365	2	0.003114	2	0.000853	2	0.018188	2	0.000838	2	0.016331	2	0.012394	2	0.012589	2	0.0132
3	0.000325	1	0.003131	3	0.000852	3	0.018199	3	0.000838	3	0.016348	3	0.012468	3	0.01259	3	0.013556
4	0.000713	4	0.003223	4	0.001132	4	0.018231	4	0.113387	4	0.025933	4	0.013638	4	0.012645	4	0.021825
RMSE for crisis period																	
3	0.000835	3	0.001355	3	1.512597	1	0.088297	1	0.686226	1	0.056362	1	0.01153	1	0.004677	1	0.005317
2	0.000840	2	0.001357	2	1.731960	2	0.087095	2	0.687300	2	0.056410	2	0.011597	2	0.004680	2	0.005337
1	0.000853	1	0.001369	1	1.744250	3	0.086823	3	0.700824	3	0.056535	3	0.011642	3	0.004706	3	0.005370
4	0.000952	4	0.001953	4	2.740419	4	0.088306	4	0.987026	4	0.056982	4	0.016201	4	0.005260	4	0.005523

no: models numbers. 1, 2, 3 and 4 represents HAR-RV, HAR-RV-J, HAR-RV-CJ and GARCH models respectively

Hence, we must be very careful when evaluating the forecasting performance. From the literature, it is clear that there are many methods (e.g., Mincer and Zarnowitz 1969; Diebold and Mariano 2012; West 1996), many different loss functions (MSE, QLIKE, MAE, RMSE, TIC, etc.) and many different volatility proxies (e.g., daily squared returns, the intradaily range and a realized volatility) for forecasting evaluation and performance comparisons. It is possible to obtain different rankings of volatility models when using different loss functions, different volatility proxies and different comparison models. Therefore, the processes of detecting proper methods for loss functions and volatility proxies are vital for appropriate forecasting comparisons (Patton 2011). It is possible to have conflicting rankings of volatility forecasts when "nonrobust" loss functions are used. To avoid "non-robust" results, we use RMSE and realized volatility[2] as our chosen loss function and volatility proxy (Patton 2011; Aït-Sahalia and Mancini 2008).

5.3 Findings

The aim of this paper is to forecast the volatilities of the emerging market returns. To do so, we assess the performance of four different methodological frameworks based on both low and high-frequency type data. Furthermore, we compare the forecasting performance of traditional GARCH with high-frequency based models, namely, HAR-RV, HAR-RV-J, and HAR-RV-CJ. It is well known that the financial market volatility is affected by financial crisis (Yalama and Celik 2013; Dungey et al. 2005; Dungey et al. 2014). This paper compares the forecasting performance of these volatility models over the non-crisis and crisis periods. To avoid non-robust results, we use RMSE and realized volatility as loss function and volatility proxy respectively (Andersen et al. 2003; Barndorff-Nielsen and Shephard 2004; Patton 2011). The estimated models for traditional GARCH and high-frequency based models are omitted for brevity (All models are available upon request). Based on the estimated model, we calculated the forecasting error for ranking forecasting ability of each estimated models. The lowest forecasting error represents the best forecasting performance. The empirical results are presented in Table 2.

The results indicate that the global financial crisis does not affect the forecasting performance in emerging markets. Specifically high-frequency based models do not affect the structural break in the underlying process. Table 3 shows a comparison of the forecasting performance of these models over the non-crisis and crisis periods. Notably, high-frequency based models perform better over both non-crisis and crisis period forecasting experiments. Moreover HAR-RV-CJ models is the best volatility forecasting model for 18 individual companies and the general stock market index for non-crisis period whereas it is the best performing for 20 individual

[2]Realized variance is a conditionally unbiased estimator of daily conditional variance, and its main advantage is that it is a more efficient estimator than the others (Patton 2011).

Table 2 RMSE for comparison of models: non-crisis and crisis period

no	GARAN	no	IHLAS	no	ISCTR	no	KRDMD	no	KCHOL	no	KOZAA	no	PETKM	no	SAHOL	no	SISE
RMSE for non-crisis period																	
3	9975.532227	3	3.118438	3	0.006361	3	0.022302	3	3.156844	3	0.263684	3	0.059688	3	0.004511	3	0.001704
2	9978.820313	2	3.290836	2	0.006414	2	0.022324	2	3.166030	2	0.264992	2	0.059844	2	0.004542	2	0.001706
1	9979.109375	1	3.697934	1	0.006593	1	0.022358	1	3.393221	1	0.265408	1	0.060004	1	0.004674	1	0.001713
4	9982.366211	4	5.438863	4	0.009339	4	0.023321	4	6.113640	4	0.482779	4	0.060045	4	0.006227	4	0.081638
RMSE for crisis period																	
3	0.191048	3	0.007912	3	0.001268	3	0.002113	3	0.001473	3	0.001375	3	0.001011	3	0.001431	3	0.028692
2	0.193247	2	0.00803	2	0.001281	2	0.002118	2	0.001492	2	0.001394	2	0.001012	2	0.001432	2	0.028717
1	0.23196	1	0.008095	1	0.001284	1	0.002124	1	0.001495	1	0.001453	1	0.001019	1	0.001432	1	0.028717
4	0.37697	4	0.030263	4	0.001783	4	0.006251	4	0.001819	4	0.01462	4	0.001421	4	0.001844	4	0.028905

no: models numbers. 1, 2, 3 and 4 represents HAR-RV, HAR-RV-J, HAR-RV-CJ and GARCH models respectively

Table 3 RMSE for comparison of models: non-crisis and crisis period

no	HALKB	no	TAVHL	no	TOASO	no	TCELL	no	TUPRS	no	THYAO	no	TTKOM	no	VAKBN	no	HALKB
RMSE for non-crisis period																	
3	0.000535	3	0.000902	3	0.001281	3	0.001765	3	0.000896	3	0.061316	3	0.000545	3	0.021905	3	0.000535
2	0.000535	2	0.00091	2	0.001283	2	0.001772	2	0.000898	2	0.061361	2	0.000545	2	0.02252	2	0.000535
1	0.000535	1	0.000912	1	0.001283	1	0.001783	1	0.000911	1	0.061496	1	0.000546	1	0.02253	1	0.000535
4	0.002959	4	0.082188	4	0.001535	4	0.001997	4	0.002105	4	0.061532	4	0.000905	4	0.063046	4	0.002959
RMSE for crisis period																	
3	0.001591	3	2.269466	3	0.001364	3	0.001471	3	0.001769	3	0.001434	3	0.000902	3	0.001246	3	0.001591
2	0.001602	2	2.275931	2	0.001365	2	0.001474	2	0.001775	2	0.00145	2	0.000914	2	0.001256	2	0.001602
1	0.001626	1	2.275959	1	0.001378	1	0.001477	1	0.001778	1	0.001452	1	0.00093	1	0.001261	1	0.001626
4	0.001915	4	4.001386	4	0.00161	4	0.002105	4	0.002187	4	0.001959	4	0.001276	4	0.001674	4	0.001915

no: models numbers. 1, 2, 3 and 4 represents HAR-RV, HAR-RV-J, HAR-RV-CJ and GARCH models respectively

companies and general stock market index for crisis period. On the other hand as it is obvious in Table 3, the traditional GARCH model perform worst among the others models in both non crisis and crisis period forecasting experiments. Hence, it can be concluded that the recent advances in high frequency data make it possible to forecast volatility in a better way than low frequency based traditional ARCH class model.

6 Conclusions

The study aims to propose the best performing volatility forecasting model for emerging markets. In doing so, we assess the performance of four different forecasting the volatility models. Furthermore, we extend our study scope by focusing not only on general market index BIST-30, but also on each constituent of market index. It is interesting to compare the empirical features of the estimated process for both the individual stock return and the general stock market index. These empirical findings can be useful for factor modeling with systematic and idiosyncratic components. Therefore, we use 26 individual stocks and one financial market index as BIST-30. The results indicate that the global financial crisis does not affect the forecasting performance of high-frequency based models in emerging markets. It is clear that high-frequency based models allow the structural break in the underlying process. Notably, high-frequency based models outperform in both non-crisis and crisis period for general market index as well as for the most of the individual stocks. According to our empirical findings, HAR-RV-CJ model has the best volatility forecasting performance among the high frequency based models for both related sub period. Our results are consistent with previous findings of Haugom et al. (2010), Zhou and Zhu (2012). It seems that the standard volatility models may not be helpful anymore for volatility forecasting. Based on previous mentioned empirical findings, it can be concluded that most individual stocks has some forecasting pattern similar to the general financial market index in Turkish stock exchange market. It appears that volatility forecasting models' performance are not influenced, especially by idiosyncratic structure of financial market.

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Calendar Anomalies in Stock Markets During Financial Crisis: The S&P 500 Case

Evangelos Vasileiou

Abstract In this study we try to briefly revise the day of the week effect (DOW) and to examine why there are conflicting empirical results through the time. Moreover, we try to add a new-alternative view to the specific area of study, adding a further possible explanation in calendar anomalies field of study. Specifically, we try to examine if investors' weekday behavior changes depend on the financial trend. For example, let suppose that there are evidence that Mondays are positive returns days, but there are signs for an upcoming financial crisis. Could this general believed practical rule be strong enough in order to be sustainable even during financial crisis period or does it change? In order to analyze this issue providing empirical support, we examine the US stock market and the S&P index for the time period 2000–2013. The results confirm our assumption that the financial trend influences the weekly stock returns' pattern, which may be an alternative explanation for the conflicting empirical findings that have been documented in the literature up today.

1 Introduction

Calendar anomalies (or effects) puzzle financial economists, scholars and traders for decades. An academic reason for the increased interest regarding the calendar anomalies (CA) study is that CAs existence violates the Fama's (1970) efficient market hypothesis (EMH). CAs are seasonal abnormalities in the financial stock markets' time series. The abnormalities' seasonality defines the calendar anomaly name (e.g. the January effect suggests that in January there are increased returns compared to the other months of the year, the turn of the month effect suggests that

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days near the turn of the month[1] are more profitable than other month days, the weekend effect (WE) which is the observed pattern of the financial market returns time series to present increased profits on Fridays and significantly lower returns on Mondays).

Most of the aforementioned patterns observed for the first time in the US stock pattern, and the reason is simple: the US stock market is the world's most significant financial market. In this study we try to examine in detail the weekend effect taking into account several explanations that the empirical literature provides, and we try to add in these explanations another one. The weekend effect was first documented by Cross (1973), and there followed other studies that established and further examined the specific pattern (French 1980; Keim and Stambaugh 1984). These studies focus on the US case, but, as we mention above, in the following years the WE research extended to out of US financial markets and confirmed the WE's existence (Jaffe and Westerfield 1985; Syed and Sadorsky 2006).

The WE's existence violates the EMH, because in this case previous prices movements include information regarding the future performance. During a time period that the EMH was the dominant finance theory, these abnormalities draw scholars and practioners interest. Agrawal and Tandon (1994), Schwert (2003) suggest that calendar anomalies fade after the scholars documented them, because the markets incorporate the knowledge of the observed patterns into the pricing of the securities and trade the anomalies out of existence.

The advantages in the field of the econometric theory and practice, call in question previous empirical studies, due to the violations of the OLS assumptions in the returns (Connolly 1989; Alford and Guffey 1996). Could the violations of the OLS assumptions be the reason for the calendar anomalies conflicting findings? Could this be the only reason? The aforementioned conflicting findings triggered our motivation to add another one, explanation regarding the existence (or not) of the WE during different financial trend periods. The difference is that the new proposed explanation has more economic though and less econometric analysis, but the one explanation does not reject the other's existence.

The paper is organised as following: Sect. 2 present the respective literature in order to establish the study's theoretical framework. Section 3 presents the data section, criteria and the descriptive statistics. Section 4 analyses the methodological approach and presents the empirical findings. Section 5 discusses all the aforementioned results, and Sect. 6 concludes the study.

2 Literature Review and Theoretical Framework

Below we present some studies which confirm the existence of WE for the US stock market and the explanations for its existence:

[1]Usually turn of the month days are defined as the last day of a month and the first three trading days of the following month.

(1) the fact that companies tend to release bad news after the market's Friday close, in order to give it enough time to absorb the shock (Mills et al. 2000).
(2) Psychological reasons, e.g. positive mood on Friday due to the weekend which positively influences the market's returns (Mills et al. 2000).
(3) Speculative short sellers' behavior leads to the weekend effect because the short sellers close their positions on Fridays and re-establish new long positions on Mondays. The specific behavior results in increased Friday returns, which fall on Mondays (Chen and Singal 2003).
(4) Lakonishok and Maberly (1990), Abraham and Ikenberry (1994) report that share price does worse on Mondays than on the other days of the week, because individual investors typically sell stocks on Mondays,
(5) Sias and Starks (1995) believe that institutional traders are the primary drivers of the effect, and
(6) The old trading slogan "buy on the rumor and sell on the news", is linked to the mergers' announcement which most take place on Mondays and leads to the weekend effect pattern (Branch et al. 2001).

On the other hand, there are studies which report that the WE is not any more a sustainable pattern. Gu (2004) suggests that the US stock market presents increasing efficiency during the last two decades and this may be a reason for the pattern's fade. The advanced and qualitative information technology, the faster execution procedures and the scholars' contribution to the investors' culture lead to a more efficient market. Chan et al. (2004) suggest that the 'Monday effect' is weak in stock markets with a high percentage of institutional holdings (which are more sophisticated than the individual investors).[2]

As we present up to this point the literature review presents conflict findings regarding the WE's existence. However, there are some recent empirical studies that not only support the "weekend effect's" fade, but also that the WE has been "reversed" (Monday returns are increased and Friday returns are lower than other weekdays) and that the reverse weekend effect (RWE) is a sustained pattern (Brusa et al. 2005).

The literature review examines how several exogenous factors (institutional and individual investors, short sellers etc.) influence the WE pattern. Vasileiou and Samitas (2014) present an alternative explanation regarding the day of the week pattern.[3] In their study they suggest that the calendar patterns in the Greek stock market depend on the financial trend. Particularly, they find a sustainable WE pattern when a no financial trend period is examined, but during a long term growth and recession periods this pattern is not sustainable. A simple explanation could be that even if we suppose that there is a predisposition in favour of a weekend effect, when a period of severe crisis is coming is the Friday effect (positive Friday returns)

[2]This study examines latter data questions Sias and Starks (1995) findings.

[3]The term day of the week is generally used because quite often in the literature is reported a week pattern which is not the weekend effect (e.g. positive return day Tuesday and negative Wednesday).

strong enough in order to resist to the crisis? On the other hand, why should Mondays be negative return days when the financial market is flourished?

The DOW (and calendar anomalies in general), violate the EMH, because EMH suggests that previous prices cannot forecast future market movements. Therefore, if the results show a sustainable long term DOW pattern this could be an indication for market inefficiency, but if not this will not reject the EMH.

3 Data Selection and Descriptive Statistics

3.1 Data Selection Process

In order to examine the WE pattern we use daily data of the Standard and Poor's 500 Index (S&P 500), which is a capitalization-weighted index of 500 US large companies' stocks. The S&P 500 index is designed to measure performance of the broad domestic economy through changes in the aggregate market value of 500 stocks representing all major industries. We choose to apply our assumptions taking as index the S&P 500, because: (i) it is popular amongst the traders (this comment has been written after conversation with professionals), (ii) it is a well-representative index of the US stock market capturing approximately 80 % coverage of available market capitalization,[4] and (iii) it has been used in most of the aforementioned studies. The S&P500 daily prices are collected from the Bloomberg database.

This study's scope is to examine the calendar anomalies under changing financial trends. However, the term 'financial trend' may be too general; therefore we ought to define the term 'financial trend' and finally to choose our data sample. Initially, we thought to use some technical analysis rules that confirm the financial trend change, e.g. moving average rules[5] define the current trend with a lag. However, we asked several professionals opinion regarding the best indicator and several counterarguments emerged, which are presented below.

Firstly, which should be the optimal lag length of the moving average: do we have to use short term or longer term moving average? Secondly, could another trading rule be better (e.g. RSI, MACD)? Thirdly, even if we find the optimal trading rule, do we know the technicians to fundamentalists' ratio, in order to conclude that investors follow the specific indicators? Fourthly, even if we find the technicians to fundamentalists' ratio, we should find which rules the fundamentalists and the technicians follow?

[4] http://us.spindices.com/indices/equity/sp-500

[5] Ülkü and Prodan (2013) suggest that when today's closing price (P_t) crosses the n-days moving average MA(n) from below we buy, but when the P_t crosses the MA(n) from above we sell. *n* is the time period for which we calculate the moving average. This period could be short-term ($n < 10$), medium term ($10 < n < 150$) or long term ($n > 150$).

Taking into consideration all of the above counterarguments, we finally decide to define that in our study a growth (recession) period ends when the index reaches the local maximum[6] (minimum). The reason is simple; if the investors (whichever evaluation process they follow: fundamental or technical) believe that a growth (recession) period is to follow, they will buy (sell) stocks and this will be depicted in the stock index performance.[7]

The second step in our data selection process is to set the sample. The primary assumption and motivation of our study is that investors' behavior changes depend on the financial trend. This assumption seems logical because even if there is a long-term predisposition in favor of a specific pattern, such as profitable Monday sessions (Monday effect), this does not mean that when there is a severe recession Mondays should remain profitable days. There are too many periods that could be characterized as sub-periods of financial growth or recession, but we finally choose the time span 24 March 2000–16 October 2013 for two major reasons:

(i) there are several empirical studies which examine the WE for time periods before 2000, and
(ii) this study's scope is to present the WE pattern changes during changing financial trend periods and the chosen time span includes two sub-periods samples of financial growth and financial recession. The specific time span enables us to reach to useful conclusions regarding the DOW pattern during different recession or growth sub-periods, and this way we could examine if there are differences even during similar trend sub-periods.

Taking into consideration the above mentioned explanation regarding the financial trends, the examined sub-periods of our sample are: (i) 1st recession from 24/3/2000 to 9/10/2002, (ii) 1st growth from 10/10/2002 to 9/10/2007, (iii) 2nd recession 10/10/2007 to 9/3/2009, and (iv) 2nd growth from 10/3/2009 to 16/10/2013.[8] The total period lasts from 24/3/2000 to 16/10/2013.

3.2 Descriptive Statistics Presentation

Using data from the S&P 500 Index we define the return as

[6]Local maximum is a mathematical term for the peak.

[7]Friedrich Nietzsche's said "The future influences the present just as much as the past". Following this quote we thought that investors forecasts influence their current behavior and this was the starting point which finally helped us resolve the financial trend definition issue.

[8]The 4th sub-period's max value, according to the data which we had available, is the 18/9/2013 (1725.52), but we use as end of period date 16/10/2013 (1721.54) in order to make some more observations and because the difference was not significant enough to change our conclusions (we run the model taking the 18/9/2013 as period-end date). All these data are available upon request.

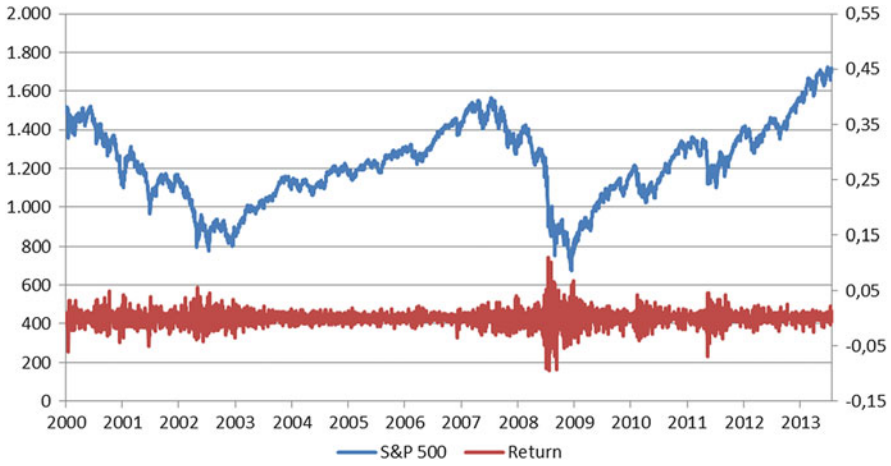

Fig. 1 S&P500 Performance Index and Returns chart during the examined sample period (27/3/2000–16/10/2013)

$$\mathbf{return_t} = \mathbf{ln}\left(\mathbf{SP_t}/\mathbf{SP_{t-1}}\right) \tag{1}$$

where SP is the S&P500 price index and the subscripts t, t−1 indicate the current and the previous observed price, respectively. Figure 1, presents the S&P 500 price index and the returns during the sample's period. From the charts we may observe that: (i) the volatility is increased during the recession periods, and (ii) periods of high (low) volatility are followed by high (low) volatility.

Table 1 presents the descriptive statistics and quantitatively confirms our previously mentioned observations: (i) recession sub-periods present increased volatility relative to the growth sub-periods, and (ii) the 2nd recession sub-period presents higher volatility than the 1st recession, which influences the following growth sub-periods, resulting in higher volatility during the 2nd Growth period relative to the first one.

Moreover, from Table 1 we may observe the following: firstly regarding the returns performance the total period's mean return is near to zero,[9] the 2nd recession is more severe than the first one, and the 2nd growth period is stronger than the first. Secondly, the time series are leptokurtic (kurtosis > 3), and the Jarque-Bera test confirms that the time series does not follow the normal distribution.[10] Thirdly, we use the augmented Dickey and Fuller statistics in order to test for a unit root in the S&P 500 returns series. The hypothesis for a unit root is strongly rejected in favour of the stationary alternative. Fourthly, we include data information regarding the positive (negative) sessions depending on the examined period.

[9]This partly confirms our prior characterization for the total period as no-trend period.

[10]The leptokurtosis of these three distributions is a sign that linear models may not be adequate to explain the specific time series' behavior (Vasileiou 2015).

Table 1 Descriptive statistics of the samples time series

	Total period	1st recession	1st growth	2nd recession	2nd growth
Mean	3.51E-05	−0.001062	0.000557	−0.002363	0.000804
Std. Dev.	0.013182	0.014450	0.008557	0.023986	0.011752
Skewness	−0.175104	0.162415	0.147704	−0.052517	−0.077586
Kurtosis	10.80546	4.308432	5.289112	6.764223	7.121178
Jarque-Bera	8676.426 (0.0000)*	48.23971 (0.0000)*	279.2393 (0.0000)*	209.7518 (0.0000)*	822.7710 (0.0000)*
Positive sessions	1812	290	696	174	652
Positive sessions (%)	53.12 %	45.53 %	55.33 %	49.01 %	56.16 %
Negative sessions	1598	347	562	180	509
Negative sessions (%)	46.85 %	54.47 %	44.67 %	50.70 %	43.84 %
Observations	3411[1]	637	1258[1]	355	1161
Dickey Fuller	−45.743 (0.0001)*	−25.054 (0.0000)*	−39.161 (0.0000)	−17.209 (0.0000)*	−37.235 (0.0000)*

Notes: *, **, *** indicate the level of statistical importance 1, 5 and 10 % respectively. The p-values are given in parentheses

[1]There return in 3/1/2008 is zero, that is the reason why the positive and negative returns sum is one less than the total observations. This day belongs to the 1st growth sub-period which presents the same difference for the same reason

Table 2 Day of the week mean returns depending on the weekday and the examined sub-period

	Monday	Tuesday	Wednesday	Thursday	Friday
Total period	−0.000171	0.000554	−0.000206	0.000334	−0.000353
1st recession sub-period	−0.000450	−0.001297	−0.001156	1.03E-05	−0.002377
1st growth sub-period	0.000707	0.000415	0.000898	0.000489	0.000283
2nd recession sub-period	−0.005437	0.002232	−0.004360	−0.003698	−0.000639
2nd growth sub-period	0.000684	0.001207	0.000410	0.001545	0.000160

The results suggest that even if the 2nd recession is harder, the positive and negative returns sessions are balanced. This is a quite strange result relative to the other period's statistics, because during the growth (recession) periods the positive (negative) session are around the 55 % of the total sessions.

Table 2, presents the mean returns customizing them to the day of the week effect. If we examine the total period, Tuesday is the most profitable day, it follows Thursday, while all the other weekdays present negative mean returns (the most negative week day is Friday and the less negative is Monday).

During the 1st Growth sub-period all the weekdays present positive mean returns, with Wednesdays and Mondays being the highest. During the 2nd Recession sub-period all the weekdays except Tuesday present negative mean returns. Among them, Monday presents the most significant losses and at the same time there are increased possibilities for negative return sessions. Finally, during the 2nd

Growth sub-period all the weekdays present positive mean returns (Thursdays and Tuesdays are higher).

4 Methodological Approach and Empirical Results Presentation

The descriptive statistics we present in the previous section (Table 1) may be a first indication that the OLS models might not be appropriate for our sample's analysis, because the specific time series (Table 1) present leptokurtosis (kurtosis > 3), while there are indications for the volatility clustering and leverage effect (the volatility during recession periods is significantly increased relative to the growth periods). Therefore, a GARCH family model, which is widely used in similar studies, theoretically and practically may be more appropriate than the OLS estimation[11] (Brooks 2008).

Among the GARCH family models theoretically the asymmetric GARCH models may better fit the sample due to our suspicions for a leverage effect. The Akaike (AIC) and Schwartz (SIC) information criteria confirm our assumptions. Moreover, these criteria enable us to choose the most appropriate model among the two asymmetric GARCH models that are mainly used in the specific literature, the T-GARCH and the EGARCH models.[12] Both models empirical results' are similar, but we finally choose the EGARCH model because: it does not need positivity constraints (Brooks 2008) and it performs better than the T-GARCH for all the examined periods, according to the AIC and the SIC.[13]

The mean return is given by the following equation

$$\mathbf{R_i} = \sum_{i=1}^{5} ai^{*}\mathbf{D_{it}} + \boldsymbol{\varepsilon_i} \tag{2}$$

where D_{it} is a dummy indicator that takes the value 1 for day i (i = 1,. . .,5 for Monday through Friday) and zero otherwise, α_i is the mean value for day i, and ε_i is

[11] We run the OLS models and we find significant ARCH effect problems. Moreover, if we adopt the OLS (assuming that the ARCH effect does not exist) the results are different than the final. These data are available upon request. The appropriate model selection is crucial, because (i) through time some studies which report the weekend effect fade, are called in question due to the violations of the OLS assumptions in the returns (Connolly 1989; Alford and Guffey 1996) and (ii) may be the reason for the conflicting findings.

[12] T-GARCH or GJR model named from the authors' initials Glosten, Jagannathan and Runkle (1993), and (ii) the exponential GARCH (EGARCH) model proposed by Nelson (1991).

[13] These data are available upon request.

the error term that follows the Student-t distribution.[14] We do not use a constant term in order to avoid the dummy variable trap.

Only for the total period we present another one version of the mean return equation. Particularly, in Eq. (2) we include the recession variable which is a time dummy variable that takes the value 1 for recession periods observations, otherwise zero. This way we are able to examine the DOW pattern under the slightly different view that examines if there is a DOW pattern and how the recession influence it

$$\mathbf{R_i} = \sum\nolimits_{i=1}^{5} ai^{*}\mathbf{D_{it}} + \mathbf{x}^{*}\mathbf{R_{t-1}} + \mathbf{recession_i} + \boldsymbol{\varepsilon_i} \tag{3}$$

The specification for the conditional variance is:

$$\log\left(\sigma_t^2\right) = \omega + \sum_{j=1}^{q} \beta_j \log\left(\sigma_{t-j}^2\right) + \sum_{i=1}^{p} \alpha_i \left|\frac{\varepsilon_{t-i}}{\sigma_{t-\mathrm{i}}}\right| + \gamma \frac{\varepsilon_{t-k}}{\sigma_{t-k}} \tag{4}$$

The log of the conditional variance guarantees that even if the parameters are negative, σ_t^2 will not be negative and that the leverage effect is exponential, rather than quadratic. If $\gamma \neq 0$ there is evidence for asymmetry and especially if $\gamma < 0$ and statistically significant there are evidence for leverage effect. Terms α_i and β_j are the respectively GARCH and ARCH coefficients, for which the lag orders are selected by the AIC and SIC.[15]

Table 3 presents the empirical findings of the study. Before move to the detailed analysis and discussion of the empirical findings we ought to note three interesting findings: (i) the day of the week pattern constantly changes through the time, which confirms our basic assumptions that financial trend influences the WE pattern, (ii) the leverage effect is constantly present during all sub-periods, which confirm that the asymmetry model better fits our sample, and (iii) the previous day's returns negatively influence the current returns. Table 4 presents several ordered[16] Ljung-Box Q for the normalized residuals, and Engel's ARCH LM statistics in order to confirm the econometric validity of the results. None of these coefficients are statistically significant; therefore our econometric models do not present autocorrelation and ARCH-LM issues.

[14]The Akaike and Schwartz criterions present better results if we use the t-statistics instead of the Generalized Error Distribution (GED) proposed by Nelson (1991).

[15]Generally, similar to related studies when the two criteria suggest different models, lag orders the SIC is preferred to the AIC because: (i) it corrects the over-fitting nature of the AIC, and (ii) it is asymptotically consistent (Koehler and Murphree 1988). However, in most of the cases both criteria suggest similar results.

[16]More statistical information are available upon request.

Table 3 S&P 500 day of the week patterns' results

	Total period (1st version)	Total period (2nd version)	1st recession	1st growth	2nd recession	2nd growth
Mean equation						
Monday	0.000269 (0.4211)	0.000324 (0.3381)	−0.000827 (0.4186)	0.000612 (0.1853)	−0.003378 (0.0694) ***	1.15E-05 (0.9842)
Tuesday	0.000577 (0.0590) ***	0.000630 (0.0437)**	−0.002272 (0.0232)**	0.000521 (0.2141)	−0.000518 (0.7548)	0.000928 (0.0648) ***
Wednesday	0.000409 (0.1580)	0.000465 (0.1141)	−0.003253 (0.0002)*	0.001090 (0.0091)*	−0.003116 (0.0472)**	6.48E-05 (0.8902)
Thursday	0.000530 (0.0787) ***	0.000600 (0.0498)**	−0.000259 (0.8005)	0.000206 (0.6353)	−0.001564 (0.2556)	0.001085 (0.0233)**
Friday	1.89E-05 (0.9494)	1.92E-05 (0.9490)	−0.002272 (0.0200)**	−0.000142 (0.7377)	−0.002770 (0.0572) ***	0.001107 (0.0333)**
Recession		−0.000972 (0.0027)*				
Volatility equation						
ω	−0.330504 (0.0000)*	−0.330504 (0.0000)*	−0.181194 (0.0000)*	−0.184082 (0.0001)*	−0.212791 (0.0000)*	−0.556650 (0.0000)*
α_1	−0.146218 (0.0005)*	−0.146218 (0.0005)*	−0.034142 (0.0112)**	0.070750 (0.0008)*	−0.324518 (0.0032)*	−0.160203 (0.0399)**
α_2	0.296272 (0.0000)*	0.296272 (0.0000)*			0.428530 (0.0009)*	0.352909 (0.0000)*
γ	−0.168944 (0.0000)*	−0.168944 (0.0000)*	−0.196322 (0.0000)*	−0.088348 (0.0000)*	−0.083469 (0.0015)*	−0.196169 (0.0000)*
β_1	0.751314 (0.0000)*	0.751314 (0.0000)*	0.974878 (0.0000)*	0.986982 (0.0000)*	1.554465 (0.0000)*	0.956031 (0.0000)*
β_2	0.225825 (0.0665) ***	0.225825 (0.0665) ***			−0.571121 (0.0000)*	

Notes: *, **, *** indicate the level of statistical importance 1, 5 and 10 % respectively. The p-values are given in parentheses

5 Discussion on the DOW Empirical Findings

In this section we try to combine all the findings of our research regarding the DOW effect. In order to present the results as clearly as possible, we will display them in four sub-sections. Firstly, we present the DOW pattern as if we examined the period 2000–2013. Secondly, we focus on the growth periods results and thirdly on the recession periods results. The different DOW patterns amongst the specific time periods confirm our assumption for the financial trends influence on the DOW

Table 4 Autocorrelation and ARCH-LM tests

	Total period	1st recession	1st growth	2nd recession	2nd growth
Q(1)	0.0590 (0.808)	0.1359 (0.712)	0.0300 (0.863)	0.9269 (0.336)	0.3337 (0.563)
Q(2)	0.2296 (0.892)	3.5409 (0.170)	0.9776 (0.613)	2.5832 (0.275)	1.0563 (0.590)
Q(3)	0.2947 (0.961)	3.5433 (0.315)	1.1647 (0.761)	2.7010 (0.440)	1.8053 (0.614)
Q(5)	6.3739 (0.272)	4.2254 (0.517)	4.7554 (0.446)	3.8176 (0.576)	4.8362 (0.436)
Q(15)	18.667 (0.229)	11.488 (0.717)	16.448 (0.353)	10.811 (0.766)	10.012 (0.819)
Q(30)	31.225 (0.404)	27.228 (0.611)	28.039 (0.568)	23.778 (0.782)	26.103 (0.670)
ARCH(1)	0.007577 (0.9306)	0.712607 (0.3986)	2.934798 (0.1122)	0.434846 (0.5096)	0.459504 (0.4979)
ARCH(2)	0.012761 (0.9936)	1.320724 (0.5167)	3.176122 (0.2043)	0.683571 (0.7105)	0.484898 (0.7847)
ARCHn	0.478685 (0.9235)	3.814571 (0.2822)	3.394322 (0.3347)	0.954749 (0.8122)	1.337983 (0.7201)
ARCH(5)	1.780015 (0.8787)	5.101793 (0.4036)	4.294230 (0.5079)	1.930500 (0.8587)	3.060401 (0.6907)
ARCH(15)	15.41192 (0.4222)	14.66934 (0.4755)	14.65599 (0.4765)	12.90089 (0.6100)	12.01624 (0.6778)
ARCH(30)	0.2783357 (0.5793)	32.39469 (0.3494)	24.48318 (0.7497)	30.75421 (0.4276)	30.88090 (0.4213)

Note: Q(n) represent the n-lagged order Q statistics value, and ARCH-LM(n) is the n-lagged value of the Obs*R-squared. In the parentheses we include the p-values

pattern, which may be an alternative explanation for the conflict findings that have been documented up today to the literature. Therefore, the fourth sub-section further discusses the overall findings and some thoughts for further research.

a. The Day of the Week patterns during the total sub-period.
When the total period is examined, both versions of the EGARCH model presents positive and statistically significant Tuesday and Thursday returns, which are consistent with the descriptive statistics because these are the only weekdays with positive returns (Table 2a). The second version of the EGARCH model shows that: (i) the Tuesdays and Thursdays are weekdays with a positive predisposition (increased statistical significance), and (ii) the recession period significantly reduce the returns. Therefore, an interpretation of the aforementioned results could be that recession significantly influences the returns during all the weekdays, but Tuesdays and Thursdays which have the positive predisposition may resist to the recession. Moreover, if the examined period for the DOW is period 2000–2013 we could suggest that the day of the week pattern for the US case suggest significantly positive returns for Tuesdays and Thursdays.

Could this suggestion be profitable during each sub-period? We will examine the sub-periods depending on the financial trend.

b. The Day of the Week patterns during the growth sub-periods.
This sample includes two sub-periods. Both of them present positive returns workdays, while all the weekdays present more than a 50 % possibility for a positive return session (Tables 1 and 2). However, during the first growth sub-period only Wednesdays and Fridays present statistically significant returns (Table 3). During, the second growth sub-period Tuesdays, Thursdays and Fridays present statistically significant positive returns. Therefore, the growth sub-periods may be similar, but they do not present a sustainable pattern.

c. The Day of the Week patterns during the recession sub-periods.
Similar to the growth sub-periods, our data sample includes two recession sub-periods. During the first recession almost all the weekdays present negative mean returns, while during the second recession period there is one exception in Tuesdays that present positive mean returns (Table 2). The EGARCH models show a changing weekly pattern, even if both examined sub-periods are recession periods. Particularly, during the first recession period Tuesdays, Wednesdays and Fridays are statistically negative return days, while during the second recession sub-period the pattern suggest Mondays, Wednesdays and Fridays as statistically negative return days.

6 Conclusions

The purpose of this paper is to present an alternative approach regarding the calendar effects methodological approach and especially the DOW pattern. Examining the DOW pattern for the US stock market during the period 2000–2013 the empirical findings support the primary assumption that the calendar patterns change when the financial trend changes. These results may be an explanation for the conflicting empirical findings that have been documented in the literature.

As for the DOW pattern, which is this study's main objective, the results confirm our assumptions that the DOW patterns are influenced by the financial trend and changes through time, but they do not suggest a sustainable pattern during the growth or the recession periods. Some interesting findings regarding the US DOW patterns are: (i) Tuesdays and Thursdays are the weekdays that present a predisposition for positive returns (moreover these are the only weekdays that present positive returns during the recession sub-periods, Thursday during the first recession and Tuesday during the second), (ii) when the financial trend is positive all the weekdays present positive returns, even if the DOW pattern changes, (iii) the leverage and the clustering effects are present in the US stock market, and (iv) a sustainable pattern may be the positive relationship (taking as measure the mean returns) that Mondays, Wednesdays and Fridays have with the financial trend. The changing patterns may be an indication of more sophisticated investors who constantly evaluate the DOW pattern and this way change it.

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Day of the Week Effect in the Stock Markets of Fragile Five Countries After 2008 Global Financial Crisis

Murat Akbalik and Nasif Ozkan

Abstract In this study, it is analyzed the existence of day of the week effect in the stock markets of Brazil, India, Indonesia, Turkey and South Africa which are named as fragile five countries (BIITS). To determine this effect in fragile five countries; daily closing price data of basic indices of the stock markets of these countries' for the period (2 January 2009–31 December 2015) and Kruskal-Wallis test and Wilcoxon rank sum test which are non-parametric statistical analysis methods, are used. The results obtained in this study supports the literature findings that day of the week effect is reducing in developed and emerging markets in the recent years for fragile five countries for the period after the 2008 global financial crisis. The findings indicate that, except Indonesia, day of the week effect doesn't exist in other four countries' stock markets. In Indonesia stock market, the lowest return is on Monday, highest return is on Wednesday.

1 Introduction

In the economy report prepared in 1 August 2013 by the research analysts of Morgan Stanley, an international investment bank, the group of countries consisting Brazil, India, Indonesia, Turkey and South Africa are named as fragile five. Morgan Stanley (2013) indicates that some similar features of these countries are effective on to be grouped as fragile five. Common features of these countries can be listed as; (1) to have a high inflation rate, (2) to have a high current account deficit, (3) to be dependent on foreign capital inflows, and (4) to experience decline in growth

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performance (Morgan Stanley 2013). After US Central Bank's policy change on reduction of bond purchasing after 2013, these five countries' currencies have lost their value the most, it's seen rapid rise in bond interests and they experienced serious declines in stock market indices. These developments have also lead to increase of capital outflow from the country and decrease of foreign capital coming into the market greatly in fragile five. For this reason, risks and vulnerabilities of these countries which has high current account deficit and financing this deficits by foreign investments are also increases (Akel 2015; Akel et al. 2015; Hayaloğlu 2015). In other words, in these five countries, sensitivity to external shocks increases.

Table 1 exhibits the average macroeconomic indicators showing the common characteristics of fragile five countries in 2014 and 2009–2014 periods. As of 2014, while the current account deficit share in the gross domestic product (GDP) is lowest in India (−%1.5), it is highest in Turkey (−%5.8). In 2009–2014 period, an average current account deficit/GDP ratio was lowest in Indonesia (−1.0 %). In 2014, Turkey is the country with the highest inflation rate (8.9 %). Inflation rates in other countries appear to be almost equal (6.4 %). During 2009–2014 periods, India is the country with the highest average inflation rate (9.7 %). While India has the highest budget deficits (−%7.0), Turkey has the lowest (−%1.0). India also is the country with the highest average budget deficit in 2009–2014 periods. Countries with the highest level of public indebtedness in both 2014 and 2009–2014 period are, India and Brazil (respectively %66.1 [%67.9] and %65.2 [%63.4]). In year 2014, India is the country with the best growth performance (%7.3), whereas Brazil has the worst performance (%0.1). In the period 2009–2014, South Africa is the country with the lowest growth of 1.8 % whereas India is the fastest %7.5.

Efficient Market Hypothesis claims that stock prices in the market reflects all the information about stocks and for this reason, none of the investors can get return above the average. According to this hypothesis, price movements occurred in the past will not be repeated and thus future prices cannot be estimated by taking the

Table 1 Macroeconomic indicators of fragile five countries (%)

Indicators	Brazil	India	Indonesia	Turkey	South Africa
Current account deficit /GDP	−4.4 (−2.6)	−1.5 (−2.9)	−2.9 (−1.0)	−5.8 (−6.0)	−5.5 (−3.8)
Inflation (consumer prices)	6.3 (5.7)	6.4 (9.7)	6.4 (5.4)	8.9 (7.8)	6.4 (5.7)
Budget deficit/GDP	−6.2 (−3.4)	−7.0 (−8.1)	−2.1 (−1.5)	−1.0 (−2.3)	−3.8 (−4.2)
Debt/GDP	65.2 (63.4)	66.1 (67.9)	25.0 (24.5)	33.6 (38.9)	46.0 (38.7)
GDP growth rate	0.1 (2.7)	7.3 (7.5)	5.0 (5.6)	2.9 (3.7)	1.5 (1.8)

The figures in the parentheses are the average values of macroeconomic indicators between the years 2009 and 2014
Source: The World Bank, IMF

historical price movements into account (Fama 1970). However, many empirical studies examining the stocks returns in certain day, week and months indicate that stock returns are higher or lower on some days, weeks or months. These findings that are contrary to the Efficient Market Hypothesis are defined as seasonal or calendar anomalies in the literature.

In this study, anomaly related to days of the week, which is one of the seasonal anomalies, or widely known in the literature as day of the week effect anomaly is analyzed for fragile five countries' stock market. In the markets that day of the week effect is available; the average return of the stocks may be varied in a statistically significant way according to days of the week. In the study, for analyzing the day of the week effect's existence in the stock markets of fragile five countries, it is used daily closing price data of basic indices of these markets in the period (2 January-2009 to 31 December 2015). And to determine whether average returns on the days of the week is different from each other, Kruskal-Wallis test which is one of the non-parametric statistical analyses and the Wilcoxon rank sum test is applied. There are a lot of studies in the literature researching the day of the week effect for stock markets of various country groups (Kohers et al. 2004; Hui 2005; Basher and Sadorsky 2006; Singh 2014). However, studies on the stock markets of fragile five countries are conducted for either a single or a few countries. In this context, analyzing the day of the week effect on fragile five countries after 2008 global financial crisis make this study distinguished from the other studies and contributes the literature.

The study consists of five sections. In the second section following the introduction, it is given the literature studies examining the day of week effect. In section three, data set and methodology used in the study is explained. In section four, it is interpreted the findings of day of the week effects in fragile five countries. In the last section, the study results are summarized.

2 Literature Review

Day of the week effect which is one of the seasonal anomalies studied widely in financial literature. The first studies on this topic were conducted in the stock market of USA and it's shown that average returns on Monday is lower and negative than other week days (Cross 1973; French 1980; Gibbons and Hess 1981; Keim and Stambaugh 1984; Smirlock and Starks 1986). In addition, other studies covering Australia, Japan, Asian and European countries have the similar results (Jaffe and Westerfield 1985; Condoyanni et al. 1987; Chang et al. 1993; Choudhry 2000). On the other hand, there are some studies in the literature claim that day of the week effect occurs in different days. In Malesia and Thailand, Brooks and Persand (2001), in Australia and Japan, Jaffe and Westerfield (1985) and Dubois and Louvet (1996), in France, Solnik and Bousquet (1990) shows that average return of the stocks tend to be lower and negative in Tuesday compared to other days.

In the international studies in recent years indicate that day of the week effect decreases or disappears in developed and emerging markets (Rubinstein 2001; Steeley 2001; Kamath and Chusanachoti 2002; Ajayi et al. 2004; Kohers et al. 2004; Hui 2005; Liu and Li 2010). Connolly (1989, 1991), Chang et al. (1993), and Easton and Faff (1994) claim sample size and/or error term arrangements and Gregoriou et al. (2004) claims transaction costs make the day of the week effect meaningless. And Sullivan et al. (2001) argues that day of the week effect may be a result of data mining. Basher and Sadorsky (2006) indicates there is no day of the week effect in most of the 21 emerging markets they studied but this effect still continues to exist strongly in some countries. On the other hand, Dicle and Levendis (2014) study, analyzing 51 international markets in 33 countries, shows that day of the week effect continues in most of the markets which are included in the analysis. All of these studies provide different evidences for existing of day of the week effect in international markets and report suspicious results with using advanced statistical methods concerning the existence of this effect.

In literature, day of the week effect is also a subject analyzed for stock markets of many country groups such as Eastern European countries (Ajayi et al. 2004), the Latin American countries (Blandon 2011), Southeast Asian countries (Brooks and Persand 2001), Asia-Pacific countries (Hui 2005) and the BRIC countries (Singh 2014). On the other hand, studies on existence of day of the week effect on stock markets of fragile five countries are conducted only for one of these countries markets or by giving places to some of these countries' markets in many countries worldwide (mentioned above). In other words, there is no study in the literature analyzing the day of the week effect by just focusing on this country group. If day of the week effect analyzed individually in the basis of fragile five countries stock market, findings from these studies are generally different from each other. Blandon (2011) emphasize that studies in the 1990s and in the beginning of 2000s in Brazil stock market provide evidences for the existence of day of the week effect (Agrawal and Tandon 1994; Aggarwal and Leal 1996; Madureira and Leal 2001); whereas some studies (Fajardo and Pereira 2008) show that this effect start to diminish after 2002. While Basher and Sadorsky (2006) cannot prove the existence of day of the week effect in the stock markets of Brazil, Indonesia and South Africa which are in fragile five, Turkey stock market reveals evidences supporting the existence of this effect. The findings obtained by Singh (2014) are also support that this effect doesn't exist in Brazil and India. On the other hand, Lim and Chia (2010) shows that there is no Monday effect in Indonesia stock market but Monday returns of the stock market is affected by return of the previous week. Anwar and Mulyadi (2012) couldn't prove that Indonesia stock market investors provide negative abnormal returns in Mondays but they indicate that investors provide positive abnormal returns on Fridays. When studies conducted in Turkey stock market evaluated in general, it is seen that Monday and Tuesday are the days providing the lowest return while Friday is providing the highest return in the week (Karan 2002; Oğuzsoy and Güven 2003; İnamlik et al. 2004; Abdioğlu and Değirmenci 2013).

Table 2 The stock markets indices of fragile five countries

Country	Index name	Index code
Brazil	Ibovespa Brasil Sao Paulo Stock Exchange Index	IBOV
India	S&P Bombay Stock Exchange SENSEX Index	SENSEX
Indonesia	Jakarta Stock Exchange Composite Index	JCI
Turkey	Borsa Istanbul 100 Index	XU100
South Africa	FTSE/JSE Africa All Share Index	JALSH

3 Data and Methodology

Data set of this study consist of daily closing prices of basic stock market indices of the countries named as fragile five in the period 2 January 2009–31 December 2015. Explanation of these countries' stock market indices and index codes are shown in Table 2. All the data used in this study was obtained from Bloomberg data base.

Daily returns related to stock market indices are calculated with the help of the formula below.

$$R_{i,t} = \ln\left(\frac{P_{i,t}}{P_{i,t-1}}\right) \quad (1)$$

In Eq. (1), $R_{i,t;}$ i is logarithmic return of the stock market index in day t, $P_{i,t;}$ i is the closing price of the stock market index in day t, $P_{i,t-1\ ;}$ i is the closing price of the stock market index in day t-1. The reason for calculating the returns by taking their natural logarithm (In) is, to eliminate the negative effects caused by extreme values in the data set on the results (Tunçel 2007; Ergül et al. 2008, 2009).

Studies in the literature analyzing day of the week effect use dummy variable regression analysis (Agrawal and Tandon 1994; Ajayi et al. 2004; Singh 2014), GARCH models (Choudhry 2000; Kiymaz and Berument 2003; Dicle and Levendis 2014), parametric statistical analysis methods (Kohers et al. 2004; Al-Barrak 2008) or non-parametric statistical analysis methods (Kohers et al. 2004; Hui 2005; Lim and Chia 2010). In this study, it is analyzed primarily that whether returns of the stock market on weekdays comply with normal distribution by using Kolmogorov-Smirnov test (K-S). According to this test results, it is seen that the returns of the stock market don't comply with normal distribution characteristics (Table 4). Therefore, the non-parametric statistical analysis of Kruskal-Wallis test (KW) is referenced (Kohers et al. 2004; Hui 2005) and to determine whether average returns of the weekdays are different from each other, this test is applied by using SPSS 15.0 statistical software package. Kruskal-Wallis test (Kruskal-Wallis H test) is known as non-parametric alternative of one-way ANOVA analysis. This test provides a comparison for three or more groups with continuous variables (Kalaycı 2010). In Kruskal-Wallis test, KW value (chi-square statistic) is calculated by using the following formula (Hui 2005; Lim and Chia 2010).

$$KW = \frac{12}{n(n+1)} \sum_{i=1}^{k} \frac{R_i^2}{n_i} - 3(n+1) \tag{2}$$

In Eq. (2), k is the number of trading days' return (k=5), n is the total number of sample observations, n_i is the sample size in i trading day, and R_i is the rank sum of the i trading day.

Generated hypotheses in the study for detecting the existence of day of the week effect as follows.

H_0: There is no difference between the mean returns of the stock market of each of the fragile five countries on weekdays.

H_1: There is difference between the mean returns of the stock market of each of the fragile five countries on weekdays.

As a result of Kruskal-Wallis test, rejection of the null hypothesis H_0 for a country's stock market means that there is a day of the week effect in that market. In other words, such result implies that there is difference between the average returns of the stock market on weekdays. To determine between in which two days average returns have significant differences, it is used Wilcoxon rank sum test. In Wilcoxon rank sum test, to reach statistic value of Z, it is used the formula below (Hui 2005; Lim and Chia 2010).

$$Z = \frac{T - \mu_T}{{\sigma_T}^2} \tag{3}$$

$$E(T) = \mu_T = \frac{n_1(n_1 + n_2 + 1)}{2} \tag{4}$$

$$Var(T) = \sigma_T^2 = \frac{n_1 n_2(n_1 + n_2 + 1)}{12} \tag{5}$$

In Eq. (3), μ_T is Wilcoxon rank sum test mean; σ_T^2 is Wilcoxon rank sum test variance. Equations (4) and (5) shows that how to calculate mean and variance of Wilcoxon rank sum test. In the equations, n_1 is the number of observations in the first sample; n_2 is the number of observations in the second sample. T is the rank sum of observations of the first sample (n_1).

4 Empirical Results

Mean return and standard deviation values of fragile five countries' stock markets for all days and each days of the week (Mondays, Tuesdays, Wednesdays, Thursdays and Fridays) is shown in Table 3. In the period (2 January 2009–31 December 2015), mean returns of all of the stock markets of these countries are positive but only mean returns of Indonesia (%0.07), India (%0.06) and South Africa (%0.05) are statistically

Table 3 Mean returns and standard deviations of stock markets on weekdays

Country	All days	Monday	Tuesday	Wednesday	Thursday	Friday
Brazil	0.0001 (0.0152)	−0.0006 (0.0167)	−0.0005 (0.0149)	0.0006 (0.0145)	0.0013 (0.0154)	−0.0004 (0.0145)
India	0.0006* (0.0127)	0.0008 (0.0161)	−0.0001 (0.0115)	0.0010 (0.0116)	0.0003 (0.0115)	0.0009 (0.0123)
Indonesia	0.0007** (0.0124)	−0.0013* (0.0139)	0.0009 (0.0120)	0.0026*** (0.0119)	0.0004 (0.0127)	0.0009 (0.0108)
Turkey	0.0006 (0.0155)	0.0010 (0.0170)	0.0007 (0.0150)	0.0008 (0.0150)	0.0003 (0.0165)	0.0000 (0.0135)
South Africa	0.0005* (0.0107)	0.0005 (0.0112)	0.0004 (0.0102)	0.0009 (0.0111)	0.0010* (0.0110)	−0.0002 (0.0101)

The figures in the parentheses are the standard deviations
Brazil = Ibovespa Brasil Sao Paulo Stock Exchange Index (IBOV); India = S&P Bombay Stock Exchange SENSEX Index (SENSEX); Indonesia = Jakarta Stock Exchange Composite Index (JCI); Turkey = Borsa Istanbul 100 Index (XU100); South Africa = FTSE/JSE Africa All Share Index (JALSH)
***, **, * represents statistical significance at 1 %, 5 % and 10 % levels, respectively

significant. In the analyzed period, Indonesia stock market provides the highest mean return (%0.07); and the highest volatility is seen in Turkey (%1.55). According to the Table 3, only Brazil and Indonesia stock markets have negative mean returns in Monday. And from these mean returns, Indonesian stock market returns are statistically significant at the level of 10 % (−%0.13). On the other hand, although mean returns of stock markets of India, South Africa and Turkey are positive on Monday, it is statistically insignificant. In other words, these returns are equal to zero. Except Indonesia, all these presented findings contradicts the results of the studies of developed markets claiming that Monday provides lower return than the other four days of the week (French 1980; Gibbons and Hess 1981).

In the literature, some findings related to different countries show that returns of the stock markets on Tuesday are also negative (Aggarwal and Rivoli 1989; Solnik and Bousquet 1990; Oğuzsoy and Güven 2003; Basher and Sadorsky 2006). In Table 3, it's reached the conclusion that Brazil and India stock markets have negative returns in Tuesday but these returns are not statistically significant. When analyzed the Wednesday and Thursday returns of the stock markets, it is seen that Indonesia stock market in Wednesday (0.26 %), South Africa stock market in Thursday (0.10 %) have statistically significant positive returns. In Friday, Indonesia, India and Turkey stock markets have positive, Brazil and South Africa stock markets have negative mean returns. However, none of these mean returns is not statistically different from zero. When the mean returns in Table 3 are evaluated generally, it is seen that most of them were near zero.

Table 4 shows that Kolmogorov-Smirnov normality test results of return series of fragile five countries stock markets on days of the week. The null hypothesis claiming the existence of normal distribution for many return series is rejected on the significance level of %1. For this reason, in the study, it is analyzed whether there is difference between the average returns of stock markets in week days with the help of nonparametric tests.

Table 4 Results of Kolmogorov-Smirnov test for normality

Country	Monday	Tuesday	Wednesday	Thursday	Friday
Brazil	0.055**	0.043	0.048**	0.048**	0.052**
India	0.107***	0.066***	0.085***	0.049**	0.030
Indonesia	0.081***	0.078***	0.085***	0.101***	0.094***
Turkey	0.089***	0.051**	0.051**	0.062***	0.050**
South Africa	0.071***	0.046*	0.058***	0.069***	0.054**

Brazil = Ibovespa Brasil Sao Paulo Stock Exchange Index (IBOV); India = S&P Bombay Stock Exchange SENSEX Index (SENSEX); Indonesia = Jakarta Stock Exchange Composite Index (JCI); Turkey = Borsa Istanbul 100 Index (XU100); South Africa = FTSE/JSE Africa All Share Index (JALSH)

***, **, * represents statistical significance at 1 %, 5 % and 10 % levels, respectively

Table 5 Results of Kruskal-Wallis test for fragile five stock markets

Country	Chi-square statistics	p-value	Null hypothesis (H_0)
Brazil	4.169	0.384	Accept
India	0.842	0.933	Accept
Indonesia	**24.142*** **	**0.000**	**Reject**
Turkey	1.253	0.869	Accept
South Africa	3.914	0.418	Accept

The null hypothesis (H_0) states that there is no difference in the returns across the days of the week. If the null hypothesis is rejected, this implies that there is a day of the week effect in the stock market of the mentioned country

Brazil = Ibovespa Brasil Sao Paulo Stock Exchange Index (IBOV); India = S&P Bombay Stock Exchange SENSEX Index (SENSEX); Indonesia = Jakarta Stock Exchange Composite Index (JCI); Turkey = Borsa Istanbul 100 Index (XU100); South Africa = FTSE/JSE Africa All Share Index (JALSH)

*** represents statistical significance at 1 % level

Table 5 shows the results of Kruskal-Wallis test which is one of the nonparametric statistical analysis methods. Chi-square values are statistically insignificant for all the stock markets except Indonesia stock market. Chi-square value concerning the stock market of Indonesia is statistically significant at the level of 1 % ($\chi^2 = 24.142$, p-value = 0.000). For this reason, H_0 hypothesis claiming there is no difference between the returns of Indonesia stock market in week days is rejected and it is demonstrated that this stock market has different mean returns in the weekdays. In other words, the existence of day of the week effect for Indonesia stock market is proven. This findings show that in fragile five countries, except Indonesia, Brazil, India, South America and Turkey stock markets price movements cannot be predicted by using historical price data. Hui (2005) express that during the 1997 Asian financial crisis, there is no day of the week effect in America, Japan, Hong Kong, South Korea and Taiwan stock markets. The author argues that the disappearing of this effect cannot be related to the crisis but the period chosen for the analysis. In addition, many studies in recent years, it is claimed that the day of the week effect is diminishing even disappearing (Steeley

Table 6 Results of Wilcoxon Rank Sum Test for Indonesia Stock Market

Pairs of trading days	Z-statistics
Monday–Tuesday	−2.952***
Monday–Wednesday	−4.529***
Monday–Thursday	−2.049**
Monday–Friday	−3.089***
Tuesday–Wednesday	−1.617*
Tuesday–Thursday	−1.178
Tuesday–Friday	−0.064
Wednesday–Thursday	−2.915***
Wednesday–Friday	−1.778*
Thursday–Friday	−1.182

***, **, * represents statistical significance at 1 %, 5 % and 10 % levels, respectively

2001; Kamath and Chusanachoti 2002; Ajayi et al. 2004; Kohers et al. 2004; Liu and Li 2010).

To be able to determine which days of the week causing the rejection of H_0 hypothesis claiming the equity of mean returns, Wilcoxon rank sum test is applied. This test determines whether returns on the two days of the week are different from each other significantly. According to the Kruskal-Wallis test results, because day of the week effect is only found in Indonesia stock market, Wilcoxon rank sum test is applied only for this country's stock market. Z-statistic values for this test are presented in Table 6. Average return of Indonesia stock market on Monday is statistically different from average returns on Tuesdays, Wednesdays, Thursdays and Fridays. This situation indicates that, Indonesia stock market provides significantly lower return on Monday in comparison to the other transaction days of the week. Meanwhile, according to the Z statistic results in Table 6, Indonesia Stock market provides statistically significant highest return in Wednesday. In other words, Indonesia stock market provides higher return on Wednesday compared to Monday, Tuesday, Thursday and Friday. Berument and Kiymaz (2001) show that the highest and lowest return takes place on Mondays and Wednesdays respectively in S&P 500 market indices. Choudhry (2000) refers that the lowest return of the Indonesia stock market occurred in Mondays. On the other hand, Lim and Chia (2010) argue that day of the week effect is not seen in Indonesia stock market.

5 Conclusion

Whether stock markets' providing different average returns in the weekdays has been the subject of several studies. In reviewing the literature on this topic, it is argued that stock markets have lowest average returns on Mondays, highest average returns on Fridays. This situation is known in the literature as, day of the week anomaly or day of the week effect. In this study, day of the week effect is analyzed

for Brazil, India, Indonesia, South Africa and Turkey which are named as fragile five, by using basic indices of these countries' stock markets data in the period (02 January 2009–31 December 2015). In the study, since the returns on the week days on the basis of market don't comply with the normal distribution assumption, for analyzing the day of the week effect, it is used Kruskal-Wallis and Wilcoxon rank sum tests which are non-parametric statistical analysis methods.

Only Indonesia stock market which is one of the fragile five countries provides statistically significant negative average return on Monday. Also, it is seen that Indonesia stock market on Wednesday, South Africa stock market on Thursday, provide statistically significant positive average returns. When average returns of the stock markets on weekdays are analyzed in general, many of them are close to zero. Results of the Kruskal-Wallis test which are used to prove the existence of day of the week effect, cannot demonstrate the existence of day of the week effect in four countries of fragile five, except Indonesia stock market. After Kruskal-Wallis test, results of the Wilcoxon rank sum test which is applied for Indonesia stock market, show that this market has lowest return on Monday, highest return on Wednesday. All these findings indicate that, after 2008 global crisis has begun, day of the week effect has start to diminish in the stock markets of fragile five countries, except Indonesia.

In studies in the future, day of the week effect can be analyzed again by including secondary market indices or individual stocks to the analysis scope. The validity of the results presented in this study can be compared using different methodologies. Also by expanding the period under review, the existence of day of the week effect in these markets can be analyzed for before 2008 global financial crisis.

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Market Volatility, Beta, and Risks in Emerging Markets

László Nagy, Mihály Ormos, and Dusán Timotity

Abstract We investigate the risk and return characteristics of 59 emerging and developed stock market indices for the period 1990–2015. The main focus of our analysis is the convergence of emerging capital markets. We apply the standard Capital Asset Pricing Model (CAPM) framework to investigate the positive relationship between risk and return, and also examine the evolution of the CAPM beta. We show that CAPM betas of different stock markets converge to the world average over time. In settings applying different risk measures from beta (volatility, Expected Downside Risk, and Shannon entropy), empirical results confirm the positive relationship between risk and expected return; however, we find that international capital markets still have significant individual characteristics.

1 Introduction

Since the milestone paper of Bekaert and Harvey (1995), literature on international integration has documented a strong convergence in the characteristics (Narayan et al. 2011) of risk-return relationship (Eun and Lee 2010; Heimonen 2002) in liberalized stock markets. On the other hand, Errunza and Losq (1985) find mildly segmented capital markets, and based on their findings, we test the international convergence for the CAPM beta. Our results are similar to the findings of Jayasuriya and Shambora (2008); however, we provide evidence for the international convergence with more robust analysis, including 59 stock indices for a 25-year period both at monthly and yearly horizons (Table 1).

We present our empirical results in four different settings. First, the standard CAPM framework for our sample is presented, in order to show the positive relationship between risk and expected return. Second, the evolution of the most

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Table 1 History of emerging markets (EM) and developed markets (DM) classification

Author	Milestone paper	Conclusion
Haim and Marshall (1970)	International Diversification of Investment Portfolios	EM and DM indices are poorly correlated, thus using EM indices implies better diversification.
Samuelson (1970)	The Fundamental Approximation Theorem of Portfolio Analysis in Terms of Means, Variance and Higher Moments	Quadratic optimization could be not optimal; hence, higher moments are important as well.
Baumol (1986)	Productivity Growth, Convergence, and Welfare: What the Long-Run Data Show	Historical data shows EM and DM have different GDP growth rates.
Barro (1991)	Economic Growth in a Cross Section of Countries	Human capital and political stability are proxies of GDP growth—which can explain the gap between EM and DM.
Richards (1996)	Volatility and Predictability in National Markets: How do Emerging and Mature Markets Differ?	The volatility of EM decreased after market liberalization, but foreign investors' overreaction causes large downside risk.
Hwang and Pedersen (2002)	Best Practice Risk Measurement in Emerging Markets: Empirical Test of Asymmetric Alternatives to CAPM	Fat-tail property of EM returns can be captured by Asymmetric Response Model and Lower Partial Moment CAPM.
Eun and Lee (2010)	Mean–Variance Convergence Around the World	Declining country and increasing industry effects imply mean-variance convergence within DM. However, EM do not converge to DM.
Heimonen (2002)	Stock Market Integration: Evidence on Price Integration and Return Convergence	Empirical evidence of partial time-varying financial integration of EM.
Salomons and Grootveld (2003)	The Equity Risk Premium: Emerging vs. Developed Markets	Average EM risk premium is higher than DM's, but its non-symmetric fat-tail distribution brings difficulties in risk assessment.
Narayan et al. (2011)	Do Market Capitalization and Stocks Traded Converge? New Global Evidence	Statistical evidences of market convergence.

common risk measure in asset pricing, the CAPM beta, is discussed for our sample period. Third, we show that: according to the idea of convergence of international markets due to international diversification and the development of capital markets, these CAPM betas and the riskiness of capital markets converge to the world average over time. Fourth, we discuss the effect of changing the beta to alternative risk measures such as Expected Downside Risk (EDR) (Ormos and Timotity 2016a), Shannon entropy (Ormos and Zibriczky 2014), and volatility. In order to do so, we present the prediction power of the regression results for daily, monthly, and yearly horizons.

Our analysis on the whole sample from 1990 to 2015 reveals a clear positive relationship between betas and expected returns in daily and yearly settings; however, when using monthly data this positive relationship cannot be seen. Overall, when applying different risk measures from beta, in most of the cases the empirical results confirm the positive relationship between risk and expected return; notwithstanding, international capital markets still display significant individual characteristics.

2 Data

The current study presents detailed analysis of 59 emerging and developed stock market indices. The analyses use US dollar denominated stock splits and dividends adjusted to daily closing prices between 26/9/1990 and 21/9/2015; data is provided by Thomson Reuters. The risk-free rate is benchmarked by the 3-Month US Treasury Bill rate from the Federal Reserve Economic Database. Our selection criteria for covered stock indices is based on their classification in IMF Economic Outlook 2015 and the MSCI WORLD Index composition in 2015. These countries are presented in Table 2. In our analysis we allocate approximately the same weight to each region. Regions and indices are selected based on the country breakdown list of MSCI World index. Although the number of countries are not equal in each region, we rebalance the sample by choosing approximately ten indices from each group.

Table 2 List of selected indices

Region	Country	Index
Africa	Kenya, Namibia, Nigeria, South Africa, Togo, Malawi, Zambia	.NASI, .OVRLNM, .NGSEINDEX, .JTOPI, .BRVMCI, .MALSMV, .LASILZ
Arab world	Bahrain, Egypt, Kuwait, Morocco, Qatar, Saudi Arabia, United Arab Emirates	.BAX, .EGX30, .KW15, .MASI, .QSI, .TASI, .ADI
Asia	India, China, Indonesia, Malaysia, Vietnam, Thailand, Bangladesh, South Korea, Taiwan, Hong Kong	.BSESN, .CSI300, .JKSE, .KLSE, .VNI, .SETI, .DS30, .KS11, .TWII, .HSI
Eastern Europe	Russia, Ukraine, Bulgaria, Hungary, Poland, Romania, Turkey, Czech Republic	.IRTS, .UAX, .SOFIX, .BUX, .WIG, .BETI, .XU100, .XUO30, .PX
South and Middle America	Argentina, Brazil, Chile, Colombia, Costa Rica, Mexico, Venezuela	.MERV, .BVSP, .IPSA, .COLCAP, .IACR, .MXX, .IBC
Western Europe, North America and Australia	United States, Japan, France, UK, Canada, Switzerland, Germany, Australia, Spain, Sweden, Netherlands, Italy, Denmark, Belgium, Finland, Norway	.SPX, .DJI, .TOPX, .FCHI, .FTSE, .GSPTSE, .SSMI, .GDAXI, .AXJO, .IBEX, .OMXS30, .AEX, .FTMIB, .OMXC20, .BFX, .OMXH25, .OBX

Table 3 Descriptive statistics of monthly returns

Index	.CSI300	.XU100	.DJI	.UAX	.WORLD
Mean	0.018	0.000	0.012	−0.034	0.004
Variance	0.056	0.026	0.009	0.037	0.002
Skewness	−0.336	−0.809	−0.819	−0.721	−1.889
Number of observations	129	310	313	104	317

In order to underline the very different characteristics of individual stock indices, we present the monthly descriptive statistics in Table 3. One may find a controversial relationship between risk and return by simply looking at the Ukrainian (.UAX) stock index compared to the world index: while the former has much greater volatility, its mean return is still negative—instead of providing a higher expected risk premium. One may also notice a further interesting property of our data sample: the number of observations differ—as some indices were not in existence at the beginning of our sampling period. We discuss how this is handled for our empirical results in the methodology section. Table 3 shows the descriptive statistics of the monthly returns, where CSI300, XU100, DJI, UAX, and WORLD represent the Shanghai Composite 300, Brose Istanbul 100, Dow Jones Industrial Average, Ukraine UX Index, and MSCI World Index respectively.

3 Methodology

The first step in the analysis is forming monthly and yearly return from daily log-return data through aggregation. If there is a year or month in which we have less than 150 or 15 trading days respectively, we drop the data points to preserve the comparability of the findings. In order to make the results more robust, for monthly and yearly aggregation we used a 30/365 convention. We emphasize that this filtering may cause bias in the statistics of short return series (e.g., DS30 and ADI). Risk premium is calculated as the difference of logarithm return and risk free rate, where daily rates are calculated by rescaling the 3-month risk free returns with 25,000.

The best linear unbiased estimator of mean is a simple arithmetic average, consequently we calculate the average returns for each index. However, mean does not contain all the information, and in particular, it does not reveal anything about risk—and so we also show sample standard deviation. The variance refers to the average risk; however, if we would like to use limit theorem techniques, then skewness could give a good clue to the rate of convergence. Nevertheless, tail risk needs to be investigated as well. Therefore, we also apply kurtosis, which is an appropriate measure because of its sensitivity to huge deviations from mean. While kurtosis represents the tail risk of the return distributions well, we still emphasize that it is sensitive to outliers. Figure 1 represents the sensitivity of kurtosis as a

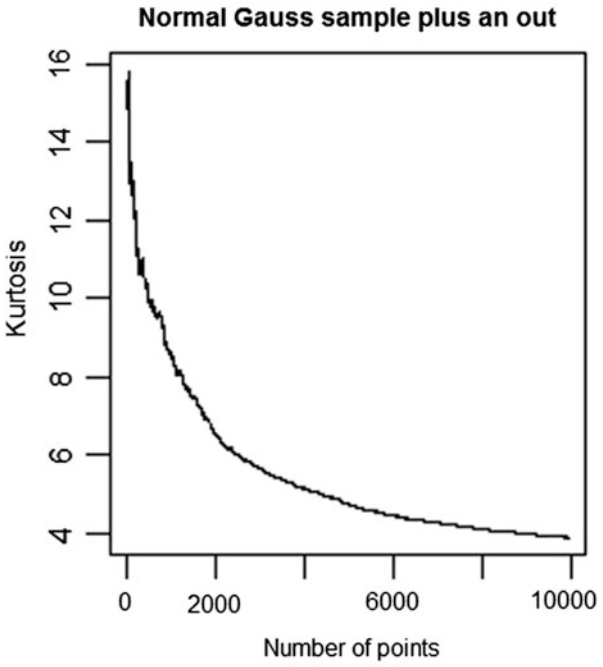

Fig. 1 Outlier sensitivity of kurtosis

Table 4 Non-linear risk measures of monthly returns

Index	.CSI300	.XU100	.DJI	.UAX	.WORLD
EDR	−0.170	−0.122	−0.073	−0.167	−0.035
Entropy	1.579	1.829	1.366	1.336	1.284
Jarque-Bera test	19.438	159.717	126.956	86.613	1792.226
p-value of Jarque-Bera test	0.000	0.000	0.000	0.000	0.000

function of sample size. A standard normal sample is generated for a given number points represented by the horizontal axis, then, number ten is added to the sample as an outlier

The probability of six standard deviation normally distributed shocks is less than 1.5×10^{-8}, which means that, on average, less than 10 shocks can be expected in one million years; hence, only one large drop can ruin the statistics.

The basic concept assumes that the returns follow normal distribution. Statistical evidence also rejects this belief. There are many different ways to test normality (Kolmogorov-Smirnov test, Chi-square test, Jarque-Bera test, etc.), which we present in Table 4. Empirical investigations show that downside risk is more significant: tumbling is more likely than huge upward swings.

Table 4 presents the risk statistics of the monthly returns, where CSI300, XU100, DJI, UAX, WORLD represent the Shanghai Composite 300, Brose Istanbul 100, Dow Jones Industrial Average, Ukraine UX Index, and MSCI World Index respectively.

Downward movements could be set apart from upward returns. This approach leads to downside risk measures, such as the expected downside risk (EDR) (Ormos and Timotity 2016a). Let X be a random variable with probability distribution function p, then EDR is defined as

$$\boldsymbol{EDR}(X) = \boldsymbol{E}\left[(X - \boldsymbol{E}(X))1_{(X \leq \boldsymbol{E}X)}\right] \tag{1}$$

The hurdles of parametric approaches can be cleared by using non-parametric metrics. For example, tail behaviour can be better understood with Shannon entropy as proposed by Ormos and Zibriczky (2014):

$$\boldsymbol{H}(X) = -\boldsymbol{E}\big(ln(p(X))\big) \tag{2}$$

The approach penalizes probability weighted dispersion, thus, a constant random variable has the lowest, and uniform the highest Shannon entropy.

We emphasize that statistical indications could be misleading if returns are not stationary: we test weak stationarity (covariance stationarity) through ADF and KPSS tests presented in Table 5. Coefficients showing monthly returns of developed markets are a weak stationer, whereas some emerging market data shows different properties.

Notice that normality assumption makes the statistics more robust. Auto correlation functions (ACF) and partial autocorrelation functions (PACF) give further information about linear dependencies. In Fig. 2 we show that higher order moments are conditionally heteroscedastic; hence, strong stationarity and independence does not hold for daily returns, while on monthly basis this dependence is eliminated.

Table 5 Stationarity analysis of monthly returns

Index	.CSI300	.XU100	.DJI	.UAX	.WORLD
ADF	−3.062	−7.261	−6.900	−3.356	−6.447
p-value of ADF	0.135	0.010	0.010	0.066	0.010
KPSS	0.126	0.043	0.293	0.121	0.125
p-value of KPSS	0.100	0.100	0.100	0.100	0.100

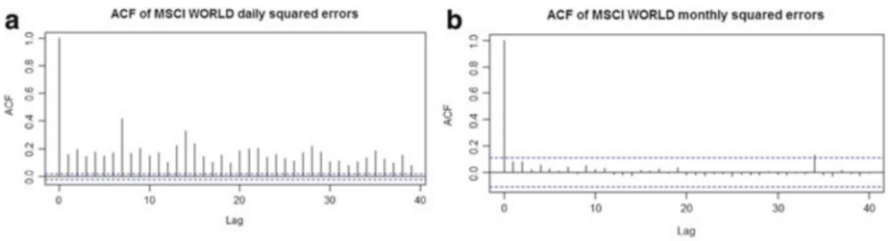

Fig. 2 Non-linear dependency of MSCI World Index returns. (**a**) Conditional dependence of daily volatility. (**b**) Conditional dependence of monthly volatility

Different risk metrics can be used to compare stock indices in the risk/reward framework. Regressing returns on different measures could help us to identify those indices which bear more risk than necessary. The linearity assumption says that all the indices should scatter around the regression line, which contains the risk free rate and the market portfolio.

Beyond static analysis, dynamic evaluation of returns could be examined using one-year shifts of the 5-year time window. This approach implies overlapping sub-periods, moreover, dependence has a smoothing effect, which also helps to recognize trends.

In the introduction we also mentioned that, as emerging capital markets trend towards developed markets, and international diversification plays an increasingly important role in asset allocation, separate markets and CAPM betas should converge to the global portfolio and unity respectively. In our tests we investigate empirically the existence of this pattern by measuring the average squared distance between individual betas and the world index, and search for a decreasing temporal trend. Analytically we define the error term as

$$\varepsilon_t = \sum_{i=1}^{n} \frac{\left(\beta_{i,t} - 1\right)^2}{n}, \tag{3}$$

where n stands for the number of stock market indices at time t. Then, our fitted regression includes a linear trend of time (t) and dummy series for the 1997–1998 Asian/Russian Crisis (D1997), 2001 Dot-com Bubble (D2001), and 2008 Financial Crisis (D2008). Hence, we apply an OLS estimation for the equation

$$\varepsilon_t = \gamma_0 + \gamma_1 t + \gamma_2 D_{1997} + \gamma_3 D_{2001} + \gamma_4 D_{2008} + e_t, \tag{4}$$

where e_t is a zero-mean error term. The decision criteria for the rejection of no convergence is a significantly negative γ_1 coefficient.

Having discussed the theories necessary to understand our findings and the methodology used throughout our paper, in following section we turn to the presentation of our empirical results.

4 Empirical Results

In this section we present our empirical results in four different settings. First, the standard CAPM framework is presented in order to show the positive relationship between risk and expected return for our sample. Second, the evolution of the most common risk measure in asset pricing, the CAPM beta is discussed for our sample period. Third, we show that, according to the idea of convergence of international markets due to international diversification and the development of capital markets as we discussed above, these CAPM betas and the riskiness of capital markets

converge to the world average over time. Fourth, we turn to elaborating on the effect of changing the beta to alternative risk measures, such as the volatility, Expected Downside Risk, and Shannon entropy. In order to do so, we present the prediction power of the regression results at daily, monthly, and yearly horizons.

4.1 Risk Versus Expected Return in the CAPM Framework

According to the Expected Utility Theory (Von Neumann and Morgenstern 2007), decision-making under uncertainty yields expected utility that is a linear function of expected return and variance. The most commonly used framework in financial modelling, the Capital Asset Pricing Model (CAPM), pioneered by Lintner (1965), Mossin (1966), and Sharpe (1964), suggests that such perception of utility leads to a linear relationship between relevant risk, as measured by beta and expected return. In this section we present our findings on this latter relationship by applying estimation based daily, monthly, and yearly returns.

First, we provide a result for the daily analysis. In Fig. 3, daily expected return is plotted against the beta values of separate stock market indices. Although, some outliers are present in the sample (such as .IBC, the stock index of Caracas), a clear positive relationship between the daily estimation of beta values and expected returns is present. The regression line is estimated with a constant, that is, we allow for inefficient markets as measured by the Jensen alpha. The red dot in the middle stands for reference market portfolio (the MSCI world index).

In Table 6 we summarize our results for daily return estimations and statistically confirm the positive relationship shown above. Two settings are analysed here: in the first one (the first two columns) we estimate a Jensen alpha by including a constant in our regression, while in the second one (last two columns) only the risk

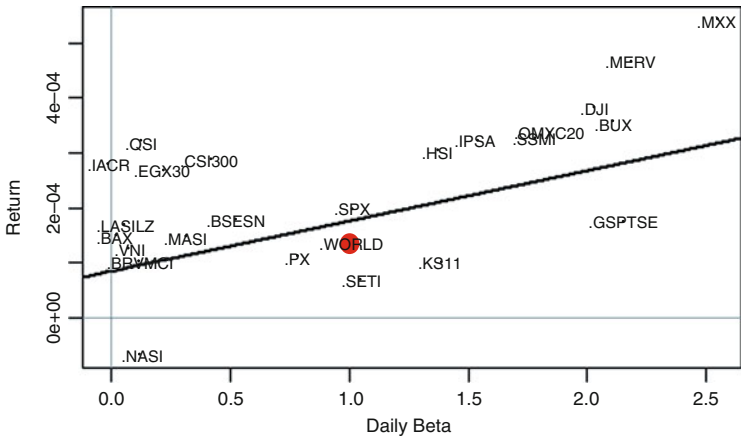

Fig. 3 Daily relationship between CAPM betas and expected return

Table 6 Daily relationship between CAPM betas and expected return

	Coefficient	p-value	Coefficient	p-value
Alpha	0.0001	0.0141	–	–
Beta	0.0001	0.0009	0.0001	0.0000

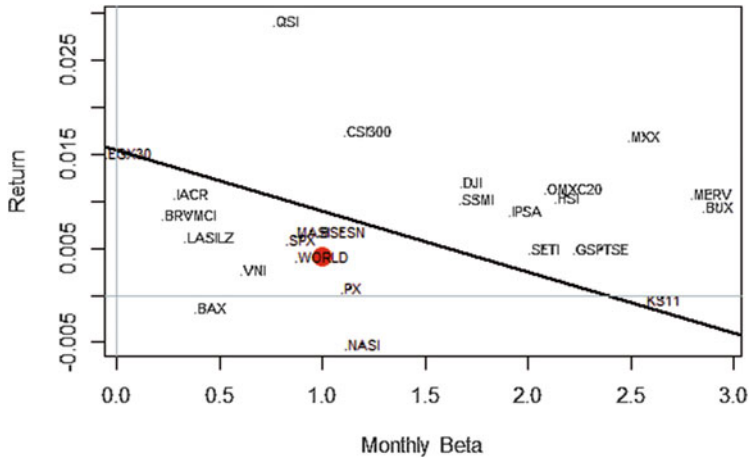

Fig. 4 Monthly relationship between CAPM betas and expected return

Table 7 Monthly relationship between CAPM betas and expected return

	Coefficient	p-value	Coefficient	p-value
Alpha	0.0131	0.0260	–	–
Beta	−0.0049	0.2425	0.0017	0.4533

premium is estimated. In both cases we confirm that the risk premium is significantly different from zero and is positive. Moreover, in the positive constant, the p-value lower than 0.05 suggests a reasonably high average over performance of daily returns as compared to the World Index. This latter finding is probably due to the equally weighted error terms of the OLS estimation, since the MSCI World Index represents the market capitalization weighted average of the sampled countries.

Now, we turn to discussing our results based on monthly return samples. First, as Fig. 4 indicates, the expected positive relationship between risk and reward does not hold anymore. This latter anomaly could be attributed to the outliers (the .ADI and .DS30 indices of Abu Dhabi and Dhaka, for instance), or the aforementioned particularity of monthly return distributions. Nevertheless, we provide the regression analysis in Table 7, which confirms the disappearance of the former significant relationship.

Irrespective of the inclusion of a constant in the regression, both models indicate no significant relationship between CAPM betas and monthly expected return. Even so, the alpha remains significantly positive supporting the idea of inefficient pricing in this setting.

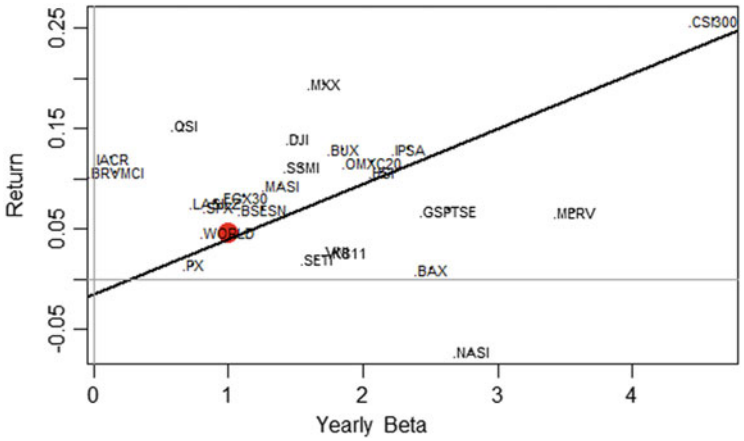

Fig. 5 Yearly relationship between CAPM betas and expected return

Table 8 Yearly relationship between CAPM betas and expected return

	Coefficient	p-value	Coefficient	p-value
Alpha	−0.0125	0.5976	–	–
Beta	0.0529	0.0001	0.0386	0.0000

Finally, we provide an estimation for the beta—expected return relationship based on yearly returns as well. As Fig. 5 shows, the outliers of the monthly statistics behave correctly in this sample; hence, the positive relationship between risk and reward remains intact.

Indeed, the regression analysis indicates highly significant co-movements between distinct stock markets and the world portfolio. Moreover, according to the p-value of the Jensen alpha, the former evidence of inefficient markets vanishes (Table 8).

Now, after we have shown the risk-reward relationship for our total sample through a cross-sectional analysis, we turn to discussing the time-series and panel analysis of the CAPM.

4.2 The Evaluation of CAPM Betas

Since 1990 capital markets have changed in many ways. The vast increase in world trade volume and liberalization of markets has led to the emergence of new capital markets. As measured by the World Trade Index of the CPB Netherlands Bureau for Economic Policy Analysis, international trade has increased by an immense 235 % over the last 25 years. This change in international trade, along with the greater access to capital markets, has further facilitated investors' ability to diversify their portfolios internationally. One the one hand, this global access to capital

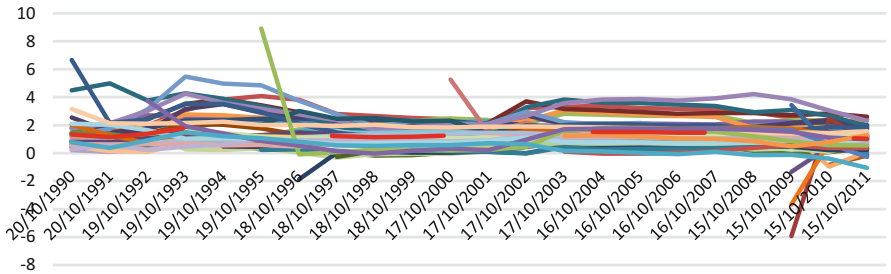

Fig. 6 The evolution of CAPM betas

markets supports the idea that well-diversified portfolios are priced in the CAPM setting. On the other hand, the development and increasing interconnectivity of geographically separate markets yields that these markets converge to each other; therefore, their betas should converge to unity.

In Fig. 6, we present this convergence by plotting the CAPM betas estimated on five-year overlapping windows, with one year lags. In line with most studies in empirical literature in the topic, we present our results using estimations based on monthly returns. The dashed line represents the equally weighted average beta for each five-year period, whereas the market capitalization weighted average is equal to unity constantly (as this latter aggregation would represent the MSCI World Index itself).

It is worth noting two patterns here: first, towards the end of the sample period betas seem to be more concentrated around the mean than at the beginning; second, in general the emergence of new capital market indices comes with an extreme starting beta—however, these quickly converge to the mean as well. In the following we test the statistical significance of this convergence.

4.3 Convergence to the Market

As discussed in the methodology section, we test the latter hypothesis (whether the CAPM betas converge to unity) by searching for a time trend component in the mean squared difference between CAPM betas and the world beta. We also include three dummy variables for the 1997 Asian/Russian crisis, the 2001 Dot-com Bubble, and the 2008 Financial Crisis. In our regression analysis the sample consists of stock market indices for which beta estimation is provided for each five-year estimation window. Hence, stock indices that did not exist in 1990, or those that have been excluded in any beta estimation are excluded.

Results of the analysis based on daily returns, is presented in Table 9. Although, the R-squared value indicates a reasonable fit to the linear model, apart from the constant term, none of the variables are significant at the five percent level. Here,

Table 9 Convergence of CAPM betas estimated on daily returns

	Coefficient	p-value
Constant	0.4262	0.0000
Time	0.0070	0.0962
Year 1997	−0.0385	0.7466
Year 2001	−0.1790	0.1434
Year 2008	0.0697	0.5709
R-squared	0.2880	

Table 10 Convergence of CAPM betas estimated on monthly returns

	Coefficient	p-value
Constant	1.4559	0.0000
Time	−0.0335	0.0375
Year 1997	−0.4533	0.3148
Year 2001	−0.6067	0.1811
Year 2008	0.1068	0.8151
R-squared	0.3138	

Table 11 Convergence of CAPM betas estimated on yearly returns

	Coefficient	p-value
Constant	19.4050	0.0012
Time	−1.0140	0.0168
Year 1997	−10.3779	0.3703
Year 2001	−6.1440	0.5908
Year 2008	2.3878	0.8393
R-squared	0.3187	

we can reject the null hypothesis that separate capital markets converge towards the global index.

In the monthly return analysis, however, the results change: as shown in Table 10, we find a clear negative linear time trend in the squared difference process. The constant is again positive and significant, suggesting that differences between separate stock markets and the world index are still far from being an integrated structure that would allow for the elimination of country-specific shocks. Nevertheless, the significant convergence to zero indicates a continuous trend towards an interconnected global market structure, in which individual shocks are eliminated.

As we show in Table 11, our analysis on yearly beta estimations yield similar results to the monthly tests: the positive constant and the negative time trend are significant here as well. Still, a noteworthy property of the latter lies in the coefficient values: here, both the constant and the time trend is much greater in the absolute sense, indicating a greater difference from, but much quicker convergence to, the world index.

Overall, we argue that the convergence property of CAPM betas can be confirmed for monthly and yearly estimations, as daily estimations are too noisy to

provide significant results. The former two subcases indicate a decreasing trend in the diversity of international capital markets; nonetheless, these markets are still found to have significant individual characteristics as measured by the difference of their beta parameters. In the following we aim to capture these differences by introducing alternative risk measures.

4.4 Performance of Alternative Risk Measures

In this subsection, next to the CAPM beta, we apply three alternative risk measures that have been documented to better capture the risk-expected return relationship in specific situations. In particular, we compare the predictive performance of beta, Expected Downside Risk (EDR) (Ormos and Timotity 2016a), Shannon entropy (Ormos and Zibriczky 2014), and volatility based asset pricing models.

First, in order to provide an approximation for the pure risk premium, we present our findings for regressions with no estimated constant. Here, we assume any factor not captured by the given risk measure is contained in the risk-free rate, from which the latter is deducted from the expected return to form our dependent variable. The daily results presented in Table 12 indicate a significant relationship between risk and reward in each setting. A noteworthy property of EDR emerges here: this measure can yield both a negative and a positive relationship between risk and return depending on the risk-free rate (see Ormos and Timotity 2016b). Another interesting feature of the results is reflected in the R-squared values: these measures of goodness-of-fit indicate that simple volatility, which also captures idiosyncratic risk, outperforms its competitors on a daily basis.

Monthly statistics shown in Table 13 indicate fairly similar findings: the positive and significant relationship between risk and reward remains intact except for EDR,

Table 12 Regression results for daily returns without alpha

	Coefficient	p-value	Coefficient	p-value	Coefficient	p-value	Coefficient	p-value
Beta	0.0001	0.0000	–	–	–	–	–	–
EDR	–	–	−0.0068	0.0073	–	–	–	–
Entropy	–	–	–	–	0.0001	0.0000	–	–
Volatility	–	–	–	–	–	–	0.0060	0.0000
R-squared	0.2790	–	0.1156	–	0.2580	–	0.4060	–

Table 13 Regression results for monthly returns without alpha

	Coefficient	p-value	Coefficient	p-value	Coefficient	p-value	Coefficient	p-value
Beta	0.0386	0.0000	–	–	–	–	–	–
EDR	–	–	−0.0127	0.7585	–	–	–	–
Entropy	–	–	–	–	0.0245	0.0065	–	–
Volatility	–	–	–	–	–	–	0.1069	0.0005
R-squared	0.3157	–	0.0016	–	0.1208	–	0.1918	–

for which we cannot reject the null hypothesis of zero effect on the expected return. In contrast to the daily statistics, fitting error for all measures but the CAPM beta increases, therefore, making the latter model the best performing.

Finally, the yearly results presented in Table 14 indicate significant relationships for only the entropy and volatility. Accordingly, they provide the highest R-squared values—suggesting that asset prices are driven by these idiosyncratic measures in the yearly horizon.

Overall, the risk premium tests more or less confirm the positive relationship between risk and reward in all three horizons. However, the assumption that the discounted prices are driven solely by the applied risk measures may have caused a great amount of bias in our previous results. Therefore, in the following we provide regressions containing a Jensen alpha estimation as well.

Table 15 summarizes our results based on daily returns. Contrary to the previous findings, risk measures only have a significant effect on beta and volatility regressions. In line with them, however, idiosyncratic volatility again outperforms its competitors.

The monthly results presented in Table 16 indicate the superior performance of the EDR measure, both in terms of significance and goodness-of-fit. In particular, and surprisingly, this is the only significant measure; moreover, its p-values are extremely low. It is no surprise, hence, that R-squared values indicate a similar pattern.

Yearly analysis in Table 17 presents findings somewhat similar to monthly results. Again, EDR outperforms its alternatives by providing lower p-values and higher goodness-of-fit.

In summary, empirical results confirm the positive relationship between risk and expected return in most of the cases. We also highlight that the inclusion of alpha

Table 14 Regression results for yearly returns without alpha

	Coefficient	p-value	Coefficient	p-value	Coefficient	p-value	Coefficient	p-value
Beta	0.0017	0.4533	–	–	–	–	–	–
EDR	–	–	−0.0059	0.2682	–	–	–	–
Entropy	–	–	–	–	0.0054	0.0113	–	–
Volatility	–	–	–	–	–	–	0.0549	0.0252
R-squared	0.0097	–	0.0005	–	0.1056	–	0.0834	–

Table 15 Regression results for daily returns including alpha

	Coefficient	p-value	Coefficient	p-value	Coefficient	p-value	Coefficient	p-value
Alpha	0.0001	0.0141	0.0002	0.0000	0.0001	0.3273	0.0000	0.6888
Beta	0.0001	0.0009	–	–	–	–	–	–
EDR	–	–	0.0027	0.5617	–	–	–	–
Entropy	–	–	–	–	0.0001	0.1608	–	–
Volatility	–	–	–	–	–	–	0.0087	0.0001
R-squared	0.1733	–	0.0058	–	0.0336	–	0.2233	–

Table 16 Regression results for monthly returns including alpha

	Coefficient	p-value	Coefficient	p-value	Coefficient	p-value	Coefficient	p-value
Alpha	0.0131	0.0260	0.0267	0.0000	−0.0071	0.6348	0.0030	0.6781
Beta	−0.0049	0.2425	–	–	–	–	–	–
EDR	–	–	0.2371	0.0001	–	–	–	–
Entropy	–	–	–	–	0.0096	0.3272	–	–
Volatility	–	–	–	–	–	–	0.0375	0.5094
R-squared	0.0239	–	0.2323	–	0.0168	–	0.0077	–

Table 17 Regression results for yearly returns including alpha

	Coefficient	p-value	Coefficient	p-value	Coefficient	p-value	Coefficient	p-value
Alpha	−0.0125	0.5976	0.1518	0.0000	−0.0091	0.9268	0.0106	0.7418
Beta	0.0529	0.0001	–	–	–	–	–	–
EDR	–	–	0.2682	0.0000	–	–	–	–
Entropy	–	–	–	–	0.0452	0.4295	–	–
Volatility	–	–	–	–	–	–	0.1282	0.0431
R-squared	0.2384	–	0.2527	–	0.0110	–	0.0699	–

significantly affects the statistics, although, its effect on the goodness-of-fit of models greatly varies depending on the risk measure applied (e.g., for volatility and entropy it is never significant, and in contrast, it is always significant for EDR). Based on the findings discussed above, no single risk measure is universally superior to the others: specific settings yield decidedly different goodness-of-fit results.

5 Conclusion

In recent decades, risk measure became the central problem of capital market analysis. We have been aware of the central the theory that capital markets converge; however, speed, other properties, and transients of the process have not been investigated in a wide sample—until now. In this paper we have shown that the positive relationship between risk and return is intact for the international capital markets in the last 25 years, even in the periods of financial crisis. However, the convergence process has still not ended, thus, similar to Errunza and Losq (1985) we still find mildly segmented capital markets where international diversification gives risk reduction opportunities. We have shown that the diversification effect is decreasing in time as the convergence process shrinks the distance between different markets; however, the speed of the convergence process is diminishing. We also find that not only the standard CAPM beta, but novel risk measures like volatility, expected downside risk of entropy can similarly capture expected returns and risk premiums with higher accuracy. The results with alternative risk measures

confirm our null hypothesis: that applying different risk measures to a CAPM beta positive relationship can be measured between risk and expected return; notwithstanding, international capital markets still possess their own significant individual characteristics.

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Part IV
Impact of Crisis, Economic Recovery and Sectoral Developments

The Relationship Between Firm Size and Export Sales: Sector or Size, What Matters?

Niyazi Berk and Belma Öztürkkal

Abstract This paper examines the performance of export focused companies listed on the Borsa Istanbul trading in the emerging market of Turkey. Using the panel data of stock market prices (1995–2011), we study the performance of companies in different sectors and their return performance in the volatile exchange rate environment and devaluation periods of 1996, 1997, 1998, 1999, 2001 and 2008. The paper investigates sales, market capitalization or asset performances' statistical significance level, with regard to these companies' export level. We review the performance of these operational measures in an environment of changing foreign exchange rates. Regression analysis is used to measure the effects of currency devaluation on the companies analyzed. Finally, the study analyzes the export sales of companies by sector following a period of sharp devaluation.

1 Introduction

There is extensive research for crisis periods and firm characteristics. One area of research includes changes in exchange rates and the related effects on company financials. Foreign exchange rate devaluation is assumed to effect companies' sales and profits. Our hypothesis is that this will change the level of company financial indicators of total assets, net earnings, exports and market capitalization. Foreign currency changes will affect a company's inputs and outputs. This effect is expected to change with the sector too.

This is a study in a market where foreign exchange rate is very volatile and the effect of the sudden change in the foreign exchange rate can be evaluated more

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easily in this laboratory market. This study focuses on firm assets and sales during periods when foreign exchange devaluation is above average. Companies which have inputs and outputs in different currencies have exposures in foreign currency. The risk is more evident if a company is subject to an instant devaluation. If a company exports, it is expected to face less risk from depreciating currency values. There are different studies on exports, investment and profitability changing with foreign exchange rates. The positive effect of hedging is proven by the findings of Adler and Dumas (1984), where they provide a method to hedge the currency risk for companies and describe the advantages of hedging where firms can increase shareholder value by shifting exposure across borders. Fazzari et al. (1988) find that firms' investment and financing choices are dependent on each other. Furthermore, they categorize firms according to size and age of firm. They find that financing and liquidity is important but more so for low-dividend paying firms.

Research on stock market liberalization confirms that after liberalization there is investment growth. Henry (2000) analyzes 11 markets between 1977 and 1994, where nine countries are found to have above median growth rates. Bleakley and Cowan (2002) analyze 500 Latin American companies from Argentina, Brazil, Chile, Columbia and Mexico between 1990 and 1999. They evaluated inventory and fixed-capital investment, finding that companies with high amounts of US Dollar debt did not invest less and competitiveness was enhanced following devaluation. This finding is opposite to the level of expectations. Aguiar (2005) investigates the investment level and export sales relationship at the times of devaluation and finds that exporting companies are more profitable after devaluation.

The cost of currency devaluation is measured by several studies. One such study is Caprio and Klingebiel (1999) where they note that the 1982–1985 and 1994 financial crisis in Turkey resulted in rescue operations costing 2.5 % and 1 % of GDP. The 2001 Turkish Lira devaluation is believed to have cost the economy much more.

Bris and Koskinen (2002) state that firms would prefer devaluation to debt negotiation since the cost of devaluation is transferred to other parties. For countries with less-developed equity markets this would be extremely dangerous since the firms would be betting at the expense of others especially if debt renegotiation is not available. Companies are tempted to invest in riskier projects at the presence of less risky options.

This study is motivated by the fact that Turkey, as an emerging market, had two major one-off devaluations in the last two decades. We add gradual devaluation periods to these. The analysis of different sectors in manufacturing will enable us to compare the findings to developed markets. We hypothesize that exports will be positively affected after devaluation periods and profit should be affected in the same direction. The rest of this study is structured as follows, Sect. 2 describes the data, Sect. 3 shows the method and main results of the study and Sect. 4 concludes.

2 Data

The data is provided by Borsa Istanbul. Borsa Istanbul was established in 1986 and has expanded over the years reaching a total of 343 listed companies with a free float rate of 32 %.[1] Transactions take place in an electronic trading environment. Daily average trading volume is 1.6 billion USD (US Dollar) and yearly total volume of trade is 341 billion USD. Its total market capitalization is 336.5 billion USD as of October 2010.[2] This makes the Turkish stock market the 7th largest market in Europe and 11th in Europe-Africa-Middle East in terms of market capitalization.[3]

The year-end data is used for three sectors from companies trading in Borsa Istanbul between December 1995 and December 2011. These are: food, automotive and metal, and textile sector companies. There are 54 companies in the data set. 13 companies from the food sector, 17 from the automotive and metal sector, and 24 from the textile sector. All three sectors have export sales and the average export sales ratio is 17 %, 28 % and 25 %. The data for export sales before 2004 is missing. The available information for the companies are: market capitalization, sales, export sales, domestic sales, total assets, net earnings and operating profit. Table 1 provides the summary statistics for the data set in both million Turkish Lira and USD. Using year-on-year changes at and after the devaluation periods, we analyze yearly changes. The year-end data for these companies is provided from Dec 31, 1995 to Dec 31, 2011 (17 years, 935 observations).

We define that devaluation is present, if there is a 25 % change in the value of the currency in the previous 12 months. This change can be one-off or gradual. Our analysis considers both types of devaluation as equal and we do consider gradual currency devaluation, if the total change in one 12 month annual period is equal to or more than 25 % devaluation. Besides gradual devaluation years with 25 % or more inflation in 1996, 1997, 1998 and 1999 the data includes the sharp devaluation years of major financial crisis in Turkey in 2001 and the last global financial crisis in 2008 which spread out from US market to other countries including Turkey. We calculated real numbers for the balance sheet and income statement variables,

[1] http://www.tspakb.org.tr/tr/DesktopDefault.aspx?tabid=151 November 2010 Monthly Bulletin

[2] http://www.ise.org/Data/Consolidated.aspx. There are seven companies which are temporarily delisted by ISE Board of Directors.

[3] A total of 45,214 companies are listed and the total market capitalization is 50,200 billion USD on World Exchanges. There is 47,127 billion USD trading in World markets. Major exchanges in the US, NASDAQ and NYSE in total had 15 trillion USD, UK 2.8 trillion USD, Germany 1.3 trillion USD and Greece 113 billion USD market capitalization as of 2009. See Jan-Sep 2010, World Federation of Stock Exchanges, http://www.world-exchanges.org/statistics/key-market-figures and http://www.world-exchanges.org/statistics/annual/2009/equity-markets/domestic-market-capitalization.

Table 1 Summary statistics (All)

Market capitalization TL	185.9	0.2	5,748.8
Sales TL	255.8	–	7,336.7
Export TL	183.1	–	4,144.0
Domestic sales TL	207.6	–	3,243.0
Total assets TL	512.6	7.6	6,302.1
Net earnings TL	8.5	(408.1)	474.2
Operating profit TL	31.8	(82.8)	489.5
Market capitalization USD	143.4	1.1	3,374.9
Sales USD	195.9	–	4,169.0
Export USD	126.0	–	2,989.6
Domestic sales USD	144.2	–	2,340.9
Total assets USD	347.8	4.0	3,686.5
Net earnings USD	7.1	(268.1)	251.0
Operating profit USD	21.0	(71.5)	259.2

(million TL or USD)

where we deflated to 1995 values all variables using December-December changes in the Consumer Price Index (CPI) provided by TUIK.[4]

Table 2 shows the descriptive statistics of the data for each year. Summary statistics are provided yearly for minimum, maximum and mean of the numbers. Our sample is subject to survivorship bias, since the companies which are bankrupted or de-listed are not reported in the data set. The omitted companies would prove the results to be stronger and the omission of those companies will not affect the findings. The data after the year 2004 has less missing information.

Table 3 classifies the companies according to three sectors; food, automotive and metal, and textile sectors as these three manufacturing sectors are analyzed and compared.

3 Method and Results

In this study, we employ a method of analysis of generalized linear models with panel data. Wooldridge (2009) provides a detailed explanation of the model. The dependent variables are separately estimated by using OLS regression. The OLS regression model is an estimation which relates dependent variable y to independent variable x.

$$y = \beta_0 + \beta_1 x_i + \mu_i$$
$$E(\mu) = 0,\ \Sigma\, \mu_i = 0$$
$$\mathrm{Cov}(x, \mu) = 0$$

[4]The US Dollar exchange rate is central bank closing rates. The PPI and CPI data from TUIK is used (dates 1995–2011).

Table 2 Summary statistics (Year 1995–2011, million TL or USD)

	1995			1996			1997			1998		
	Mean	Minimum	Maximum	Mean	Minimum	Maximum	Mean	Minimum	Maximum	Mean	Minimum	Maximum
Market capitalization TL	4.0	4.0	4.0	8.9	8.9	8.9	13.7	13.7	13.7	9.5	9.5	9.5
Sales TL	4.2	4.2	4.2	8.4	8.4	8.4	15.9	15.9	15.9	27.8	27.8	27.8
Export TL												
Domestic sales TL												
Total assets TL												
Net earnings TL	0.5	0.5	0.5	1.0	1.0	1.0	0.9	0.9	0.9	2.1	2.1	2.1
Operating profit TL												
Market capitalization USD	67.3	67.3	67.3	82.9	82.9	82.9	67.0	67.0	67.0	30.4	30.4	30.4
Sales USD	71.0	71.0	71.0	77.8	77.8	77.8	77.6	77.6	77.6	88.7	88.7	88.7
Export USD												
Domestic sales USD												
Total assets USD												
Net earnings USD	8.9	8.9	8.9	9.0	9.0	9.0	4.5	4.5	4.5	6.6	6.6	6.6
Operating profit USD												
	1999			2000			2001			2002		
	Mean	Minimum	Maximum	Mean	Minimum	Maximum	Mean	Minimum	Maximum	Mean	Minimum	Maximum
Market capitalization TL	41.1	41.1	41.1	26.1	26.1	26.1	21.5	21.5	21.5	44.4	44.4	44.4
Sales TL	42.7	42.7	42.7	62.7	62.7	62.7	99.4	99.4	99.4	143.4	143.4	143.4

(continued)

Table 2 (continued)

	1995			1996			1997			1998		
	Mean	Minimum	Maximum	Mean	Minimum	Maximum	Mean	Minimum	Maximum	Mean	Minimum	Maximum
Export TL												
Domestic sales TL												
Total assets TL												
Net earnings TL	0.7	0.7	0.7	0.4	0.4	0.4	(22.2)	(22.2)	(22.2)	0.7	0.7	0.7
Operating profit TL												
Market capitalization USD	76.1	76.1	76.1	38.9	38.9	38.9	14.9	14.9	14.9	27.1	27.1	27.1
Sales USD	79.1	79.1	79.1	93.3	93.3	93.3	68.7	68.7	68.7	87.4	87.4	87.4
Export USD												
Domestic sales USD												
Total assets USD												
Net earnings USD	1.2	1.2	1.2	0.6	0.6	0.6	(15.4)	(15.4)	(15.4)	0.4	0.4	0.4
Operating profit USD												
	2003			2004			2005			2006		
	Mean	Minimum	Maximum	Mean	Minimum	Maximum	Mean	Minimum	Maximum	Mean	Minimum	Maximum
Market capitalization TL	46.4	46.4	46.4	45.7	45.7	45.7	76.9	76.9	76.9	131.2	131.2	131.2
Sales TL	169.5	169.5	169.5	191.7	191.7	191.7	182.9	182.9	182.9	221.4	221.4	221.4
Export TL	–	–	–	–	–	–	39.7	39.7	39.7	35.8	35.8	35.8
Domestic sales TL	–	–	–	–	–	–	165.5	165.5	165.5	216.3	216.3	216.3

Total assets TL												
Net earnings TL	(1.6)	(1.6)	(1.6)	0.6	0.6	0.6	15.6	15.6	15.6	(1.1)	(1.1)	(1.1)
Operating profit TL												
Market capitalization USD	33.3	33.3	33.3	34.2	34.2	34.2	57.3	57.3	57.3	93.3	93.3	93.3
Sales USD	121.7	121.7	121.7	143.5	143.5	143.5	136.3	136.3	136.3	157.5	157.5	157.5
Export USD	–	–	–	–	–	–	29.6	29.6	29.6	25.4	25.4	25.4
Domestic sales USD	–	–	–	–	–	–	123.4	123.4	123.4	153.9	153.9	153.9
Total assets USD												
Net earnings USD	(1.1)	(1.1)	(1.1)	0.5	0.5	0.5	11.6	11.6	11.6	(0.8)	(0.8)	(0.8)
Operating profit USD												
	2007			2008			2009			2010		
	Mean	Minimum	Maximum	Mean	Minimum	Maximum	Mean	Minimum	Maximum	Mean	Minimum	Maximum
Market capitalization TL	300.0	300.0	300.0	120.8	120.8	120.8	202.0	202.0	202.0	496.0	496.0	496.0
Sales TL	233.6	233.6	233.6	243.0	243.0	243.0	277.9	277.9	277.9	374.8	374.8	374.8
Export TL	47.4	47.4	47.4	50.1	50.1	50.1	33.4	33.4	33.4	43.0	43.0	43.0
Domestic sales TL	222.1	222.1	222.1	231.5	231.5	231.5	292.2	292.2	292.2	413.3	413.3	413.3
Total assets TL	347.6	347.6	347.6	420.0	420.0	420.0	613.8	613.8	613.8	891.3	891.3	891.3
Net earnings TL	11.0	11.0	11.0	(6.7)	(6.7)	(6.7)	33.3	33.3	33.3	77.7	77.7	77.7
Operating profit TL	7.9	7.9	7.9	42.2	42.2	42.2	53.6	53.6	53.6	88.5	88.5	88.5
Market capitalization USD	258.8	258.8	258.8	79.4	79.4	79.4	135.8	135.8	135.8	322.6	322.6	322.6

(continued)

Table 2 (continued)

	1995			1996			1997			1998		
	Mean	Minimum	Maximum	Mean	Minimum	Maximum	Mean	Minimum	Maximum	Mean	Minimum	Maximum
Sales USD	201.5	201.5	201.5	159.7	159.7	159.7	186.9	186.9	186.9	243.8	243.8	243.8
Export USD	40.9	40.9	40.9	32.9	32.9	32.9	22.4	22.4	22.4	28.0	28.0	28.0
Domestic sales USD	191.6	191.6	191.6	152.1	152.1	152.1	196.5	196.5	196.5	268.8	268.8	268.8
Total assets USD	299.8	299.8	299.8	276.0	276.0	276.0	412.7	412.7	412.7	579.7	579.7	579.7
Net earnings USD	9.5	9.5	9.5	(4.4)	(4.4)	(4.4)	22.4	22.4	22.4	50.5	50.5	50.5
Operating profit USD	6.8	6.8	6.8	27.7	27.7	27.7	36.1	36.1	36.1	57.6	57.6	57.6

Table 3 Summary statistics (sectors)

	Food sector			Automotive and metals sector			Textile sector		
	Mean	Minimum	Maximum	Mean	Minimum	Maximum	Mean	Minimum	Maximum
Market capitalization TL	274.1	0.8	5,748.8	328.6	0.5	3,980.0	41.6	0.2	898.0
Sales TL	150.0	–	2,753.2	599.0	–	7,336.7	55.3	–	374.8
Export TL	43.3	–	633.8	470.2	–	4,144.0	31.4	–	260.4
Domestic sales TL	207.8	–	2,121.4	417.1	–	3,243.0	40.7	–	413.3
Total assets TL	346.0	9.5	3,014.0	1,126.5	13.4	6,302.1	136.8	7.6	891.3
Net earnings TL	5.3	(54.0)	197.7	23.7	(408.1)	474.2	(0.7)	(52.7)	77.7
Operating profit TL	29.0	(20.0)	271.8	73.6	(82.8)	489.5	1.5	(32.3)	88.5
Market capitalization USD	195.3	3.2	3,374.9	260.3	2.7	2,652.5	35.1	1.1	475.4
Sales USD	113.0	–	1,790.6	449.0	–	4,169.0	50.6		283.6
Export USD	30.4	–	412.2	322.1	–	2,989.6	22.5		224.6
Domestic sales USD	144.1	–	1,380.1	289.0	–	2,340.9	29.0		268.8
Total assets USD	238.0	6.2	1,960.2	758.3	11.5	3,686.5	95.7	4.0	579.7
Net earnings USD	4.6	(40.4)	132.5	18.5	(268.1)	251.0	0.2	(36.4)	50.5
Operating profit USD	20.6	(13.1)	198.1	47.7	(71.5)	259.2	1.0	(21.7)	57.6

(million TL or USD)

β_0 in the equation is the value when y=0. μ is the error term and it represents the factors other than x which affect y. The sum of the OLS residuals μ_i are 0.

We use OLS regression to measure the effect of the USD on the Turkish Lira (TL) exchange rate and devaluation dummy on yearly sales, which reports that devaluation is 1 if there is 25 % or more foreign exchange rate devaluation in one year period and 0 otherwise. All dependent variables other than the dummies and variables measuring the change are in logarithms and in real form. We use the variables, which measure changes in the nominal form in the regression. All company specific variables are deflated back to 1995 values using December-December changes in the Consumer Price Index (CPI) provided by TUIK.

The regression equation (1) where the logarithm of net earnings in TL (dependent variable) shows a positive relationship with the logarithm of operating profits and logarithm of total assets in TL at 1 % significance level. Table 4 shows the result of the regression.

$$\begin{aligned} \text{NET EARNINGS TL}_{it} = & -1.7137 + 0.5955 * \text{OPERATING PROFITS TL}_{it} \\ & + 0.5376 * \text{TOTAL ASSETS TL}_{it} \\ & - 0.0601 * \text{SALES TL}_{it} \end{aligned} \tag{1}$$

Table 5 shows the regression results of Eq. (2), where the logarithm of sales in TL has a positive relationship with the logarithm of total assets in TL with 1 % significance. The devaluation dummy does not show any significant relationship with current sales.

$$\begin{aligned} \text{SALES TL}_{it} = & -0.7111 + 1.2329 * \text{TOTAL ASSETS TL}_{it} \\ & + 0.2027 * \text{DEVALUATION DUMMY}_{it} \end{aligned} \tag{2}$$

Table 6 shows the result of regression equation (3) where the logarithm of total assets in TL as a dependent variable has a positive relationship with the logarithm of the previous year's market capitalization with 1 % statistical significance. This year's devaluation shock has a negative effect on total assets and last year's devaluation shock has a positive effect on total assets all results being statistically significant.

$$\begin{aligned} \text{TOTAL ASSETS TL}_{it} = & \ 0.6443 \\ & + 0.8584 * \text{LAG(MARKET CAPITALIZATION TL)}_{it} \\ & - 0.2064 * \text{DEVALUATION DUMMY}_{it} \\ & + 0.6403 * \text{LAG DEVALUATION DUMMY}_{it} \end{aligned} \tag{3}$$

In Table 7 the regression equation (4) results are shown, where change in the logarithm of market capitalization in TL is the dependent variable, while the

Table 4 OLS regression

Dependent variable		
Panel regression		
	Net earnings in TL	
Regressor[a]	Coefficient	Std. error
C	−1.7137***	0.306
Operating profits in TL	0.5955***	0.0929
Total assets in TL	0.5376 ***	0.1917
Sales in TL	−0.0601	0.1492
Adjusted R^2	77 %	
F statistic	122.42	
p-value (F stat)	0.0001	
Obs.	825	

Statistical significance: ***1 %;**5 %;*10 %
[a]All level variables enter the equation in real terms and in log form

Table 5 OLS regression

Dependent variable		
Panel regression		
	Sales in TL	
Regressor[a]	Coefficient	Std. error
C	−0.7111***	0.0897
Total assets in TL	1.2329***	0.0452
Devaluation dummy	0.2027	0.1655
Adjusted R^2	77 %	
F statistic	371.78	
p-value (Fstat)	0.0001	
Obs.	709	

Statistical significance: ***1 %;**5 %;*10 %
[a]All variables level enter the equation in real terms and in log form. Devaluation is measured in US$/TL

logarithm of operating profits shows a positive relationship with 1 % statistical significance. The devaluation dummy and lag of devaluation dummy have negative effects on market capitalization, where the current year's devaluation has a stronger negative effect on market capitalization with 1 % significance.

$$\begin{aligned}\text{MARKET CAPITALIZATION TL}_{it} &= 3.7625 \\ &+ 7.027 * \text{OPERATING PROFITS}_{it} \\ &- 4.5864 * \text{DEVALUATION DUMMY}_{it} \\ &- 2.8298 * \text{LAG DEVALUATION DUMMY}_{it}\end{aligned} \tag{4}$$

Table 6 OLS regression

Dependent variable		
Panel regression		
	Total assets in TL	
Regressor[a]	Coefficient	Std. error
C	0.6443***	0.0633
Lag (market capitalization)	0.8584***	0.0308
Devaluation dummy	−0.2064*	0.1119
Lag of devaluation dummy	0.6403***	0.1147
Adjusted R^2	79 %	
F statistic	258.74	
p-value (F stat)	0.0001	
Obs.	729	

Statistical significance: ***1 %;**5 %;*10 %
[a]All level variables enter the equation in real terms and in logform. Devaluation is measured in US$/TL

Table 7 OLS regression

Dependent variable		
Panel regression		
	Market capitalization in US$	
Regressor[a]	Coefficient	Std. error
C	3.7625***	0.8751
Operating profits in US$	7.0272***	0.4391
Devaluation dummy	−4.5864***	1.4863
Lag of devaluation dummy	−2.8298*	1.4845
Adjusted R^2	56 %	
F statistic	91.07	
p-value (F stat)	0.0001	
Obs.	719	

Statistical significance: ***1 %;**5 %;*10 %
[a]All level variables enter the equation in real terms and in log form. Devaluation is measured in US$/TL

Table 8 explores the effect on dependent variable export sales of sector differences as well as devaluation in the current year, preceding year, or two preceding years. Regression equation (5) shows that lag of export has positive and significant effect on export sales. Compared to textile sector companies food sector companies show larger export increases and companies from automotive and metal sector show even greater increases, both sector effects are statistically significant at a 1 % level. Devaluation shock has a higher negative effect if the shock was in the previous year and less negative effect if it occurred in the current year, this is not statistically significant. The devaluation two years previous has a positive but not significant effect on export sales.

Table 8 OLS regression

Dependent variable		
Panel regression		
Export in TL		
Regressor[a]	Coefficient	Std. error
C	−0.3846 ***	0.1347
Lag of export in TL	1.0281 ***	0.0314
Food sector dummy	0.3778 **	0.1851
Automotive and metal sector		
Dummy	0.4430 ***	0.1582
Devaluation dummy	−0.1597	0.1828
Lag of devaluation dummy	−0.2529	0.1860
Lag 2 (devaluation dummy)	0.1482	0.1942
Adjusted R^2	84 %	
F statistic	199.55	
p-value (F stat)	0.0001	
Obs.	709	

Statistical significance: ***1 %;**5 %;*10 %

[a]All level variables enter the equation in real terms and in log form. Devaluation is measured in US$/TL

$$\begin{aligned} \text{EXPORT TL}_{it} = & -0.3846 + 1.0281 * \text{LAG(EXPORT)}_{it} \\ & + 0.3778 * \text{FOOD DUMMY}_{it} \\ & + 0.4430 * \text{AUTOMOTIVE DUMMY}_{it} \\ & - 0.1597 * \text{DEVALUATION DUMMY}_{it} \\ & - 0.2529 * \text{LAG DEVALUATION DUMMY}_{it} \\ & + 0.1482 * \text{LAG2(DEVALUATION DUMMY)}_{it} \end{aligned} \tag{5}$$

The findings confirm the significant relation of devaluation and balance sheet variables on exports as expected. The sectors have differ in effect on the results.

4 Conclusion

Previous studies have analyzed investment and financing methods and their reactions to devaluation. These studies generally analyze developed markets. This study is analyzing one of the major emerging markets, Turkey, subject to a major financial crisis period with devaluation in 2001. The financial crisis in 2001 was a major banking crisis which brought about a major restructuring in the banking sector.

The findings confirm the hypothesis that operating profits and total assets have a positive effect on net earnings and total assets have a positive effect on sales. Total assets are negatively affected by a devaluation shock in the current year. Market

capitalization is negatively affected by devaluation shocks in the current and previous year. Export sales increase when the previous year's exports increase. The data shows the effect of exports is greater in the automotive and metal sector, and less so in the food and textile sectors. The difficulty of obtaining investment and capital structure data limits the scope of the study. The availability of this additional data would allow a more thorough study.

The study has potential importance in macroeconomic programs and policies. Emerging markets are vulnerable to devaluation and changes in interest rates. Further studies can question the individual effects and changes on outcomes for policy implications. The positive of this market can be the potential learning outcome of risk management after several foreign exchange shocks in surviving companies.

Appendix

Year	US$/TL devaluation	Consumer price inflation
31DEC1995	−2.7 %	76.0 %
31DEC1996	80.7 %	79.8 %
31DEC1997	90.8 %	99.1 %
31DEC1998	52.9 %	69.7 %
31DEC1999	72.2 %	68.8 %
31DEC2000	24.4 %	39.0 %
31DEC2001	115.3 %	68.5 %
31DEC2002	13.3 %	29.7 %
31DEC2003	−15.0 %	18.4 %
31DEC2004	−4.1 %	9.3 %
31DEC2005	0.4 %	10.5 %
31DEC2006	4.8 %	9.7 %
31DEC2007	−17.5 %	8.4 %
31DEC2008	31.3 %	10.1 %
31DEC2009	−2.3 %	6.5 %
31DEC2010	3.4 %	6.4 %
31DEC2011	22.8 %	10.4 %
Average	27.7 %	
Minimum	115.3 %	
Maximum	−17.5 %	

Major one-off devaluation years are 2001 and 2008. Additionally 1996, 1997, 1998 and 1999 are years with high devaluation occurring gradually

Variables

Market capitalization TL	Price × number of shares of date in thousands of local currency units
Sales TL	Sales, measured in thousands of local currency units

Export TL	Total foreign sales in thousands of local currency units
Domestic sales TL	Local sales in thousands of local currency units
Total assets TL	Total assets in thousands of local currency units
Net earnings TL	Earnings in thousands of local currency units
Operating profit TL	Operating profit in thousands of local currency units
Market capitalization USD	Price × number of shares of date in thousands of foreign currency units
Sales USD	Sales, measured in thousands of foreign currency units
Export USD	Total foreign sales in thousands of foreign currency units
Domestic sales	USD Local sales in thousands of foreign currency units
Total assets USD	Total assets in thousands of foreign currency units
Net earnings USD	Earnings in thousands of foreign currency units
Operating profit USD	Operating profit in thousands of foreign currency units
Devaluation dummy	Equal to 1, if there is a 25 % change in the value of the currency in the previous 12 month, else 0
Food sector dummy	Equal to 1, if the company is in food sector, else 0
Automotive and metal sector dummy	Equal to 1, if the company is in automotive & metal sector, else 0

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The Relationship Between Economic Development and Female Labor Force Participation Rate: A Panel Data Analysis

Ozlem Tasseven

Abstract In economics, any production function is composed of capital labor and technology inputs. In the gross domestic product (gdp) growth of an economy labor seems to be an important input. Therefore, a country's economic growth depends mainly on labor supply. In order to attain economic growth and development, an optimal choice of male and female labor force participation is necessary. Besides cultural and sociological factors, economic, education and health factors are the main issues affecting labor force participation in developing as well as developed countries. The objective of this chapter is to analyze the determinants of female labor force participation which are per capita gross domestic product, unemployment rate, ratio of female to male primary enrollment, ratio of female to male secondary enrollment, ratio of female to male tertiary enrollment, fertility rate and life expectancy of females at birth. The data used in this analysis belongs to World Bank database for G8 countries between 1995 and 2013. The results show that unemployment has a discouraging effect on female labor force participation rate. The gross domestic product and education are found to affect female labor force participation positively.

1 Introduction

The female labor force participation rates increased significantly in the developed countries lately. However, in many developing countries including Turkey female labor force participation rates have been declining. The labor force participation rate differs between females and males mainly in developing countries. In developed countries the difference between female and male labor force participation rate is closer to each other when compared to developing countries.

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Low female labor force participation is observed mostly. Some of the studies argue that macro variables are the causes of declining female participation rates. Unemployment rate, educational attainment of females, urbanization rate and migration from rural to urban regions, the share of agriculture and industry in the economy and fertility rate are mentioned as the causes of low and declining participation of females in most of the developing countries. On the micro side, years of schooling, age, marital status and the number of children are considered as the determinants of participation rate. Also, wage discrimination between male and female employees' has a negative effect on female labor force participation rate. There are significant differences between female and male hourly earnings.

In terms of economic growth and development, the quantity and quality of labor force are considered the main determinants in growth process. Tansel (2002), Goldin (1995), Durand (1975), Pampel and Tanaka (1986) consider economic development as the main determinant of female labor force participation rate. Ozerkek (2013) investigates the long run relationship between unemployment and labor force participation rates for a panel of European countries. High unemployment rates show that the costs are high in the economy leading to underuse of labor input. Therefore, economic development and growth are affected indirectly as a result of a rise in unemployment.

Education is found to be another important determinant of labor force participation rate. Many studies have shown that females with higher education get higher pay, which affect aggregate spending positively that, will lead to economic growth through demand side and also through higher female labor force participation. Patel (2012), Thevenon and Ali (2012), Bowen and Finegan (1966), Mammen and Paxson (2000) and Klasen and Pieters (2012) use educational attainment as the determinant of female employment. Socio-cultural determinant of female employment is the fertility rate in many studies. The decline in fertility slows down population growth thereby labor supply per capita increases (Dayıoğlu and Kırdar 2010).

Goldin (1995), Durand (1975) and Pampel and Tanaka (1986) claim that there is a long term relationship between female employment and economic development. Before industrialization, female employment was set to be high in agricultural sector as the industrialization spread females pulled back from the labor force and female labor force participation rate declined. In developing countries with huge population such as China and India low labor force is preferred by manufacturers and producers. This gives competitive advantage to these countries due to decreased production costs.

There is general observation that there is social inequality between males and females which leads to unequal opportunities in business life; especially in terms of wages, positive discrimination against males during the recruitment process. Gender inequality prevents the development of individuals, countries and societies. The empowerment of females through the promotion of females' rights and an increase in the access of females to resources and education are essential for economic development. Gender equality in social relationships is an essential factor that affects economic growth.

We analyze the determinants of female labor force participation rates among G8 countries. The variables used in the analyses are per capita gross domestic product, unemployment rate, ratio of female to male primary enrollment, ratio of female to male secondary enrollment, ratio of female to male tertiary enrollment, fertility rate and life expectancy of females at birth using World Bank database between 1995 and 2013. In the second section of this chapter, the literature review on the female labor force participation rate has been portrayed. In the third section the data and the model used in the analyses are given. Fourth section provides the empirical findings. The last section concludes.

2 Studies on Female Labor Force Participation Rate

In this section studies on female labor force participation rate are examined. Economic growth and development seem to be the most important factors affecting female employment. Educational attainment, fertility rate, productivity differences between countries, unemployment rate, the ratio females in the population, socio-economic and socio-cultural factors, social and cultural factors, labor market conditions, urbanization, marital status, economic cycle, the number of children, the number of children between the age of 0–5, the attitude towards female employment in the society are considered as the other determinants.

The decline in the female labour force participation in G8 countries could be related to the structural influences such as the aged of the population. Aaronson et al. (2014) state that the aging of population causes a downward pressure on labor force participation rate as increasing birth rate causes people to move into age groups which have low participation rates.

Pampel and Tanaka (1986) investigate the determinants of female employment for 70 nations between 1965 and 1970. Together with economic development some micro factors such as family, social and demographic explanations of the status of females are used as explanatory variables.

Tansel (2002) analyzes the determinants of female employment across 67 provinces for 1980, 1985 and 1990 in Turkey. Economic growth and educational attainment are found to affect female employment positively, whereas unemployment rate is found to have a negative impact on it. In rural areas higher female employment is expected especially on agricultural sector. This kind of female workers are usually low paid or unpaid. As the importance of agricultural sector declines for the economy, in order to work in different sectors females should be highly educated.

Tansel (2002) states that decreasing female employment is due to the decrease in the share of rural population, population issues, females' years of schooling compared to males' years of schooling, sectoral differentials, unfair payments and the retirement issues in Turkey. Tansel mentions that increases in enrollment rates of schooling delay entry into labor market. Another reason of declining rate is that changing of labor force from agricultural sector to non-agricultural sector. Because

of being lower paid it's normal to observe higher participation rates in agriculture sector compared to non-agriculture sector. Lower paid sectors of the economy usually have higher participation rates than highly skilled workers. Tansel argues that the reason of the decline is the early retirement scheme. The earlier is the retirement age, the earlier is the exit from the labor force.

Dayıoğlu and Kırdar (2010) analyze the effect of demographic and economic determinants of female employment using 23,000 households per quarter in 2000. Dayıoğlu and Kırdar find that the change in the geographical structure of rural population could be the reason for the decline in female employment. Females in rural areas are likely to migrate, which causes the female employment to decrease. Also, the share of households in rural areas in agriculture sector seems to decline also. Furthermore, the participation rate of highly skilled females is found to have stagnant participation rates of 70 % after 2000.

Thevenon and Ali (2012) use human capital augmented growth model for analyzing the relationship between human capital and economic growth. The dependent variable is taken as output per capita, whereas the independent variables are population growth, technological advance, the improvement of economic efficiency, physical and human capital using data belonging to 30 OECD countries between 1960 and 2008 period. It is found that both males and females have increased the time period of their education. More skilled females are more valuable for the labor market than males since females are less likely to lack basic skills for relevant jobs. It is found that the human capital would be less which might cause slower economic growth. Improvement in gender inequality will lead to higher female labor force participation which will result in higher economic growth.

Educational attainment can be considered as a critical factor for female employment. There is a general agreement that males have higher education levels than the females therefore, labor productivity of males is higher than that of females. Due to lower educational attainment females work in lower paid jobs or unpaid jobs. We observe that female and male employees who work at the same standard of jobs receive different payment in return, which can be described as gender discrimination. In this case usually female employees are less paid. When the qualified employees increase, the productivity of innovation of the economy improves. Qualified labor force should be obtained by high standards of education. As the education improves society would have more qualified individuals who have the capacity to innovate. As the innovation improves new standards of technological improvement can be integrated to the sectors of the economy causing higher growth in the economy.

Female education has several effects on economic development. The qualified female contributes to the economy herself. Also, there will be other effects that can be defined as the family education which passes from mother to the children and other family members. It is easier for an economy to maintain economic development through giving importance to education.

Palaz et al. (2006) investigate the effect educational attainment on labor force participation rate during the 1960–2000 period for Turkey. The educational variables

are observed for males and females separately at different levels of schooling over the last 40 years. The variables used are female and male labor force, the attendance to primary school, secondary and university. Polat et al. found that education has an important effect on employment rates for males and females having educational attendance at every level in Turkey. It is found that the result of educational attainment at secondary and university level have the largest effect on female employment.

Bowen and Finegan (1966) investigate the relationship between educational attainment measured by years of school completed and female employment. The entire labor population is divided into three groups which are prime age males (aged 25–54), older males (aged 65–74) and married females (aged 18–64) since labor force behavior differs among these groups. It is found that as the educational attainment stage increases, the labor force participation for prime-age males, older males and married females increases. Another finding is that the completion of an extra year of schooling is related with an average increase of about 1 % in the participation rate of married females and with an average increase of about 2 % in the participation of older males. It is seen that the change of schooling years affect the labor force participation rates positively.

Klasen and Pieters (2012) examine the determinants of female employment in India during 1987 and 2004. It is found that labor force participation of less educated females is related to economic and social factors. It is observed that for highly educated females, there is not progress in labor market conditions in India.

Patel (2012) analyzes labor force participation in India for the years 1993-1994, 1999–2000, 2004–2005, 2007–2008 and 2009–2010 from 33 states using panel dataset for rural and urban regions separately. The variables used in the analyses are the number of females, average number of people, number of young children, the number of educated females, sex ratio (number of females per 1000 people) and unemployment rate. Patel tests three different hypotheses about female employment. The first one claims that, as the average size of household increases, female employment decreases. The second one claims that, as the sex ratio increases for a particular region; female employment increases as well. The third one mentions that female employment is negatively related to unemployment rate. It is found that 1 % increase in sex ratio causes female employment to increase by 1.98 % in rural regions and 1.41 % in urban regions. If the average number of people increases by 1 % in urban areas, female employment decreases 11.9 %. It is argued that economic policies which limits the number of children could be enforced which could allow the females who join the labor force. Proportion of agricultural households is also found to be crucial.

Schweitzer and Smith (1974) argue that unemployment is likely to be a reason for workers to exit the labor force due to discouragement. On the other hand, a decrease in the unemployment rate could pull back the discouraged workers. Also, improved labor market conditions could increase labor force participation. Ozerkek (2013) investigates the link between participation rate and unemployment for a panel of European countries. It is found that for females there is a long run comovement between participation rate and unemployment suggesting discouraged worker effect for females. However, for males such a relationship isn't found to exist.

Petersen et al. (2006) investigate the difference between males and females in productive sectors. They compare the wages for part time and full time jobs for males and females in United States, Norway and Sweden. Under full time work, the wage gap is found to be independent of occupation. On the other hand under part time work, the wage difference depends on productivity. It is seen that in Norway and the United States females prefer part time work than males.

Mammen and Paxson (2000) investigate the wage differentials between females and males even after controlling for education and labor market experience for 90 countries. It is argued that as opportunities for males increase without improvement in females' wages, female employment decreases. It is seen that although there are variations across countries and within countries the female employment first declines and increases with economic development. Since females leave family enterprises to work outside as a result female's income rises. In emerging countries females receive less education, have higher mortality rates and under much more control compared to developed countries.

Bloom et al. (2007) analyze the relationship between fertility and female employment using 5 year age groups. Bloom et al. use the fertility rate, the people living in urban areas, capital stock, expected living period for females and the educational attendance of males and. It is found that there is a strong relationship between fertility rate and female labor supply between 20–39 years of age. Another finding is that with each child decreases female employment by 10–15 % for the females aged 25–39 and 5–10 percentage points the females aged 40–49. It is suggested that the decline in fertility could affect long run economic growth since there would be more resources for children's health and education.

3 Data and Methodology

Women's entrance to the labor force is dependent on the economic, financial, social, religious and cultural position of their families. Utility of the family is maximized according to work and leisure allocation. Female employment is also related to several labor market conditions. The female labor force participation equation in this chapter can be indicated as in Eq. (1):

$$\begin{aligned} \text{labor} = f(&\text{gdpcap, primary, secondary, tertiary, fertility,} \\ &\text{unemploy, wages, lifeexpec}) \end{aligned} \tag{1}$$

the explanatory variables are per capita gross domestic product (gdpcap), ratio of female to male primary enrollment (primary), ratio of female to male secondary enrollment (secondary), ratio of female to male tertiary enrollment (tertiary), fertility rate (fertility), unemployment rate (unemploy), wage and salaried workers (wages), life expectancy of females at birth (lifeexpec). The logarithm of per capita gross domestic product is used in the analysis. All data are derived from World Bank

Database and covers G8 countries which are Canada, Germany, France, United Kingdom, Japan, Italy, Russian Federation and United States between 1995 and 2013. The data is balanced panel and the missing values in some of the observations are filled with the mean value of the variable of interest.

A general panel data model is as in the following:

$$y_{it} = X_{it}b_{it} + e_{it} \tag{2}$$

where $i = 1, 2, ..., N$ shows cross sectional unit and $t = 1, 2, ..., T$ shows time period. In studies using panel data analysis different models could be obtained based on the assumptions about the properties of the error term and the changeability of the coefficients. The models obtained by different assumptions are fixed effect and random effect models. In both of the models, e_{it} error terms are assumed to be independent for all cross sectional units and time periods. In random effect model the variation according to cross sectional units or cross sectional units and time periods are incorporated to the model as a component of error term. When fixed effect models are used, the differences across cross sectional units are modelled by differences in the constant term, slope coefficients are constant. The slope coefficients could change according to cross sectional units, but not according to time periods.

Asteriou and Hall (2007) define panel data models as in the following:

$$y_{it} = \beta' x_{it} + \alpha_i + \nu_{it} \tag{3}$$

for the fixed-effect model $\alpha_i = z_i'\alpha$. For fixed effect model, the method of estimation depends on whether z_i is constant or random. If z_i is considered to be constant "dummy variable estimation" is used, if it is random "error component model" is used for estimation. If N is quite small and number of observations is large, fixed effect model is preferred. In Eq. (3) for the random effects model $\alpha_i = \alpha + \mu_i$. When random effect model is used, the characteristics which are not observed by the explanatory variables are incorporated in the error term. Therefore, they are defined as a constant random variable. Generalized least squares estimation is used for efficient estimation. If N is quite large and T is smaller than N, efficient estimators could be obtained by using random effect model. If T is quite large and N is quite small, fixed effect model could be preferred. On the other hand if T is quite small and N is quite large there won't be a significant difference between the two models. If cross sectional units are sampled from a large population, random effect model is used; otherwise fixed effect model would be more appropriate (Özer and Biçerli 2004).

The assumption that there is no correlation between the error term components and the explanatory variables in random effect model could be tested using Hausman and Taylor (1981) test statistics. Whether the difference between the parameter estimators of fixed effect and random effect models are statistically significant or not is investigated. Hausman test statistics is used in order to choose between the fixed effect and random effect models. Under the null hypothesis stating that random effect model is valid, the test statistics is distributed as chi-square. In order to make

efficient estimations together with Hausman test, cross sectional dependence between units should be tested (Hoechle 2007). In the literature there are several tests for cross sectional dependence (Friedman 1937; Frees 1995; Pesaran 2004). Among these tests Pesaran (2004) is the one that could be used for efficient and unbalanced panel data. In each of these tests, the null hypothesis states that there is cross sectional independence between the units (De Hoyos and Sarafidis 2006).

The cross sectional dependence test developed by Pesaran (2004) (CD) is given in the following:

$$CD = \sqrt{\frac{2T}{N(N-1)}}\left(\sum_{i=1}^{N-1}\sum_{j=i+1}^{N}\hat{\rho}_{ij}\right) \tag{4}$$

First generation and second generation unit root tests are used in order to decide whether there exists unit root or not in the variables. Levin et al. (LLC) (2002), Im, Pesaran and Shin (IPS) (2003), ADF Fisher and PP Fisher tests are developed in the first group. Pesaran (2007) test is developed as second generation unit root test. LLC assumes that the coefficient of lagged variable should be homogeneous for all units, which is a strong restriction. LLC test estimate a separate regression for cross sectional unit allowing for individual unit roots. First generation unit root tests assume that all units are cross sectionally independent from each other. According to Pesaran CIPS test it is assumed that all units are cross sectionally dependent to each other.

4 Empirical Results

The labor force participation in Turkey is examined based on the model including several different variables representing the education, health and population growth issues. The equation used in the analyses is given below:

$$\begin{aligned} labor_{i,t} = {} & \propto_0 + \beta_1 gdpcap_{it} + \beta_2 Primary_{it} + \beta_3 secondary + \beta_4 tertiary_{it} \\ & + \beta_5 fertility_{it} + \beta_6 unemploy_{it} + \beta_7 wages_{it} + \beta_8 lifeexpec_{it} + \varepsilon_{it} \end{aligned} \tag{5}$$

In this section, we examine the whether fixed effect or random effect estimation would be appropriate using the Hausman statistics. The null hypothesis states that random effects estimation would be valid. It is found that random effect model is appropriate, since p-value of chi-square test statistics with 8° of freedom is found to be 0.1428. Cross section dependence between the G8 countries is tested using Pesaran (2004) test. The null hypothesis of cross sectional independence is accepted at 5 % significance level, therefore first generation unit test are undertaken. The results of first generation unit root test with intercept term are given in Table 1 and the results with trend and intercept term are given in Table 2. The results of these tests seem consistent. According to IPS test results for gdgpcap, tertiary, wages and lifeexpec variables the null hypothesis of a unit root is rejected.

Table 1 First generation panel unit root test with intercept term

Method	labor	gdpcap	primary	secondary	tertiary	fertility	unemploy	wages	lifeexpec
Levin, Lin & Chu	8.166 1.0	−4.259 0.00**	−3.14 0.0008**	−3.60 0.0002**	−0.27 0.39	−2.13 0.016**	−0.109 0.45	−1.98 0.02**	−1.128 0.12
IPS	−6.22 0.00**	−0.939 0.17	−3.106 0.0009**	−3.819 0.0001**	−0.41 0.33	−2.78 0.0027**	−1.53 0.063**	0.29 0.616	2.51 0.99
ADF Fisher	68.53 0.00**	22.66 0.122	40.60 0.0006**	45.08 0.0001**	16.97 0.38	39.97 0.0008**	24.24 0.08*	27.02 0.04**	6.73 0.97
PP Fisher	334.76 0.00**	28.09 0.03**	44.46 0.0002**	36.91 0.0022**	29.69 0.019**	36.95 0.0021**	13.54 0.63	31.26 0.012**	21.28 0.16

The p-values are given under the test statistics. * denotes significance at 10 %, ** denotes significance at 5 % and *** denotes significance at 1 %. Lag length is chosen automatically by Eviews 8

Table 2 First generation panel unit root test with intercept and trend term

Method	labor	gdpcap	primary	secondary	tertiary	fertility	unemploy	wages	lifeexpec
Levin, Lin & Chu	−215.2 0.00**	−0.79 0.21	−4.16 0.00**	−1.66 0.04**	3.10 0.99	−2.78 0.0027**	0.91 0.82	−1.60 0.05**	−1.67 0.04**
IPS	−90.45 0.00**	1.36 0.91	−4.32 0.00**	−1.29 0.09*	3.12 0.99	−1.94 0.026**	−1.77 0.03**	1.47 0.92	−0.33 0.37
ADF Fisher	58.2 0.00**	12.22 0.72	48.39 0.00**	29.24 0.02**	13.25 0.65	30.68 0.014**	26.81 0.04**	17.58 0.34	17.08 0.38
PP Fisher	75.73 0.00**	8.79 0.92	18.69 0.0012**	22.78 0.11	11.29 0.79	25.65 0.059*	11.08 0.80	27.14 0.03**	16.58 0.41

The p-values are given under the test statistics. * denotes significance at 10 %, ** denotes significance at 5 % and *** denotes significance at 1 %. Lag length is chosen automatically by Eviews 8

Table 3 Panel unit root tests for first differenced variables

Method	dgdpcap	dtertiary	dwages	dlifeexpec
Levin, Lin & Chu	−6.33 0.00**	−1.85 0.032**	−8.83 0.00**	−10.97 0.00**
IPS	−4.75 0.00**	−3.95 0.00**	−7.24 0.00**	−8.82 0.00**
ADF Fisher	50.36 0.00**	49.36 0.00**	75.70 0.00**	93.72 0.00**
PP Fisher	61.03 0.00**	46.2 0.0001**	342.2 0.00**	108.43 0.00**

The p-values are given under the test statistics. * denotes significance at 10 %, ** denotes significance at 5 % and *** denotes significance at 1 %

In Table 3 panel unit root test for the first differenced variables are presented. It can be seen that the null hypothesis is rejected at 5 % significance level for dgdpcap, dtertiary, dwages and dlifeexpec variables, which are first differenced variables. Therefore panel regression estimations are undertaken using the first differenced forms of these variables together with other stationary variables.

In order to do panel regression estimation using stationary and first differenced variables, we undertake Hausman test. It is found that fixed effect model is appropriate, since p-value of the chi-square test statistics is found to less than 0.05. Our estimated model is given in the following:

$$\begin{aligned} labor_{i,t} = \; & 75.57 + \underset{(1.91)}{16.30}\, dgdpcap_{it} + \underset{(0.96)}{0.36}\, primary_{it} \\ & + \underset{(1.65)}{0.33}\, secondary_{it} + \underset{(1.32)}{0.04}\, dtertiary_{it} + \underset{(0.21)}{0.14}\, fertility_{it} \\ & - \underset{(-2.98)}{0.36}\, unemploy_{it} + \underset{(0.12)}{0.002}\, wages_{it} + \underset{(1.27)}{1.06}\, lifeexp_{it} + \varepsilon_{it} \end{aligned} \tag{6}$$

The values in parenthesis The F test for the overall significance of the model is found to be 139.01 with p-value 0, showing that the model has explanatory power. It is found that female labor force participation rate is affected positively by per capita gross domestic product and female to male secondary school enrollment ratio, negatively by unemployment rate. Female to male secondary school enrollment ratio is found to be significant at 10 % significance, the others are found to be significant at 5 % significance. It is found that when per capita gross domestic product increases by 1 unit, female labor force participation rate increases by 16 units. Female to male secondary school enrollment ratio is found to increase female employment by 0.33 units, whereas unemployment ratio decreases female labor force participation by 0.36 units.

When the World Bank data on female labor force participation rate is analyzed it is observed that this ratio is around 52 % in 2000 and there has been a steady decrease in this ratio; in 2013 it was 50 %. Females have variant roles, which changes

depending on conditions of time period and cultures, in economic development. Females spend their time by unpaid work in the home, household plot or childcare generally. This relationship has given males the primary role on economics development, causing males to be more productive in economics. In today's changing world, the role of females in economics development has started to change. However, the traditional roles of females at home including child care still exist. Policies should be designed in order to improve the education females, implement supporting laws on working females and empower females' status through demographic developments.

5 Conclusion

In this chapter using panel data methodology, the determinants of labor force participation rate for G8 countries are analyzed using data between 1995 and 2013. It is found that per capita gross domestic product and educational attainment at secondary level affect the ratio positively and significantly, whereas unemployment rate affects the ratio negatively and significantly. As the economy grows the welfare of the individuals in the economy increase. This means that aggregate supply increases together with labor force participation rate. Sectoral composition of employment in agricultural, manufacturing and services are different form each other in G8 countries; the determinants of female employment could be related to the labor market structures, gender equality in the labor market, work payment and institutions.

As the economy grows, female employment increases by improving job opportunities for women.

Unemployment rate is found to be affecting female labor force participation ratio negatively. As unemployment increases both female and male participation rates decline. This finding is similar to Tansel (2002). Ozerkek (2013) find that there is cointegration between labour force participation rate and unemployment rate for females suggesting that there is discouraged worker effect for females.

The education at the secondary school level is found to affect female labor force participation rate positively. The significance of education indicates that policies should be strengthened in order to increase female attainment in labor force. Although there are cultural, social and religious barriers for women to work, government authorities should concentrate on providing secondary and higher levels of education. As a policy implication, measures should be taken in order to decrease unemployment rates and improve labour market conditions, so that female employment could increase, job opportunities should be improved and fair wages should be equally paid to females and males. Cultural responsibilities for housework and child-bearing activities are the main obstacles that prevent women from work. Especially married women and women with the children aged between 0 and 5 are affected to a great extent.

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The Impact of the 2008–2009 Global Financial Crisis on Employment Creation and Retention in the Platinum Group Metals (PGMs) Mining Sub-sector in South Africa

Mavhungu Abel Mafukata

Abstract The main objective of this chapter is to investigate the impact of the 2008–2009 global financial crisis on the employment creation and retention in the South African Platinum Group Metals (PGMs) mining sub-sector. Desk-top literature review and analysis approach was employed for the study. The crisis led to slow-down in platinum demand and price. The slow-down might have resulted from changing consumption behaviour of major platinum consumers such as the US and Euro Zone who were greatly affected by the events of the global crisis. There were massive job losses and inability of the platinum sector to create any new jobs during the crisis as a result of the slow-down of crucial Foreign Direct Investment (FDIs) into the South African economy. Subsequently, standard of living amongst mine-workers dropped and this lead to increased demands of higher wages and other benefits. The wage negotiations became volatile and characterised by antagonisms leading to the fateful events of the Marikana massacre. Government should seek to improve and increase macroeconomic stimulus packages amongst potential investors to encourage inflows of FDIs. Personal bonuses payable to mine bosses should be curtailed during this period of economic volatility to avoid instigating labour unrest and increased demands for benefits.

1 Introduction and Background

1.1 The Origin, and Why the 2008–2009 Had to Happen

Although loose monetary policy, global imbalances which are characterised by inter-linkages with global financial systems, incorrect perceptions of risk and lax

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financial regulations have been cited as the main traditional causes of the previous global financial crises, the 2008–2009 crisis was instead said to have been mainly caused by a defective mortgage policy adopted by the Clinton administration in the United States (Helleiner 2011; Marumoagae 2014; Tanga and Tangwe 2014; Verick and Islam 2010). A plethora of emerging literature (Marumoagae 2014; Verick and Islam 2010) postulate that the mortgage policy decision adopted by the Clinton administration compelling mortgage lending institutions to extend and accelerate low-income households in the United States to access mortgage loans despite obvious risk of the loan recipients unable to repay and service such loans dramatically and consequently exposed the United States economy to the subsequent historical financial crisis of 2008–2009. The crisis eventually became the worst economic depression ever in the United States, and eventually the world over since the catastrophic "Great Depression" of 1929–1930 (Baldwin 2009; Marumoagae 2014; Romer 1993; Tanga and Tangwe (2014). The collapse of the Lehman Brothers in September 2008 furthermore worsened and aggravated the 2008–2009 crisis (Essers 2013; Verick and Islam 2010). It stands as no surprise of the "Clinton administration's global economic and financial" crisis to emerge and later spread worldwide in the speed and intensity with which it did (Helleiner 2011) affecting in its global onslaught even smaller economies such as South Africa. The impact of the crisis was contrary to postulations of many a commentator such as Allen and Giovannetti (2011) for example who never thought the events could take that turn. It is historical that although economic crises have that tendency to be regionally-induced, they tend to, with time spread across regions. Romer (1993) corroborates this assertion postulating that the "Great Depression" of 1929–1930 had emanated in the United States after some financial policy bungle there, but subsequently transferred to the rest of the world with immense consequences. In fact, according to Romer (1993: 20) "*It is clear that the centre of the depression was the United States of America, in the sense that most of what happened elsewhere has to be explained in terms of the American contraction, while that contraction is hardly explicable in any but internal terms*". The assertion expressed by Romer (1993) has actually been postulated earlier on by Meltzer (1976). This explains the typical trend of global financial crises to begin as provincial factors which end as cross-border factors (Romer 1993).

A plethora of post-crisis literature (Allen and Giovannetti 2011; Maredza and Ikhide 2013; Marumoagae 2014; Suhrcke et al. 2011) had sufficiently demonstrated the profound socio-economic backlash and consequences the 2008–2009 global economic crisis would have on global economy in general. The crisis disrupted global economic growth and development across economies, however with huge consequential implications for the smaller economies (Marumoagae 2014). In their book series "Strategic Developments and Regulatory Practice in Global Finance", Olgu et al. (2015) discuss various kinds and forms of global financial and economic crises ever experienced in world history. Marumoagae (2014) also sufficiently

deliberate on this. Both Marumoagae (2014) and Olgu et al. (2015) postulate that global financial crises have been sporadic and pockets of incidences emerging throughout history. These crises—some emerging without any evident pre-warnings, have had some profound and devastating socio-economic impact on humans. Meltzer (1976) however contended that most of these crises would have evident pre-warnings citing the timeous and prompt response of the Federal Reserve Board to the crisis in 1929 as documented in the minutes of the Board, and the notes taken during meetings by the governor of the Federal Reserve Bank of New York George L. Harrison in the summer of 1929 as examples of pre-knowledge. Tanga and Tangwe (2014) reports that the 2008–2009 global financial crisis was, and remains the worst ever such crisis post-World War 2.

The events of the 2008–2009 American crisis demonstrated that economic growth and development anywhere in the world stem from stable economic system (Maredza and Ikhide 2013). Financial and economic crises were often inter-linked with the rest of the global economy as evidenced by both the 1929–1930 (Romer 1993) and 2008–2009 crises (Marumoagae 2014) respectively. The 2008–2009 crisis was accompanied by the collapse of several financial institutions, sharp increases in public sector debt, lamentable declines in global trade, decreased Gross Domestic Products (GDPs) and rising unemployment rates characterised by increased retrenchments of workers as a result of a slow-down in production and inability of the economies to create new jobs amongst others (Marumoagae 2014; Suhrcke et al. 2011). Some of these challenges persisted even post-crisis. This is typical of financial crises just as it happened during the 1929–1930 depression (Romer 1993). For poorer regions, Suhrcke et al. (2011) revealed that global financial crises would have devastating long-lasting effects which could be genocidal and catastrophic. Marumoagae (2014) and Tanga and Tangwe (2014) profoundly deliberate on the negative effects of financial and economic crises on employment opportunities and ability of the citizenry to generate household income—especially amongst the poor during the crisis.

The purpose of this chapter is to look at finding ways to improving policy measures which could be adopted in South Africa as a response tool to loss of employment opportunities in the Platinum Metals Groups mining (PMGs) sub-sector post-2008–2009 global financial crisis. There has been of late sufficient evidence and consensus postulating that indeed South Africa had been hard hit by the events of the 2008–2009 global financial crisis characterised by immense loss of existing employment, failure of the economy to create new, and also to retain existing employment opportunities. Subsequently, these shortcomings were accompanied by devastating socio-economic implications (Marumoagae 2014)—and a solution has to be sought and found.

1.2 *From the United States to the Rest of the World: Dispelling the Myth of Sub-Saharan Africa's Exoneration From the Impact of the 2008–2009 Crisis*

No matter how less intensive the integration of developing economies in global economy might be, there always exists that opportunistic surprise for the worst. There was a popular myth in fact during the commencement of the 2008–2009 global financial crisis when the crisis first emerged in the United States. Some economists vehemently argued that the crisis would not have effect on the economies of the smaller regions of the world such as South Africa for instance (Allen and Giovannetti 2011). However, this optimism later faded. Emerging trends instead pointed differently to the optimism. What later emerged strongly was that the crisis would, instead affect a lot more smaller economic regions than the bigger economies; much contrary to the mythological assertions initially punted by most commentators (Allen and Giovannetti 2011). Subsequently, Baldwin (2009) suggested that the 2008–2009 global financial crisis emerged as being one of the worst financial crisis to ever hit all global regions with so much intensity since World War 2. Also, the United Nations Conference on Trade and Development Report (UN 2013) also conceded that economies of both the developed regions and emerging markets were in fact severely affected by the crisis. The effects of this crisis are still persistently reflected in the accompanying slow and weak GDP growth performance of most economies around the world (Marumoagae 2014). Various reasons are forwarded for this persistence. Chief amongst all the reasons would be the interdependence, and reliance of the developing economies on the bigger economies (Marumoagae 2014; Pigato and Tang 2015) which characteristically exposed these developing economies to the vulnerability of the crisis.

Although some agencies, economists and commentators have had varying views on the intensity of inter-linkages of economies with regard global finance, and the subsequent spill-over effects of the crisis for example (Olgu et al. 2015; Kasekende et al. 2010; Manyeruke and Muqayi 2011), it is evident from the postulations expressed earlier in this chapter that such inter-linkages between the economies of major economies outside SSA affected by the financial crisis and the economies of the countries in the rest of the world in fact existed. In other words, the financial and economic outcomes of the economies in the developing regions are dependent on the existing inter-linkages of these economies and those of the larger economies such as Euro Zone and the United States. Evidently, economic dimensions were that there were no detachments or de-linkage of global economies of any sort—especially with regard SSA as had been earlier on postulated by some (Manyeruke and Muqayi 2011; Negasi 2009). In fact, the whole global economy has been fundamentally inter-linked to almost a bloc—especially during this era of a faster economy of the post-Cold War period during which capital movement amongst regions and state-to-state has highly liberalised, accelerated and even moved more faster than previously between regions, if not amongst multiple regions (Olgu et al. 2015).

Based on these assertions, it is therefore easier to identify how, and why the issues of financial and economic crises affecting economies elsewhere in the Euro Zone and the United States would eventually be linked, and subsequently transmitted to the rest of the developing regions. Modern economic trends would reveal that Sub-Saharan Africa in general and the SADC in particular for instance have had increased economic integration with the Euro Zone region and the United States of America more than at any other given time of global trade—especially in the past two decades. In the case of South Africa,—especially post-apartheid there have been some increased bilateral trade relations and agreements with the Euro Zone and the United States such as the African Growth and Opportunity Act (AGOA) of 2000 promoting South Africa-US market cooperation for instance. Through this trade agreement, South Africa enjoys duty free access for its export to the American market for example. On the one hand, Euro Zone countries such as United Kingdom (UK), Germany and the Netherlands for example, continue to have long-time trade relations with South Africa (Jordaan and Kanda 2011). Off course emerging dimension in Sub-Saharan African economics is that the region is intensively getting immersed in economic partnership with the Eastern bloc—especially that of India, China, and the Tiger economy of the far East in particular. There is a new development in global economics though resulting in migration and shift of focus on trade partners by most economies in Sub-Saharan Africa who are beginning to also "Look East" from the known "Look West" policies (Marumoagae 2014). Furthermore, South Africa's membership in the BRICs could also explain that new trade dynamics are fast emerging in global economics. This trend would in the long term provide extension of probabilities of the emergence of more and more exposures of the involved economies such as South Africa to international risks and hazards emanating from inter-linkages of global economies because obviously, these new trade and market partnerships would deepen global integration and globalisation of economies.

Having considered the nature of inter-linkages of global economies as expressed here, this chapter concurs with Kasekende et al. (2010) that the current global financial and economic crisis might as well be "a crisis Africa did not create" The Kasekende assertion helps explain the irony that when the United States would go through financial and economic deceleration through internal misgivings of their own, and Greece's inability to repay their international debt to the IMF on the one hand for example, some regions in the developing economies such as South Africa for instance would find themselves having to bear the brunt over problems they did not create at first. This is the nature of global finance and economics as they unfold. The implication is that even if smaller economies such as Sub-Saharan Africa, let alone South Africa were to have that political will to influence the economic events as they continue to unfold in the United States and some areas of the Euro Zone, there simply exists no opportunity to escape the simmering aftermath of the crisis emanating from those regions simply because developing economies have little control and choice over prevailing economic and financial environments taking place in those regions (Ikejiaku 2008). Although the Euro Zone and the United States are not the world, whatever happens in these countries would have

devastating effect of economics elsewhere, suggesting therefore that when such powerful economies are economically affected, smaller economies are bound to be negatively affected too. Smaller economies bear the brunt of being part of the global economics of a highly internationalised, inter-linked, globalised and centralised economic and financial monopoly.

1.3 Statement of the Problem

The UN's World Economic Situation and Prospects 2013 mid-year update report released in May 2013 reports that economies around the world shall be faced with a negative global economic growth which lacks potential to create employment opportunities (Fourie 2014). Since this postulation, There has been a plethora of literature (Fourie 2014; Marumoagae 2014) emerging investigating the impact of a weak global economy as a result of the slow-down of economic growth on global employment prospects for most economies. However, studies which specifically investigate the effect of the 2008–2009 global economic and financial crisis on the employment retention and sustainability prospects especially in the South African economy—specifically in the Platinum group Mining are conspicuously limited. This chapter fills that empirical gap. The choice of South Africa is relevant mainly because (1) South Africa is a giant of global platinum mining as a result of the country's 85% share of global platinum reserves, (2) prevailing international and internal market conditions in the platinum sub-sector, and (3) the fact that South Africa's key export resource Platinum Group Metals (PGMs) sub-sector seems to be struggling to retain and also create new employment opportunities in an already jobless economy (4) increasing interest in development economic disciplines with regard the relational impact of 2008–2009 global crisis on employment capacities of economies—and South Africa is currently experiencing these conditions. Inability of economies to retain employment opportunities during financial crises have been experienced throughout the world previously (Jensen 1989). Literature such as that of Marumoagae (2014) only opined on issues of across-sector effects of the 2008–2009 crisis on broader socio-economic factors of society in South Africa but not specifically on employment in the Platinum Group Mining sub-sector. Other emerging literature (Kemp 2016: 15; Mtongwana 2016: 7) for example, and the deliberations of the World Economic Forum (WEF) held in Davos, Switzerland only deliberated on complexities and constraints affecting the Platinum Group Mining sub-sector without making any reference to the effects of the 2008–2009 crisis on socio-economic factors of society as such. In Davos, the Minister of Trade and Industry, Rob Davies actually conceded that the South African economy is currently going through a critical slow-down due to pressure from prevailing global economic patterns.

1.4 The Structure of this Chapter

This chapter first presents a comprehensive introduction and background to the study. The study design, and methodologies employed to conduct the study are presented thereafter. Furthermore, the main objectives and the specific objectives, theoretical frameworks and selected variables for the analyses are all comprehensively documented. The chapter records the findings of the study followed by the conclusion and recommendations thereof.

1.5 Main Objective of this Chapter

The main objective of this chapter is to investigate the impact of the 2008–2009 global financial crisis on the employment creation and retention in the Platinum Group Metals (PGMs) sub-sector of South Africa.

1.6 Specific Objectives

Specifically, this chapter comments on the effect the employment dynamics as evolving in the Platinum Group Mining sub-sector would have on the socio-economic welfare of mine-workers. Amongst others these effects are profiled with regard household income distribution of mine-workers, quality of life of mine-workers and their dependants, labour politics and collective bargaining processes, and finally the effects on worker responses through unrest and strikes leading to the events of the Marikana massacre.

1.7 Theoretical Framework and Selected Variables for Analyses

This chapter employs the theoretical framework adopted by Tulus T.H. Tambunan in the study of the two big economic crises of 1997/98 Asian financial crisis and 2008–2009 global financial crisis. Tambunan had called both of these crises as the "Transmission Channels of the Effects of the 2008/09 Crisis on the Indonesian Economy" (Tambunan 2010). The Tambunan theory is relevant to this chapter because it is needed that amongst others there be an assessment of the behaviour of the foreign market with regard commodity demand from the chapter's case study; South Africa during the period under investigation. However, this chapter acknowledges and opines that Tambunan has some obvious material limitations which could hamper certain areas of analyses of this chapter. For example, Tambunan

does not show how economic linkages, integration and globalisation of economies; for instance, the linkages of the major economies such as the United States and those of the developing economies link or integrate. Because of this omission, Tambunan does not, and sufficiently demonstrate therefore how the smaller economies are subsequently affected by the economic events emanating from the crises of the major economies. As a result of this shortcoming, this chapter finds options in Essers (2013) to complement Tambunan. Essers provides guidelines on how integrated trade between countries might influence transmission of the economic and financial crisis to another country. Essers (2013) also maps out how trade has, in the past been a major driver of economic performance between one country and another. In the event of limitations on Essers (2013), theoretical supplementation has been sought from Meyn (2004). Meyn (2004) postulates that decline of exports on an economy would have effect on the performance of the particular economy. On the reverse of it, the postulation suggests that poor performance of one economy might have influence on the performance of the trade partner economy. Evidently, this chapter adopts a multi-theoretical approach with Tambunan (2010), Meyn (2004) and Essers (2013) providing the theoretical framework.

The mining sector in South Africa is vast, and comprised of various sub-sectors. The effects of the global economic and financial crisis (GEFC) are therefore expected to be broad-based extending to the broader mining sub-sectors in general. Considering the logistical limitations of this chapter, this chapter only therefore analyses issues affecting the platinum mining sub-sector, and only limited to employment creation and retention thereof. Evidence exists that employment factors in this sub-sector have also had extended profound implications on other socio-economic factors of the platinum mine workers in South Africa. Amongst others this chapter investigates such implications with regard the welfare of the mine-workers during, and post-crisis, up to the events of the tragic Marikana massacre.

2 Discussion

2.1 Mining Economy in South Africa: Historical and Current

As far back as the discovery of gold in the De Kaap Goldfields in 1882, the Makongwa mountains in the Barberton area in 1884 and the Witwatersrand Goldfields in 1886 (Anhaeusser n.d), South African indigenous peoples of various tribes have been deeply engaged in commercial mining practices for ages (Pooe and Mathu 2011), until the arrival of the first European colonisers and explorers such as George Harrison, George Walker and Fred Struben who, like their predecessor Dutch entourage of Jan Van Riebeeck and others began to arrive in the mid-1650s, though only discovered and revived mining around the 1800s (Anhaeusser n.d). By

the time Harrison, Walker and Struben arrived in the South African mining sector, mining was already in existence in South Africa with evidence of mining activities everywhere in the country (Anhaeusser n.d). However, it is evident through history that the arrival of Harrison, Walker and Struben (Anhaeusser n.d), in the mining economy, and the introduction of colonial and apartheid economy drastically altered the mining economy in South Africa. For example, the mining economy began to be dominated by a new development; ownership of the mines and mining rights. Mining increased its economic significance by shifting from a smaller economic practice to large-scale producer with cross-border market in Europe and the United States beginning to dominate. Also, mining became technologically and logistically modernised with new mining skills imported from the rest of the world and new technology also invading the industry. Crucially, this growth and massive industrialisation of the mining sector introduced the need for organised labour which led to the rising of labour trade unions amongst others. As far as the first waves of modernisation of mining in South Africa, the sector has been exposed to numerous disturbances, unrest, strikes and protest campaigns motivated amongst others by the struggle against apartheid and white monopoly of mainstream formal economy in South Africa. This still persists to date. It is well understood by the majority of economic commentators that any disruptions therefore to mining in South Africa would pose serious complexities for the economy in general—especially with regard GDP output contribution, employment creation, employment retention, household income generation and poverty reduction measures and initiatives for instance. Currently, disruptive tendencies are already having huge negative impacts on the mining industry—especially in the Platinum Group Metals (PGMs) of the Rustenburg platinum belt, North West province.

2.2 Platinum Mining and Global Market Trends

2.2.1 Slow-Down in the Demand of Platinum

From 2000 to 2005, the demand for Platinum was on the rise on yearly basis (Fig. 1). However, there was a slow-down on the demand for Platinum in 2006 and yet another recovery in 2007. Generally, global economic trends of a booming economy—especially during the period 2002 to 2007 (Verick and Islam 2010) could explain the reasons behind platinum boom of 2007. As indicated in Fig. 1, the demand for Platinum began to slow-down from 2007 to 2009. Market conditions as dictated to by the events in platinum consumer regions such as the United States of America (USA) and certain parts of the Euro Zone and other influential platinum consumers elsewhere such as Japan began to show strain over the events of the economic crisis—and this began to have effect on platinum market trends.

In other words, the inconsistency displayed by platinum demand trends (Fig. 1) between 2006 and 2009 just before the inception of the 2008–2009 global economic and financial crisis could explain the damage inflicted by America's bungle on the

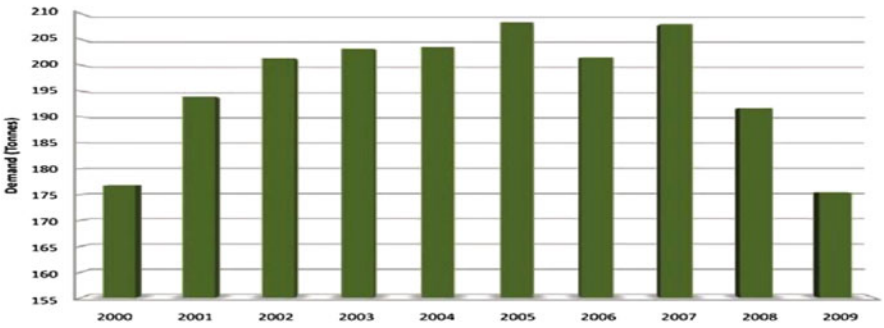

Fig. 1 Export demand patterns for the South African Platinum Group Metals. Source: Van der Merwe (2011)

housing sector being the 1999 President Bill Clinton's policy of relaxation of financial lending regulations in the Banking sector to fast track housing targets in the United States (Helleiner 2011; Verick and Islam 2010). Cross-industrial events amongst platinum consumer sub-sectors in the United States and the Euro Zone might have had implications in the platinum sector of South Africa. For example, the sharp decline of platinum demand from 2008 to 2009 could have been triggered by amongst others the slow-down of platinum consumption as a result of events affecting the auto-mobile industry in these regions. This assertion could be substantiated by the findings reported (Gastrow 2012). Gastrow (2012) found that there were fundamental slow down in performance of the automotive sub-sector in the bigger economies such as the United States and the Euro Zone which tend to be the largest consumers of platinum metals during this period. During 2008–2009, motor vehicle purchase experienced a major plunge because the larger part of the market would not afford credit and subsequent repayments thereof forcing the consumers to postpone such purchases and to avoid debts in a bad time for that matter (Gastrow 2012; Hawthorne et al. 2005). The slow-down in the US economy as a result of the economic crisis and its effect on the automotive industry turned out to be the major draw-back of the platinum mining industry in South Africa for as long as the US and Euro Zone economies remained in that financial and economic state. Based on this, it could be argued that South Africa's platinum economy, if not the entire economy of this African country is intertwined, inter-linked, integrated and highly dependent on the US and Euro Zone economies. The postulation "the old proverbial truth that the rest of the world sneezes when the US catches a cold appeared to be vindicated" as penned by Verick and Islam (2010) might sufficiently corroborate the assertion in this case. Evidently, smaller economies such as South Africa would economically suffer at times from economic issues they would never have control on. The effects here were arguably evident—especially with the accompanying slow-down in the demand of auto-catalysts in the automotive industry in the United States but eventually affecting the South African platinum market for instance (Hilliard 2001). Essers (2013) confirms that postponed consumption and investment in the bigger economies transmits decreases in commodity demand.

2.2.2 The Fluctuations of the Price of Platinum in Global Market

Stability of market is desirable for every global economy. Global market dynamics change spontaneously. Commodity price changes timeously depending on a plethora of factors. Figure 2 illustrates the performance of platinum in terms of price in global market while Fig. 3 shows the patterns of the price of platinum in global markets over an extended period (1992–2010).

As indicated in Figs. 2 and 3, it is evident that the platinum price fluctuation was even more evident during 2008–2009. This plunge of price between 2008 and 2009 (Fig. 2) might be in relation to prevailing global economic and financial conditions related to the 2008–2009 economic and financial global crisis. However, according to Fig. 2, the price of platinum showed some enormous increase between 2007 and 2008 and a behaviour of fluctuations according to Fig. 3 between 1992 and 2008 on the one hand. The global economic boom of 2002 up to 2007 (Verick and Islam 2010) might have boosted the platinum market at this point. This price fluctuation behaviour is corroborated by Capps (2012). Most notably, is the sharp decrease of the price later during 2008–2009. This might be the period when the effects of the economic crisis were setting in. According to Capps (2012) the plunge in platinum price during 2008–2009 was more than half; from US Dollar 1 980 per ounce to US Dollar 900 per ounce. Figure 4 shows platinum price patterns between 2011 and 2015.

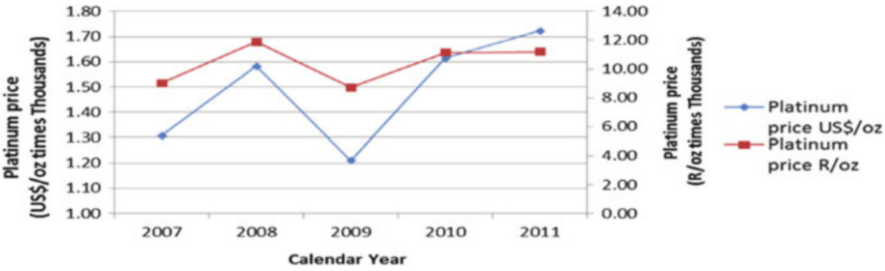

Fig. 2 The price of platinum during the 2008–2009 crisis. Source: Neingo and Cawood (2014)

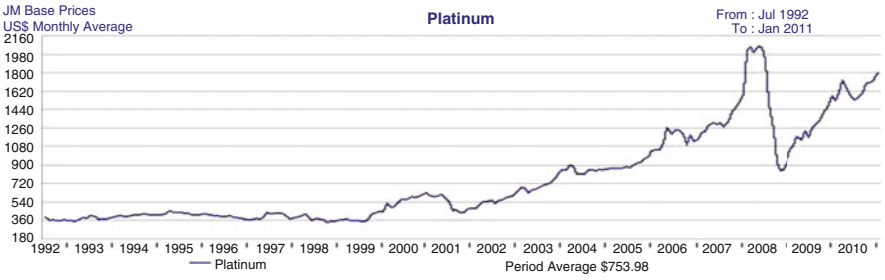

Fig. 3 Price fluctuations of platinum from 1992–2011. Source: Capps (2012)

Fig. 4 Platinum price over five year period—2011–2015. Source: Infomine.com

Fig. 5 Platinum Price from fourth quarter half of 2015 and first quarter of 2016. Source: Infomine.com

It has been a struggle since the plunge of the platinum price during the 2008–2009 economic recession to regain the performance of 2007 during the economic boom for instance. The price of platinum in South Africa has never broken the barrier of US Dollar 1 980 per ounce attained since 2011, but instead has plunged further as low as US Dollar 900 per ounce. As revealed in Fig. 4, it has been a downward spiral of the platinum price from 2011 right through to the third quarter of 2015 when the price was pecked at approximately USD 872.25 per ounce. Furthermore, Fig. 5 reveals an un-improving market behaviour of platinum price right from the fourth quarter of 2015 to the first quarter of 2016 (Infomine 2016).

The behaviour of the platinum market in this regard, based on the properties of Figs. 2, 3, 4 and 5 suggests that the platinum mining sub-sector in South Africa is highly characterised by market instability. Whereas the causality of the instabilities could be ascribed to events of global market, there are evidently a plethora of internal factors involved. As matters are, it could be opined that the platinum mining could not be a reliable and sustainable source of South Africa's GDP. In other words, the platinum economy is vulnerable to international market shocks as, and when they become volatile (Van der Zwan and Nel 2010).

The Implications

The fact that the demand base of the sector was affected, it meant that the overall economic performance of the economy might also be affected. Poor performance of platinum in the international market with regard price has consequences in the economy. Firstly, it affects profits. Once profits are affected, various other intertwined complexities set in; for example, cost cutting measures tend to emerge amongst mining houses which would seek to maximise profits. This might be accompanied by other consequential effects such as low wages for mine-workers as mining houses cut down on expected high production costs to manipulate the effects of the price swings. Earlier studies (Capps 2012; Neingo and Cawood 2014; Van der Zwan and Nel 2010; Van der Merwe (2011) who found that the South African platinum mining sub-sector has experienced devastating shocks during the global financial crisis of 2008–2009 which slowed down commodity demand—especially that of platinum while also impacting on the price of the commodity as well corroborate the assertion. As a result, not only was the South African platinum economy unable to create new jobs but a considerable number of existing employment opportunities were also lost. Loss of jobs during economic and financial crisis have in most cases been difficult to avoid and therefore inevitable in most cases (Essers 2013). While, the South African Chamber of Mines projects the employment opportunities in the mining sector in South Africa at one million (Van der Zwan and Nel 2010), which has currently subsided by at least half post global financial crisis, it is also key to note that the South African economy had lost approximately one million employment opportunities in all sectors during the crisis (Verick 2011). It would emerge later that what appears to be a challenge of one country in the region spills over to become an intra-regional challenge. For example, when mine-workers lose jobs in the South African mines, other smaller economies such as Lesotho, Swaziland, Mozambique, Malawi amongst others also feel the brunt because a number of their migrant workers from these countries are employed in the South African mines. In other words, remittances earned and dispatched by these migrant mine-workers were also severely affected. The consequences might be that subsequent increases of potential unemployment miners; who have lost jobs in the crisis from any of the mentioned countries would have to find some alternative elsewhere for their working class personnel out of job in South Africa. Some return home to cause more socio-economic problems for their countries (Allen and Giovannetti 2011). The implications are that a number of households lose their household income, and therefore risk dropping standards of living.

In the case of the South African public, the implication of the mining economy shedding so many employment opportunities would, on the one hand increase the number of jobless citizenry. The consequences of this is heavy reliance of the citizenry on the already over-sized state welfare resource base with increased risk of exposure to service-delivery based public violence and xenophobic attacks on foreign nationals—especially those of African descent (Mafukata 2015). This assertion is corroborated by Tanga and Tangwe (2014) who found and reported

that there were in fact sudden increases of the numbers of people dependent on state social grant in South Africa in case of job losses in other sectors. The failure of the platinum mining sub-sector to keep pace with high cost of living amongst mine-workers led to increased pressure on mining houses to accept high wage demands by workers therefore courting for unprofitable business. Failure of such agreements and commitment would eventually lead to unprecedented turmoil, strikes, protests and violence in the sector which would spill over to other sectors. In 2012 for example, the persistence of the mine-workers for increased benefits led to prolonged and unresolvable wage demands and subsequent strikes leading to the famous 16 August 2012 massacre in Marikana where approximately 34 mine-workers were killed and 78 wounded by the police in a bloody confrontation in which a number of police officers were also killed (Satgar 2009; Twala n.d). The view of the workers in South Africa have been that workers were poorly paid—especially in the mines. This assertion could be corroborated by the sentiment ascribed to one labour leader who argued that "In South Africa, we've made a choice: we don't want to build a low-wage economy that's premised on exploitation of workers" Tony Ehrenreich (Mills and Herbst 2012). The Ehrenreich assertion might assist explain the anger of the general mine-workers in South Africa which makes the country's labour industry look a poisoned space for investment in the economy in the eyes of cross-border investors. According to Tanga and Tangwe (2014) "...the crisis together with the 2011 Euro Zone debt crisis is likely to continue to lead to increased poverty and economic vulnerability of households across South Africa" What this argument suggests is for a solution to be sought and found because t is evident that the 2008–2009 global financial crisis had created a cobweb of factors which negatively and heavily impacted on the broader South African economy.

3 Conclusion and Recommendations

South Africa is one of the regions seriously affected by the global economic and financial crisis of the 2008–2009. Despite some argument to the contrary, the US policy gap on mortgage housing turned out to have major economic implications for global economy including previously excluded regions from the turmoil. Influential individuals and powerful global institutions had projected a favourable climate for smaller economies during the 2008–2009 economic crisis. This chapter concludes that global economies operate in a highly inter-linked and globalised environment promoting dependency. This chapter furthermore concludes that the platinum mining sub-sector employment retention capacity was affected by the events of the 2008–2009 global financial crisis. The sub-sector was affected with regard price of the commodity and demand by international market. The effects had impact on other social factors of the mine-workers. The impact was mostly felt with regard job losses and decreased household income base. In addition, workers engaged in prolonged labour strikes which led to loss of remittances by workers of foreign

diaspora employed in the mines and earnings by locals. This chapter recommends that mining executives should desist from personal bonus allocations during economic stress and crises to avoid instigation of difficult wage demands by mineworkers. Government must expedite definition of ownership of the mines and mining rights. Unnecessary labour strikes should be avoided to boost investor confidence of the economy. Employment must be protected and jobs can only be cut as last resort.

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The Effects of the Crisis on Nautical Tourism: An Analysis of the Italian Situation Regarding Port Features, Linked Economic Activities and Taxation

Enrico Ivaldi, Riccardo Soliani, and Gian Marco Ugolini

Abstract Since 2008 the Italian nautical industry has gone through a period of uninterrupted crisis with serious consequences both of an economic nature and in terms of loss of jobs. In particular, the sector of pleasure boating has undergone profound upheaval which has essentially affected three areas.

The non-renewal of the fleet due to a sharp decrease in new registrations is the first. The second is the inability to modify the port supply and number of berths, given that ports are in fact a stock of long-term real estate. This has resulted in falling prices and a difficult economic and financial situation for port managers. The third concerns boaters, the driving force of nautical tourism, who responded immediately to the general crisis with a change in behaviour, devoting less time and money to boating. This disaffection has been further aggravated by legislation that has proved almost hostile and heavily punitive towards boaters and boating in general.

Finally, since 2014–2015 the Italian Government seems to have changed course and has cancelled some vexatious rules (which weakened public finances) thus giving new hope to the shipyards and to boaters: the first challenge will be to bring back on board the 40,000 boaters who have deserted.

The contribution to the paper and paragraphs 1 and 6 are the result of a joint effort. Credit for paragraph 2 goes to E. Ivaldi, for paragraph 5 to R. Soliani and for paragraphs 3 and 4 to G. M. Ugolini

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1 Characteristics of the Involution in the Nautical Sector

The nautical sector and in particular that of nautical tourism thrived until 2008 (AMI-CENSIS 2008), although even then elements of possible weakness were beginning to emerge (Benevolo 2008). Domestic production grew at high rates, port facilities increased in number and new ports were designed because the supply of berths, at least in many parts of the country, could not meet the potential demand.

Today we are still in the midst of a crisis that has lasted for more than 6 years and that has affected all economies globally. This has resulted in a steep decline for the boating industry, even higher in percentage than the average for other economic sectors, due to its peculiar elasticity characteristics. Turnover of shipyards, engine and accessory manufacturers was reduced almost to a third of its original value; according to the estimates available it dropped from a value of over 6.4 billion Euros in 2008 to 2.4 billion Euros in 2014, about 90 % of which was accounted for by exports, while the domestic market had almost completely stalled. The enduring positive performance in exports is due to the fact that sales are stable especially for large boats and super-yachts, a field in which Italy has always been and still remains the world leader.

Even the practice of nautical tourism has decreased significantly: this recent trend, especially evident in 2012 and 2013—already damaged by the general economic crisis—has been further aggravated by the combination of at least two types of events. On the one hand, the proliferation of repeated and invasive tax inspections on boat owners, who are often named and shamed as possible (or certain) tax evaders; on the other hand, the introduction in 2012 of the mooring fee to be paid by any craft located in the Italian ports, which will be discussed later.

2 The Key Aspects of the Industry

The boating industry—or rather, that of nautical tourism—is extremely complex and its understanding requires a clearly-defined logical and methodological framework. It may be useful to start from the concept of yachting in the broadest sense of the term, that is the combination of leisure activities involving navigation and therefore with the use of a boat (Fortezza 2009). Here we will discuss some of the main elements of the supply chain (Ugolini 2010): as regards the supply they are basically the fleet and the available berths in the port facilities; as regards the demand, the key characteristics are the economic behaviour of the boaters, the consequent economic activities and, more generally, other transversal elements such as marine culture, education and taxation, together with public policies for the sector.

Starting with the supply side, certainly one of the most effective variables for assessing the volume and importance of nautical tourism is precisely the size of the existing fleet.

Table 1 Total size of the fleet (2012)

Fleet in Italy—n. of units	**593,738**
Total registered units	**104,738**
Total unregistered units, of which	**489,000**
– Motor units	356,300
– Canoes, kayaks, other crafts for sports, etc.	124,700
– Sailing boats without engine	8,000

However, unlike for example the automotive sector, counting the fleet is no easy task because yachts under 10 m in length do not have to register and so are excluded from specific surveys.[1] For this reason, the values shown are the result of an estimate, refined and updated several times over the last decade, compiled by the authors as part of the studies conducted by the Nautical National Observatory (Ugolini et al. 2011, 2012, 2013, 2015). Such values are based on the estimated average life by type of unit, that is 20 years for sailing boats and 10 years for other small units (canoes, kayaks, crafts for sports and rowing boats) and refined by combining the above with the data on the Certificato di Uso Motore, a certification which all leisure motor boats must have (Pagani Isnardi et al. 2015). The resulting estimate of the unregistered fleet amounts to about 489,000 units, of which 356,000 motor units, and over 132,000 small units, of which about 8000 sailing units without an engine. More accurate numbers are available instead for units above 10 m, which are almost 105,000 nationwide (Table 1).

However, this data must be properly analysed with additional information about the quality of the fleet: for example, data about the size expressed as the length of the units and the type of propulsion used (rowing, sailing, motor) (Table 2).

As regards propulsion there is a high prevalence of motor boats which represent more than 74 %, among which those under 10 m are almost 410,000 and make up 69 % of the total. Other crafts are the next in number (canoes, kayaks, other crafts for sport and also patinos) with almost 125,000 units (21 %). Sailing boats represent a minority, about 28,000 (4.76 %) with a prevalence of boats over 10 m long. Recreational boats (over 24 m) consist of 250 units.

On the other hand, if aggregated by size, the units under 10 m prevail significantly: 421,000 (sailing + motor) as well as 124,700 crafts, a total that makes up 91.9 % of the national fleet. So if the characterization of pleasure boating (and the boat owner) makes specific reference to the boat, we can say that the typical boat owner is one who owns a motor boat under 10 m, followed at great distance by one who enjoy boating on a simple craft. There are even fewer owners of larger motor boats (>10 m) and last in the category are the sailing enthusiasts (who are less than 5 %).

A first measure of the impact of the crisis on boating would have been to estimate the change in the total number of units. However, since most of these are not

[1]Units without prior registration refer to the provisions of the Legislative Decree 18 July 2005, n. 171 (Code of Yachting) that identifies precisely "pleasure crafts" with rowing units or hulls less than 10 m in length.

Table 2 Fleet by length and propulsion of pleasure crafts (2012)

Length	Crafts	Sails (with/without auxiliary engine)			With motor			Ships	Total
		Up to 10 m	Over 10 m	Total	Up to 10 m	Over 10 m	Total	(over 24 m)	
Registered		3086	17,182	20,268	53,654	30,566	84,220	250	104,738
Unregistered	124,700	8000		8000	356,300		356,300		489,000
Total	**124,700**	**11,086**	**17,182**	**28,268**	**409,954**	**30,566**	**440,520**	**250**	**593,738**
%	*21.00*	*1.87*	*2.89*	*4.76*	*69.05*	*5.15*	*74.19*	*0.04*	*100.00*

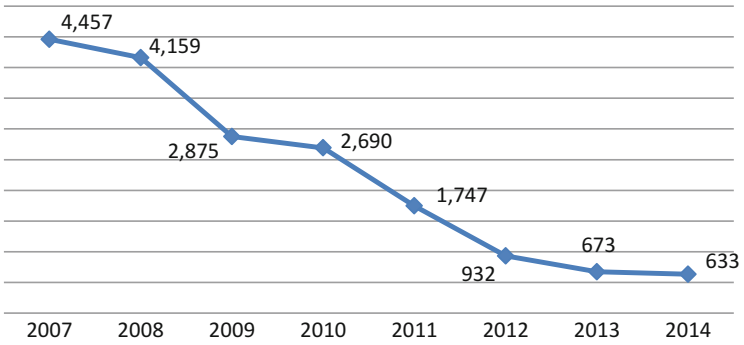

Fig. 1 Trend of registrations of new pleasure crafts in the given year

Table 3 Registrations and cancellations of pleasure crafts

Year	Registered fleet	Registrations	Cancellations	Difference	%
2012	104,738	932	2524	−1592	−1.5
2013	103,146	673	2148	−1475	−1.4
2014	101,671	633	2040	−1407	−1.4
Total over 3-year period		2238	6712	−4474	

registered, this is impossible. Therefore, the estimate is limited to registered units and undertaken in two ways. The first by analysing new registrations (Ministry of Infrastructure and Transport 2014)[2]: starting from 2007 (the last year before the crisis) until the latest available data (2014) there is a clear perception of how significantly the sector has collapsed: there was a relentless decrease from almost 4500 newly registered units per year to little more than 630 (14.2 % of the initial value) (Fig. 1).

This first representation may seem to signal that boating has simply grown less over the period considered. In fact the fleet has decreased: detailed analysis of the last three years shows how the cancellations of units are well above the registrations of new units, resulting in a negative balance of about 1.5 %, probably reaching a value of 8–10 % since the beginning of the crisis (Table 3).

3 The Marinas: Facilities and Berths Growing

The demand side of the supply chain is absolutely strategic, i.e., the marina, which can be identified as the infrastructure providing a physical interface between land and water. This function is actually performed not only by the more complex

[2]These are registrations with the *Uffici Marittimi* and the *Motorizzazione Civile*, as reported on the annual journal *Il diporto nautico in Italia*.

structures (Gasparini 2004) but also, albeit with certain limits, by basic facilities such as simple ramps for launching boats.

For this purpose, the ports are divided for convenience into three different types which have different levels of service:

– marinas: basically correspond to private marinas;
– multifunctional ports: generally public structures, sometimes within commercial ports or harbours;
– mooring points: equipped at best with temporary structures which are removed or unavailable during the winter season.

Given the interface function of ports, it is clear that nautical tourism is inextricably linked to the presence of these infrastructures (Ruggeri 2007): by 2013 in Italy a total of 554 ports were active, belonging to three types (Pagine azzurre 2014) (Table 4).

All the Italian facilities are sufficiently well-structured and this can be confirmed by the analysis of some indicators. An initial assessment regards the density in number of facilities and berths, related to the length of the coastline (7.705 km): as for the structures, on average there is one port[3] every 13.9 km of coastline and an average density of 20.8 berths per km of coastline. It is evident that since these are average values, the specific situations at local/regional level can differ even significantly, with possible lack of facilities. This is especially true in relation to the average distance between the ports and the actual number of boaters: for example in Sardinia the values for density increase to 7.21 km/port and for the frequency they decrease to 11.5 berths/km of coastline (Ugolini 2013c). The second assessment concerns the relationship between berths and potential boats that need to have a permanent place in the water. Excluding a priori smaller crafts (124,700), we can include all boats over 10 m (48,000), which presumably have a berth. There are still 112,000 berths available for approximately 421,000 boats up to 10 m, which means a coverage ratio of 26.6 % or, conversely, that 73.4 % of the boats up to 10 m (309,000 units) do not have a berth in a port.

This calculation, albeit with some degree of uncertainty,[4] leads to two types of considerations: the first suggests that a significant proportion of these boats have no need for a permanent place in the water, for reasons of frequency of use, willingness to pay the cost, or the disposal of that boat. Secondly, that any residual demand can be met at least in part through the provision of appropriate infrastructure (from the most basic forms of ramps to fast and economic forms of slipways) together with facilities like dry storage. These factors, despite requiring further analysis, seem to indicate that the frequently mentioned lack of berths is not actually so dramatic.

[3]Here the term port is used indifferently to indicate each of the three types identified above.

[4]For example we have not taken into account the fact that about 10 % of the berths are to be reserved for transit and that moreover, there is certainly a number of crafts which, for various reasons, are no longer able to navigate or that have been disposed of, and that therefore do not need a berth.

Table 4 Ports and berths by type (2013)

		Marinas	Multifunctional ports					Mooring points			
	Total n°	Marina	Port	Industr./ commer. port	Canal harbour	Dock	TOT. Multifunctional ports	Mooring	Beach with facilities	Natural Harbours	TOT. Mooring points
Ports	554	78	231	17	38	68	354	111	3	8	122
Berths	160,568	42,818	64,768	4830	17,931	11,900	99,429	16,008	699	1614	18,321
Average number of berths	290	549	280	284	472	175	281	144	233	202	150

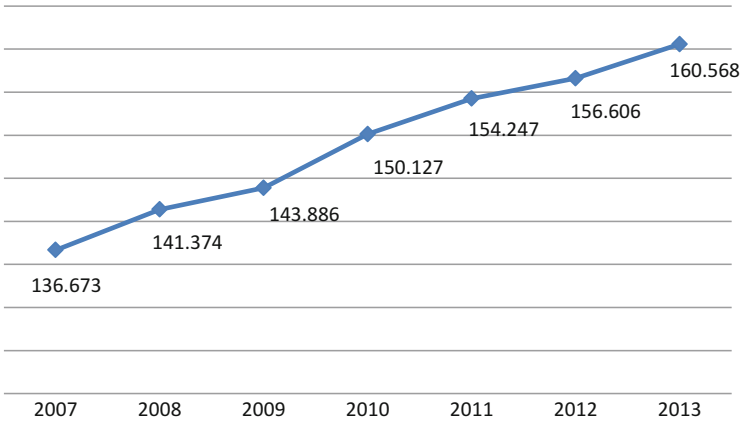

Fig. 2 Trend in the number of port facilities and the offer of berths

A further indirect confirmation is given by the fact that the drop in demand during the crisis, which we will examine below, was not replaced by immediate requests for berths.

Against this background one would have expected that, as with new registrations, the offer of berths would also have experienced a slowdown. In fact, in this case one must speak of port facilities as a real estate asset. On the one hand, the term points precisely to the accumulation effect, namely the fact that it is the result of an activity that unfolds over time (Quagli 2008); on the other hand, like any other real estate stock it is subject to extreme rigidity, which does not allow for immediate adjustments to changing market conditions, except for changes in the price of the goods, but not in the decrease of actual availability. This rigidity has caused a deep crisis for marina management. The fact that even in this time of crisis the number of facilities has grown from 501 to 554 (53 new ports; +10.6 %) and berths have increased even more (+24.000; +17.5 %) (Fig. 2) is due precisely to the fact that the construction of a port can take up to ten years or more from the decision of investment: thus these new ports are the result of initiatives already taken in the pre-crisis period, even in times of booming economic conditions (Fig. 2).

The paradox is that in the face of this growing supply, yachting went through a period of serious crisis, as measured by the fall in traffic recorded in the marinas, exacerbated by particularly punitive government measures.[5] In 2012, at the end of the season, it was possible to estimate[6] a loss of over 36,000 permanent berths (over 22 %), with an impact on employment of more than 10,000 jobs lost, including direct employees and auxiliary jobs. Even the berths reserved for boaters in transit have seen a very substantial fall in demand, estimated at −33.8 % from previous

[5]It is the introduction in late 2011 of the mooring fee which affected not only the ownership of berths but also the stationing in ports, regardless of flag and even the nationality of the owner.

[6]Direct survey by the National Nautical Observatory

years. This decrease, for both permanent berths and those for transit has for the 2013–2014 period amounted to approximately 40,000 unoccupied permanent berths.

4 The Loss of Economic Auxiliary Activities

The drastic drop in attendance of boaters, both permanent and in transit, detected in marinas obviously results from a similar change in previous navigation habits (ISPO 2009). This was established through a direct survey conducted in the summer of 2012 and 2013. Over 50 % of those surveyed said they had changed habits in particular regarding the use and frequency of navigation. A further analysis of the responses has enabled us to provide specific data on the quantification of boat-days (one of the most indicative measures of boating), by comparing it, among other things, with the values of a previous period when the crisis was still in its early stages (Fig. 3).

In just 3 years, the average number of days spent at sea by the boat owner thus fell from 59.6 days to 40.0 days (including holidays, weekends and day trips), with a decrease of 32.9 %; this reduction is especially significant for larger boats: the days of navigation for recreational vessels (>24 m) fell from 92.5 to 52.1 (−43.7 %). Even more significant is the response in terms of navigation in transit, that is, away from their home port: it went from an average of 12.0 days to 2.5 (−79.1 %), which means that boat owners virtually eliminated cruise activities to reduce costs.

Although this was the main response (24.1 %) of boaters to the crisis (Fig. 4), just as important was the percentage of those who responded by reducing expenses both on land (12.9), and for the management and maintenance of the boat (12.6 % of

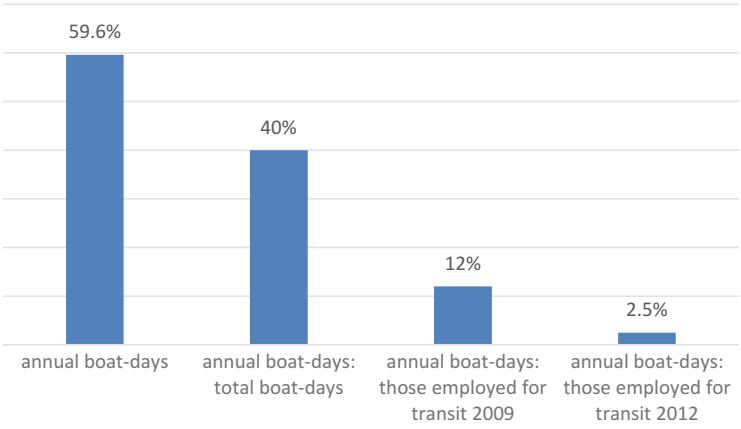

Fig. 3 Number of annual boat-days: total and those employed for transit (2012)

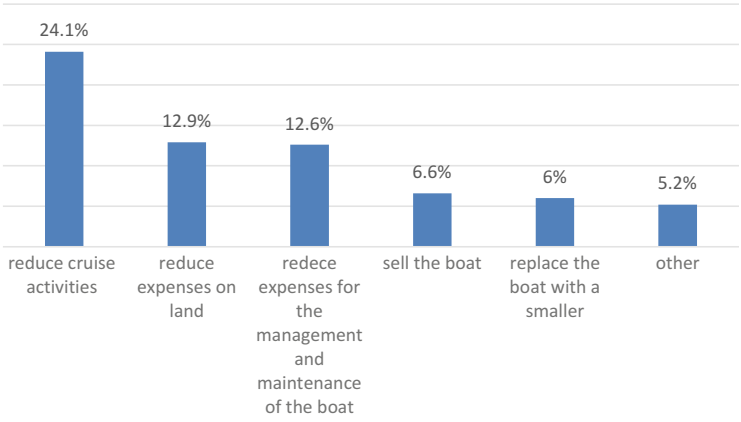

Fig. 4 Number of annual boat-days: total and those employed for transit (2012)

Table 5 Expenses of the boaters by size of boat (Euros/year)

	Expenses for the boat			Expenses on land		
	2009	2012	% 2012/2009	2009	2012	% 2012/2009
Crafts (<10 m)	5779	3793	−34.4	9423	3515	−62.7
Units 10–18 m	14,314	9711	−32.2	22,368	8689	−61.2
Units 18–24 m	27,982	20,164	−27.9	54,961	24,031	−56.3
Yachts	73,418	35,507	−51.6	401,001	110,228	−72.5

boaters). Finally, some of the most extreme reactions from boaters were to either sell their boats (6 %) or replace them with a smaller and therefore less demanding one in terms of costs of management (6.6 %).

So the consequences of the change in behaviour of boaters has serious consequences in terms of the economic auxiliary activities of nautical tourism (Federation of Sea, CENSIS 2002, 2011). An inter-temporal comparison with the year 2009 is appropriate here, starting from the use of extensively tested methodologies (ICOMIA 2008, 2012). The expenses of the boat owners can be divided into two broad categories: those related to the boat, including port services, fuel, purchase of accessories and components and, more generally, the cost of annual maintenance. And those related to purchases made on land connected to nautical activity: transport, catering, sports and recreational activities, entertainment, shopping.

The estimate of such expenses[7] required the segmentation of boaters, because they vary greatly depending on the size of the boat owned (Table 5).

Before starting the analysis, it is useful to note that the above figures relate to profit in auxiliary activities produced by each boat: thus there is consistency in the

[7]The values refer to the survey carried out among boaters who keep their boat in the marina, which is the most structured and specialized type of tourist port.

Table 6 Variation in the expenses by boaters and in the derived nautical profits (millions of euros)

	2010	2012	2012–2010
Expenses in marinas (78)	1100	594	−506
Expenses in other ports (476)—estimate	1300	798	−502
Total expenses by boaters	2400	1292	−1108
Tourist derived profit: other services, charter, multiplicator, etc.	4600	2484	−2116
Total expenses by boaters + tourist derived profit	7000	3776	−3224

costs related to the boat, while expenses on land are related to all boaters taking into account the average number on each type of boat (starting from 3.9 persons for those smaller than 10 m). Besides the obvious fact that the costs grow much more than proportionally to the length of the boat, because the value of the boat itself and so the spending power of the owner (and guests) is also much higher, it also appears that the costs of the boat are much less elastic (the decline is within a range of −34.4/−51.6). Indeed, they consist of fixed main components and are not simply related to the frequency of use, such as port services (including the berth) and many of the ordinary administrative expenses which are in fact irreducible. Instead, expenses on land have undergone a considerable decrease: from a minimum of −62.6 % for crafts, up to −72.5 % for yachts.

These results have allowed us to propose a macro level evaluation for the entire sector of Italian nautical tourism. Starting from expenses (for the boat and on land) regarding units permanently based in the marina (42.818 berths), we determined the expenses related to all the other types of ports (117.750): obviously these expenses are proportionately much lower due to the type of facilities, which also include simple moorings, and therefore to the size of the boats and their port costs. As regards the reduction of expenditure relating to boaters moored in these ports for the year 2012 we applied instead slightly lower loss coefficients. The result of these operations is an overall decrease in expenses by Italian boaters of 1.108 million euros between 2010 and 2012, equal to −53.8 % (Table 6).

However, the loss of wealth produced by nautical tourism is not limited to direct expenses sustained by the boat owner, but must also include the subsequent derived profit. Accepting the most reliable estimates of the calculation of this derived profit[8] and calculating what was already expressed in terms of the expenses by boaters, it is possible to conservatively estimate a value of the multiplier of about 1.9, leading to 3.776 million euro for the year 2012 with a total loss of 3,224,000 euro.

[8]CENSIS and National Nautical Observatory

5 The Relevance of Public Policies for the Sector

The analysis adequately demonstrates how nautical tourism is complex and as a whole highly responsive to economic conditions in terms of elasticity of demand (spending behaviour of boaters). From this point of view it should not therefore be surprising that in a period of such marked and prolonged crisis the navigation activities of boaters have decreased together with the related industries.

However the peculiarities of the Italian situation cannot be understood thoroughly if other factors that directly influenced the development of the sector are ignored. In particular we refer to the aforementioned legislation and the broader public policy towards the sector. Evidence of this fact is supported by the consideration that in these years of economic crisis the activities and the turnover of the boating industry (construction, engines and accessories) have behaved differently depending on the markets of destination: in 2008 the domestic component weighed about 50 % in terms of turnover, while in 2014 it was reduced to about 10 %, a sign that the crisis in Italy has been particularly dramatic.

Considering now the orientation of public policy towards the sector, one must point out the mooring fee on all crafts longer than 10 m, introduced in December 2012. It was unique, compared to existing versions in the past, because it applied to all pleasure crafts permanently based in Italy, not just those belonging to foreign nationals who had chosen our facilities as home port. The immediate result was the loss of boats especially to the neighbouring ports of France (Côte d'Azur) and Croatia.

This exodus, as well as undermining the financial stability of many port facilities, has had immediate consequences for the finances of state and local public authorities that managed marinas. In order to quantify the loss of public revenues, we estimated the reduction of costs incurred by the boat owners (including fuel) in terms of lower revenue from VAT and excise taxes, revenue from mooring fee and VAT deriving from the non-purchase of new crafts. Altogether this revenue amounted to about 970 million euro in 2009: in 2012 it fell sharply to 462 million with a net loss of 508 million (−52 %).

In the face of such lost revenue the State had estimated to collect about 150 to 155 million euro with the mooring fee, while in reality (also because of the exodus of boats), it obtained only 25. So, at a later time (2013), the authorities recognized the folly of this tax (as well as the damage to public finances) and have turned it into a fee for the ownership of a boat charged only to Italian nationals, and they later abolished it for units up to 14mt in length and reduced it for larger units.

Other tax measures proved to be equally burdensome for boating, such as the introduction of the so-called *redditometro* which, considering the boat a luxury, attributed to the owners a standard rate of income assessment higher than that of houses and cars. In this case, the state was forced to change the punitive measure for the sector. Another issue is still open and regards the state concessions to marinas in two respects. The first is the duration of the concessions, which appears limited in relation to the necessary time of amortisation of the investment. The second is that

Table 7 Estimated derived profit (EUR) and jobs created by the recovery of berth and boaters

If, out of the lost 40,000 boaters, we could bring back...	10,000	20,000	30,000	40,000
Expenses for the boat	58,000,000	116,000,000	174,000,000	232,000,000
Expenses on land	64,000,000	128,000,000	192,000,000	256,000,000
Total derived profit recovered	122,000,000	244,000,000	366,000,000	488,000,000
Jobs recovered	2917	5833	8750	11,667

the fees were increased significantly, thus modifying the terms of economic benefit under which manufacturers and managers of the structures had calculated profits.

Finally also the administrative procedures, obligations and the resulting inspections have been an obstacle to the spread of the practice of nautical tourism. The introduction, not completely operational, of the electronic registry (like the one used for cars), and of the "Blue Label" which simplifies and protects the boat owner in the execution of the controls at sea (avoiding inspections on those who have already been subjected to a check and have therefore obtained the label), signalled a recent change of course by the state administration that seems to finally treat boating like other Italian productive sectors (among the finest in the world) without punitive intents or presumptions of wealth/evasion against boat owners.

If such a reorientation were to bring disappointed boaters back to sea, the first effect would be to recover all or part of the berths not used because of the crisis and the resulting derived profits: in the following table we show a simulation of different options with increasing impact (Table 7).

Taking into account the purchasing power in terms of derived profit, both for the boat and on land, we can estimate an immediate return of nearly 500 million euro in addition to the effects on employment of more than 11,000 new employees.

6 Conclusions

One may wonder in the end what are the prospects for recovery and further development of the sector. The answer is not easy and cannot be limited to the specific variables, but must refer to the evolution (hopefully positive) of the current economic situation. Based on the repeated analyses of the sector conducted over the past six years we can say that Italy certainly has a lot to offer to yachting and nautical tourism (Ugolini 2013b).

Considering what we referred to as keys elements in the supply chain, we must first acknowledge the existence of a production capacity, both in terms of technology and in terms of design, unique in the world and widely recognized. For this reason the foreign market has withstood the crisis and, when the domestic market restarts, manufacturers will be perfectly equipped to respond (Ivaldi 2013).

On the other hand even the offer of marinas is adequate and ready to meet the return of lost demand and also a good share of any extra demand: however, improvements are needed in the environmental sustainability of the marinas (Ugolini 2013a) and in the value-for-money relation in terms of growth of global competitiveness. Moreover, the orientation of the past years to build new marinas will have to consider the possibility of increasing the offer of berths through re-use of spaces currently abandoned and/or not used. This of course would also serve the purpose of conservation and protection of our coasts, coastlines and water quality that are the main reason for navigation and satisfaction of boaters.

Finally, in terms of demand, we must consider boaters and all those who practise activities related to navigation (including of course, water sports, diving and other less popular practices, even in inland waters) who certainly have not "disappeared": it is important not to lose them and bring them back to the sea by eliminating unfairly punitive measures and "oppressive" red tape related to the ownership and management of their boats.

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Shipbuilding in Italy at the End of the Crisis: Is There a Road to Recovery?

Enrico Ivaldi, Riccardo Soliani, and Gian Marco Ugolini

Abstract Until the year 2008, the segment of boating enjoyed an excellent state of health (AMI-Censis. La sfida della nautica: porti, servizi, tecnologie. Terza indagine sul turismo nautico in Italia, 2008), although even then elements of possible weakness were beginning to emerge (Benevolo. Luci ed ombre del turismo nautico, in Analisi gestionale dei porti turistici nella nautica da diporto, Il caso di Imperia, a cura di Quagli A. pp. 212–253, 2008). Domestic production grew at high rates, port facilities were multiplying and new ports were designed because the offer of berths, at least in many areas of the country, was not able to meet the potential demand.

Later the sector went through a period of uninterrupted crisis with heavy economic consequences in terms of loss of employment. Today we are still in the midst of a crisis—possibly at the dawn of a recovery—after a fall that has lasted for more than 7 years and that has affected all economies globally. In the nautical sector it caused a heavy decline, even greater in percentage than the average of other sectors of the economy, given its peculiar characteristics of elasticity. Indeed, the yachting sector has undergone a series of profound changes which have affected the main highways in the industry.

In Europe, all variations are negative, with the result that the number of units produced more than halved over the course of the 4 years under analysis; on the other side of the ocean, the United States, by far the largest producer, saw a 34 % decline in the number of boats, amounting to over 250,000 units less.

These data are further confirmed in the order book of superyachts. A decline in the number of orders for the third consecutive year in 2011, was followed by a substantial stability from 2012 to 2014 and a little rise in 2015. In the global ranking of boats over 24 m, Italy always comes first, followed by the Netherlands, Turkey, USA, Great Britain, Germany, Taiwan, China, France and New Zealand.

The contribution to the paper is the result of a joint effort from the authors. However, credit for Sect. 1 goes to E. Ivaldi; for Sect. 2 to R. Soliani; for Sect. 3 to G. M. Ugolini; for Sect. 4 to the three authors.

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However, at European level the Italian yachting industry ranks third in terms of number of boats produced, after France and Poland, and has ranked first worldwide for years in terms of value of production exported. Strictly speaking, the production chain for boats includes the industrial activities for the construction of recreational yachting units and the activities that support its use. This sector, combined with that of the closely related nautical tourism, is a relevant multiplier of employment: 10 new jobs in the nautical sector (industry + tourism) generate 64 new employees in the general economic system, of which about a quarter only in satellite industries.

Until the problems related to the public debt of the Eurozone members are not solved, and austerity measures continue, the global industry, and the yachting one in particular, will not see the long-awaited "light at the end the tunnel". Italy has been deeply affected by this crisis, with serious consequences on this excellent high range hallmark of Italian style, well known all around the world. The people affected by this are not just the affluent, but also skilled workers and the middle class, who, in perspective, could consider the purchase of a small boat as an original and comparatively not overly expensive good to enjoy leisure time in the Mediterranean.

The industry's picture plays in a continuous alternation of light and shade and two aspects appear: on the one hand the importance of boating in terms of an articulate and complex supply chain and of economic loss caused by 7 years of free fall; on the other hand, the fact that the fundamental elements (boats, port facilities, boaters) are not lost and can be retrieved based on adequate policies.

1 The Crisis in Shipbuilding

The analysis about the size and development of the registered fleet highlights only one of the aspects that signal the industry's health: when we talk about yachting we cannot take into account only the boating activities, where the sea is at the heart of the tourist experience and its main motivation, but also the many other activities related to it, such as shipbuilding, the management of marinas, the brokerage industry, etc. (Quagli 2008). The reality of yachting is quite mixed and it is therefore reductive to think of it as one sector in its strict sense: on the contrary, we must refer to a wider range of conceptual categories such as the macro-sector, the value system and the sectoral system, which enable us to understand all the necessary and complementary activities for the construction, maintenance and, of course, use of yachting units (Fortezza 2009).

The Italian boating industry as a whole, with reference to the European Union, is at the top spot in terms of value of production for export, well above Germany, and second only to the United States worldwide (Icomia 2015).

However, as mentioned above, the production chain also includes activities that support the use of the boat (Cazzaniga Francesetti 2005): so this sector, combined with that of the closely related nautical tourism, is among the most valuable in terms of jobs: in fact, 10 new employees in the nautical sector (industry + tourism)

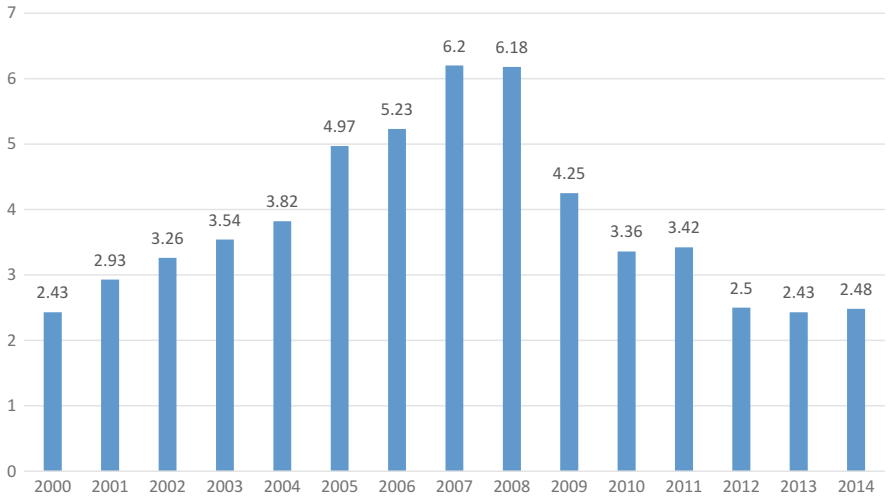

Fig. 1 Yachting industry turnover (2000–2014) (Figures in € billions)

generate 69 new jobs in the general economy, of which about one quarter only in the satellite industry (Federazione del mare, Censis 2015).

So the 4.5 % decline in the fleet in the last 3 years assumes a high significance if we consider its consequences on the real economy (Pozzo 2010), which are much more heavily reflected in the evolution of turnover 2000–2014 (Fig. 1). The size of such decline cannot be missed: a value of 2.43 billion euros at the beginning of the century went up at sustained rates to 6.2 billion in 2007–2008, only to experience a free fall that brought it back to the levels of 15 years earlier (Ivaldi 2014).

Comparing the latest data on the yachting sector in Italy (Pagani Isnardi et al. 2015) with that of 2007, when the industry had reached its peak, a halving of the data can be observed[1]: −64 % of contribution to GDP, −60 % of total sales, and −55 % of employees, who dropped from over 35,000 to just over 16,000. Such numbers reflect the crisis which has dramatically affected the yachting industry. However, the yachting industry is still a resource for the national economy, a phenomenon that has its roots in the economy and has a strong impact on wealth and employment (Tracogna 2007), even if the contribution of the yachting industry to the national GDP decreased from 3.57 ‰ to 1.46 ‰ (Table 1).

The sector is also characterized by high specialization and excellence in terms of technology and design evolution—two key points of Made in Italy; therefore, with regard to the impact of the economic crisis on employment, there were not

[1]The analysis was carried out through the data provided by the publication “La Nautica in Cifre ed il 2015, Analisi di Mercato per l’anno 2014”, published by UCINA. Unless otherwise stated, the tables and figures refer to this source.

Table 1 Temporal analysis of the contribution to the GDP of yachting compared to the national GDP

Year	GDP growth rate	Growth rate of contribution to GDP Boat	Contribution to GDP	Total turnover	Contribution to GDP of boating/ GDP Italy
2007	+1.4 %	13.2 %	5,548,690,000	6,208,790,000	3.57 ‰
2008	−1.0 %	0.2 %	5,557,110,000	6,181,210,000	3.53 ‰
2009	−5.1 %	−34.4 %	3,646,170,000	4,247,540,000	2.40 ‰
2010	+1.3 %	−23.4 %	2,792,288,000	3,358,890,000	1.80 ‰
2011	+0.4 %	2.0 %	2,848,920,000	3,423,770,000	1.80 ‰
2012	−2.4 %	−29.9 %	2,000,000,000	2,497,250,000	1.43 ‰
2013	−1.8 %	−2.1 %	1,955,780,000	2,425,010,000	1.44 ‰
2014	+0.4 %	+2.0 %	1,995,570,000	2,475,420,000	1.46 ‰
Δ % 14-13			2.0 %	2.1 %	
Δ % 14-07			−64.0 %	−60.1 %	

immediate repercussions, as employees have decreased in lower percentage compared to the decrease in sales—thanks to the use of layoffs where possible—and since manufacturers have also tried, as long as possible, to keep their skilled labor, which constitutes a real competitive advantage for the Italian boating industry in the world (Ivaldi 2013). As for the sub-sections, the composition of revenues is very different than in the past: exports—which now exceed more than two-thirds of the total production of the entire sector, reaching more than 90 % in shipbuilding—fell by about 30 % from 2007 to 2014, while domestic production for Italy decreased by 81 %. The crisis is also confirmed by data on imports, which declined by almost 70 % over the same period (Table 2).

As regards the year 2015, in the absence of official data, we can refer to a market survey released by UCINA on 30 September 2015 showing an increase of 10 % for the turnover of the nautical year 2014/15 over the previous year, with the shipbuilding sector growing by 10 %, that of accessories growing by 9 % and, finally, the motor industry growing by 15 %. During the same period, we also witnessed a turnaround for sales in Italy, with an increase of 12 % which is the first positive figure since 2008.

It should be noted how even the data released by Assilea, the Italian Association of Leasing, referring to the numbers of marine leasing contracts signed between January and August 2015, show an increase of 11 % compared to the same period in the previous year, while the value of these contracts recorded an increase of 114 %. In other words, compared with a significant increase in the number of marine leasing contracts, there is more than a doubling of the average of the entered value.

Revenue growth in 2014 and estimates for 2015 indicate that the path to market consolidation is continuing positively: the stability of the main economic indicators, combined with the estimated upward trend for years to come, together with concrete positive signs for domestic demand, enable us to look with greater

Table 2 Yachting industry. All sectors (2007–2014)

Year	Domestic production for the internal market (a)	Domestic production for export (b)	Domestic production (a + b)	Imports (c)	Balance export–import	Total turnover (a + b + c)
2007	2,661,300,000	2,324,640,000	4,985,940,000	1,222,850,000	1,101,790,000	6,208,790,000
2008	2,647,800,000	2,327,570,000	4,975,370,000	1,205,840,000	1,121,730,000	6,181,210,000
2009	1,729,390,000	1,815,800,000	3,545,190,000	702,350,000	1,113,450,000	4,247,540,000
2010	1,160,770,000	1,610,810,000	2,771,580,000	587,310,000	1,023,500,000	3,358,890,000
2011	939,120,000	1,918,230,000	2,857,350,000	556,420,000	1,361,810,000	3,413,770,000
2012	604,210,000	1,476,500,000	2,080,710,000	416,540,000	1,059,960,000	2,497,250,000
2013	479,060,000	1,589,500,000	2,068,560,000	356,450,000	1,233,050,000	2,425,010,000
2014	486,570,000	1,618,190,000	2,104,760,000	370,660,000	1,247,530,000	2,475,420,000
Δ % 14-13	1.6 %	1.8 %	1.8 %	4.0 %		2.1 %
Δ % 14-07	−81.7 %	−30.4 %	−57.8 %	−69.7 %		−60.1 %

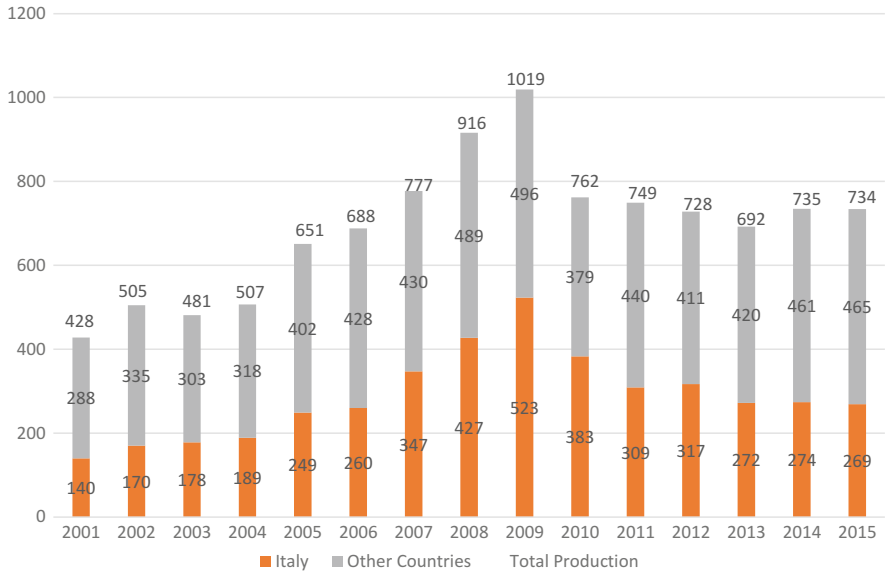

Fig. 2 Order for Superyacht 2015

confidence to the future of the Italian manufacturing sector. Especially in the production of vessels over 24 m (superyacht), Italy maintains a leading position (Fig. 2), with 269 orders in 2015, 37 % of the world orders, out of a total of 734 total orders (Global Order Book 2015, Showboats International).

2 The International Production Scenario and the National Contribution of Boating

The analysis of the overall consequences related to the boating industry is not limited to the additional income generated by the navigation activity of the domestic yachters. With a wider view on the international scenario, we can see how different scholars agree that the centre of gravity of world economic activity is shifting gradually towards the east: in a couple of decades, the "economic centre of gravity" has shifted 3000 miles from the Atlantic Ocean in the 1980s to near Izmir, Turkey, in 2008. Since 2008 this trend has intensified further, and it is expected that in the next 30 years the centre of gravity will reach an intermediate zone between India and China. Another important sign is the growing number of so-called HNWI (High Net Worth Individuals—acronym commonly used in the world of finance and luxury to indicate all the people who have high net wealth, conventionally more than one million dollars) in the East, in Latin America and other emerging markets with high growth rates, noting that in our case major boating refers precisely to this cluster of people.

These socio-economic trends are also confirmed by the shift of the activities of a growing number of shipyards and manufacturers of marine engines and accessories to the east and south. Taiwan, Poland, China, Mexico and Brazil are just a few examples of countries where the boating industry is relatively new but rapidly growing due to the low cost of labour, which can reduce the cost of building a boat up to 40 %, but also because of the quality improvement that occurred in recent years. In addition, these countries are becoming markets for the boating industry products, although recently the general economic situation of some of them (Brazil, for example) caused a sudden halt.

In the face of these global scenarios, Italy is in the awkward position of having lost almost completely the domestic market and hugely relying on exports, in which it is a world leader. The percentage breakdown of the total turnover, in fact, shows an increase in the share of exports relative to domestic production (the share of exports has risen from 53 % in the pre-crisis period to the current 93 % of the total national production). In order to identify the weight that the boating industry has in the national context, it is possible to compare the development of this sector to the national GDP (Fig. 3).

The trends are similar, although that of yachting appears to amplify that of GDP; recreational boating is, in fact, a market with high elasticity of income: if the wealth of a country decreases, some goods are more easily given up and recreational boating is obviously one of them. The relationship between the percentage change in GDP compared to the percentage change in the sector's GDP is very high, higher than 10. For this reason, as soon as the trend will reverse the rise of the industry will be faster than the national average. In times of economic growth, the benefits were

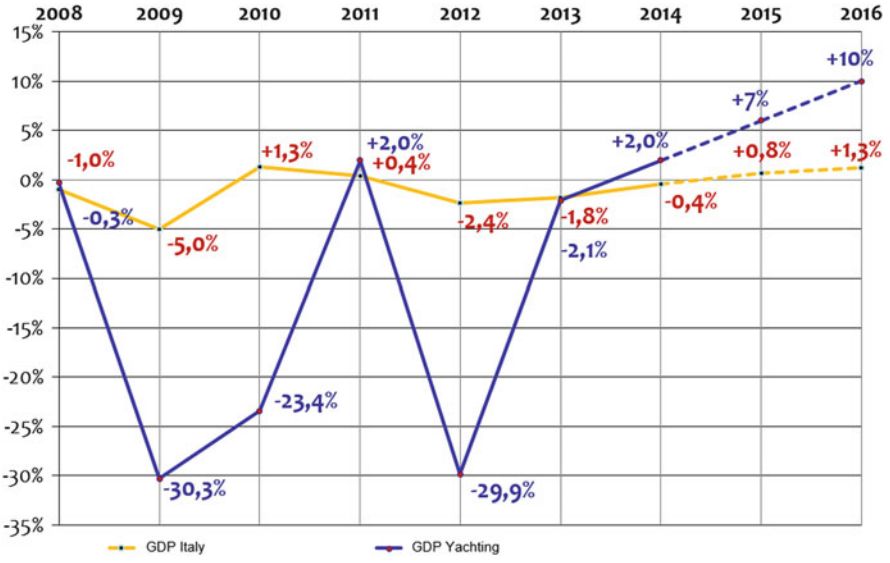

Fig. 3 Trends in the growth rate of GDP and the growth rate of GDP of yachting

many: in 2007, with the GDP growing by 1.4 %, the GDP generated by the yachting grew by 13.2 %; in 2008 the change in GDP was already negative (−1 %), but the contribution of yachting to the GDP grew by 0.2 % over the previous year and of course in the period of greatest decline of the GDP (−5.1 %) the GDP of yachting decreased by more than 30 %.

If estimates of the GDP growth will prove to be correct, the contribution of yachting to the GDP could therefore present the trend exhibited in the graph, and the turnover could have a more than proportional benefit. Note that the yachting sector seems to grow even when the national GDP remains constant or slightly negative if the GDP of the countries where exports are made grows, since it is an export-oriented sector.

The data for 2014 seem to show a slight improvement (about +2 %), and the first data relative to 2015 suggest an estimated growth of the contribution to GDP of around 10 %. There are also positive expectations in the domestic market, which should see sales rise (+12 %) for the first time in 7 years.

3 Changing Public Policies

The analysis demonstrates with sufficient significance that the yachting sector is very complex and, as a whole, is highly responsive to economic conditions in terms of demand elasticity. Therefore, from this point of view, it is not surprising that, in a period of crisis so marked and prolonged, even the yachting industry has seen a decline of production and of the resulting related income.

However, it must be remarked that this trend has had very different paths depending on the target market: in fact, in 2008, the national component weighed about 50 % in terms of turnover, while in 2014 it decreased to about 10 %, a sign that the crisis in Italy has been particularly violent. For the yachting sector the peculiarities of the Italian situation could not be understood in depth without also exploring other factors that have influenced directly its evolution. In particular, reference must be made to targeted legislative measures as well as the more general public policy towards the sector.

The evidence shows that in recent years the State took measures that appeared generally punitive if not schizophrenic in some cases.

As regards punitive measures, we have to remember that in general the procedures, obligations and the consequent administrative controls have been an obstacle to the spread of the practice of nautical tourism. Controls were often performed in the open sea (even when they could be more easily carried out at ports) and by different bodies (Financial Police, Coast Guard, Police, Carabinieri etc.) on the same craft.

Equally burdensome for boating were different tax measures such as the introduction of the so-called *redditometro* (income indicator) which, considering the boat as a luxury item, attributed to the owners a higher standard rate coefficient of income than that of houses and luxury cars. Or the ups and downs in the rules on

nautical leasing, introduced and later modified and again realigned with the criteria already in force in other European countries. In both cases, the State was forced to change the regulations in the face of disappointing results in terms of higher tax revenues.

The emblematic case is certainly constituted by the introduction in December 2011 of the parking fee on all boats longer than 10 m, due from May 2012. Its uniqueness, compared to existing versions in the past (and in any case abolished in 2003), was that it applied to all yachts stationed in Italy, not just those belonging to foreign nationals who had chosen our facilities as home port, or were simply in transit. The immediate result was the escape of boats to neighbouring ports especially in France (Côte d'Azur) and Croatia.

This exodus, as well as undermining the financial balance of many port facilities, had immediate consequences for the finances of the State and local government agencies that managed marinas. In order to quantify the loss of public revenue, an estimate was made of the decrease in costs incurred by boaters (including fuel) in terms of lower income from VAT and excise duty, in the revenues from fees for public berths and VAT caused by failure to purchase new boats. Altogether these revenues amounted to about 970 million euros in 2009: in 2012 those have sharply decreased to 462 million with a net loss of 508 million (−52 %) (ONN 2015).

In the face of such lost revenue, the Italian government, in introducing the parking fee, had estimated to collect about 150 to 155 million euros, while in reality (also because of the boats escape), it only received 25. Therefore, only one year later (June 2013), the authorities recognized the senselessness of this tax (as well as the damage to public finances) and turned it into a tax on the yacht ownership for Italian nationals, with the exception for vessels up to 14 m in length and a reduction to 50 % for those 14–20 m in length.

However, it was not until 2016, with the stability law (paragraph 366, Article 1 of Law 208/2015) that the state finally cancelled the tax, since the assessments conducted by the competent ministerial offices had found that the actual revenue of the tax risked not even to cover the costs of management and collection.

Several regulatory measures have recently tried to fix the discrimination that has been reserved to the sector for years. For example, the reform of the Nautical Code, the introduction of the Electronic Registry (on the model being used for passenger cars, and not completely operational), the "Blue Badge" that simplifies inspections and protects the boat owner in terms of inspection modalities at sea (i.e. to ensure that those who have already been subjected to a check and have therefore obtained the badge are not stopped again), were signs of a recent reversal by the administration of the State that finally seems to treat yachting like other Italian productive sectors (and among the finest in the world) without punitive intentions or presumptions of wealth/evasion against boat owners.

4 Concluding Remarks

In conclusion, one may wonder what are the prospects for recovery and further development of the sector. The answer is not easy and cannot be confined only to the specific variables, but must refer also to the evolution (hopefully positive) of the current economic situation. Based on the repeated analyses conducted we can say that Italy has certainly a lot to offer to boating and nautical tourism. Retracing the fundamental hubs of the chain one must first acknowledge the existence of a production capacity, both in terms of technology and design, unique in the world and widely recognized. It is precisely for this reason that the foreign market held and, when the domestic one will jump start again, the producers appear perfectly equipped to respond.

A first confirmation comes from a slight growth of the global turnover in the last 2 years, which indicates that the path to market consolidation may continue positively, thanks to the enormous commitment of companies in the nautical sector, who have had more than 6 or 7 years of tremendous suffering. Therefore 2015 and, hopefully, 2016 will be years of renewed confidence in the Italian customers and other Mediterranean countries, vital market areas for the majority of our yards. Exports, which managed to support the entire chain in recent years, also continue to maintain a world leading position, counting on the excellent performance of the North American market, the main in the world, and the good recovery being recorded in Northern Europe.

Alongside the efforts of the producers, the consolidating quality of the offer of marinas and the undiminished passion of boaters, however, there is a need for a policy action that is finally able and willing to reverse the trend by introducing rules and measures, often at no cost or even with increased tax revenues due to the growth of the supply chain (from production to navigation of the boaters): the reform of the Nautical Code, the cost and duration of State fees, the full recognition of the value of Made in Italy in boat production, the regulation of leasing and financing, the implementation of the Electronic Registry, the Blue Badge are all actions, already partially taken, which must be quickly completed with a renewed awareness of the value—also in economic terms—of boating and of nautical tourism.

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Life Insurance Reforms and Capital Formation Development: Lessons for Nigeria

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Abstract Many advancing economies employ life insurance mechanism to drive capital formation and accumulation. This paper presents observable facts on Nigeria relative to peers, which suggest abysmal life insurance density and penetration; perhaps are responsible for the extremely low capital formation gap. The paper is motivated by the economy's low savings ratio, hence it hypothesis that capital formation through life insurance mechanism may not develop. Two stage least square (TSLS) method in a recursive system was employed from 1980 to 2013. The result finds that capital formation ratio (Cfr) is positively sensitive to life insurance penetration (LIP), and to a period lag of the problem variable (Cfr(−1)).The outcomes of instrumental variables are in line with a priori, except for interest rate. The dynamic and static ex-post simulations, and ex-ante forecasts evaluation meet the standards. The forecast results fit the expectations of the underlining assumptions, suggesting that on average Cfr can grow by 8 % per annum ceteris paribus. This finding is therefore consistent with financial development theory. It recommends that Pension regulators should step-up compliance of existing statute on compulsory life cover by employers; Insurance regulators should engage public education on life insurance; the federal government should adopt fiscal incentives to attract foreign direct investments in the industry for competitiveness and make policies for mandatory life policy for all adult working citizens.

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1 Introduction

The needs for capital formation in the promotion of economic development have received much discussion in economic literature; however, more still need to be done. Nurkse (1953) opines that the vicious circles of poverty in developing countries can be broken through capital formation. Jhingan (2007) realizes that the deficiency of capital goods can be eliminated by capital formation, which would result in fuller utilization of available resources. Ojo (2010: 2) contends that what seems to have been the drawback to effective and efficient capital formation is that largely developing countries are yet to realize exactly what is largely related to factors of ingenuity in appropriate financial technology and policies most effective and efficient to making the financial sector perform its desired roles adequately. Many variables impact a country's capital formation though the savings mechanism.

The 'proclamation' on financial liberalization and repression to enhance "saving culture" and hence easy capital for long term investment (better and efficient capital allocation) in developing countries, which Mckinnon (1973) and Shaw (1973); and global development partners co-promote has hardly succeeded. Evidence from many empirical studies reveal that despite the shift to market based interest system, the financial market is still fraught with obvious imperfections. In Nigeria the banking institutions appear to have been disproportionately advantaged relative to savers (Ojo 2010).

Insurance theory contends that death is a personal risk that cannot be transferred; however its financial consequences can be transferred and borne to a 'common pool' managed collectively by an assurer. Insurance has been a contingent and essential risk management service for the society that ensures national and international social-economic stability and development. Pant (2000) reveals that the major role of insurance in the modern economy is to establish security platform as counterparty to the economic agent's risk thereby empowering it.

Feyen et al. (2011) reason that gross premium to GDP (total insurance penetration) captures the extent of risk management in any economy, while life premium reflects the economy's savings motive. A distinguishing feature of life insurance institution is that its assets and liabilities consist predominantly of longer term financial claims. As the long term business arm of the insurance industry, life insurance assumes assurance role in timing and occurrence of death. Thus it advances two basic assistances in the economy through its pure protection policies and investment based policies. However, of common knowledge on the drawback to insurance development are the moral hazard practices and its corresponding adverse selection risks. Where these concerns are addressed appropriately, the glowing fortune of the industry can be magnified.

It suffices to state that issues concerning redirection of savings to the more productive long tenure end that would enhance insurance inclusion and hence a better mechanisms for capital formation in Nigeria have continually attracted attention of researchers, operators and policy regulators without appreciable

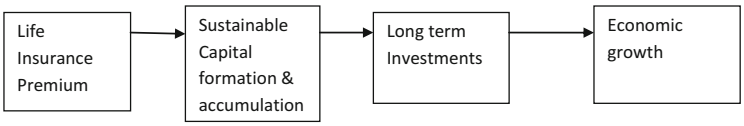


Fig. 1 Life insurance premium and economic growth nexus. Source: The authors

improvement. Feyen et al. (2011) assert that due to long investment horizon nature of life insurance companies, they can contribute to providing long term finance and more effective risk management. Pagano (1993) conjectures that endogenously, capital accumulation of productive capital would become more efficient as development of financial intermediaries are made to improve. Should appropriate policy reforms evolve, current evidence from the demographic structure seems to favour the growth of life insurance business in Nigeria. Figure 1 presents a conceptual framework of linkage between life insurance and economic growth. The relative predictability of its contractual liability can make life insurance premium mechanism more reliable channel for required resource mobilization, long term fund allocation which is important to economic growth.

Carmichael and Pomerleano (2002: 75) discuss the global contributions of the insurance industry as promoting financial stability among households and firms, mobilizing savings, relieving pressure on government budgets, fostering trade and commerce, and assisting the community in mitigating risk. To benefit from improved insurance inclusion, Ojo (2010) contends that financial institutions could promote increased "realized" savings and aggregate savings in general, while improved financial intermediation brings forth higher capital formation in the productive sectors Facts on Nigeria's insurance development however reveal low performance of the subsector. Investigation by Meristem (2014) reveals that subsequent to the GDP rebasing, the Nigerian insurance sector lags the overall economy's growth as insurance penetration and density remain "low at 0.43 % and USD8.9 respectively relative to South Africa (13.39 % and USD1071.9), Mauritius (6.25 % and USD507.2), Kenya (3.17 % and USD29.9) and Ghana (3.07 % and USD49.3)". The stylized facts on Table 1 corroborate this assertion.

Facts from 2013 Insurance global report (see Table 1) provides statistical evidence to Nigeria's lowest life insurance penetration (LIP) of 0.0009 (0.09 %) and density (LID) (life insurance per capita) of $2.63 among global peers presented. Coincidentally, the gross fixed capital formation (GFCF) of $75.5 million (15 % of GDP) is very poor relatively. Using capital formation ratio to GDP, other than Egypt, Nigeria's performance is abysmal compared with all countries presented, despite the huge population (7th) and GDP size (25th) in the World Bank global ranking.

This study conjectures that the type and pattern of fund mobilization could precipitate the required volume, quality of investment finance and sustainable capital formation. The model of fund mobilization in Nigeria can aptly be described as 'hostile' to savers due to its financial repression practices—see Diemiriuc-Kunt and Detragiache (1998), Beim and Calomiris (2001: 47–59), Kemal (2001), and

Table 1 Life insurance penetration, density and gross fixed capital formation (GFCF) for selected economies for 2013

Countries	Population (per million)/rank	Life premium ($ in million)	Non-life premium ($ in million)	GDP($ in billion)/rank	LIP	LID ($)	Gross fixed capital form ($ in million)	% of GDP
Nigeria	173.6/7th	457	1406	521.8/25th	0.0009	2.63	75.5	15
South Africa	52.9/27th	44,556	9565	350.6/33rd	0.127	842.3	67.8	19
Egypt	82.0/15th	1051	1051	271.9/41th	0.004	12.8	37.5	14
Kenya	44.3/30th	520	1000	55.2/77th	0.009	11.7	11.3	20
Chile	17.6/64th	6986	4626	277.2/38th	0.025	396.9	65.4	24
Singapore	5.3	15,092	2870	297.9/36th	0.05	2847.5	77.1	29
S. Korea	50.2/26th	91,204	54,233	1304.5/14th	0.07	1816.8	386.8	29
Japan	127.3/10th	422,733	108,773	4919.5/3rd	0.086	3320.7	1068.8	21
Brazil	200.3/5th	49,417	39,513	2245.6/7th	0.02	246.7	408.3	18
China	1357.4/1st	152,121	125,844	9240.2/2nd	0.016	112.1	4370.8	49
India	1252.1/2nd	52,174	13,401	1876.8/10th	0.027	41.6	530.7	31
United States	316.1/3rd	532,858	726,397	16,768.1/1st	0.03	1685.7	3244.3	20

Source: 2015 International-Insurance-fact-book: www.iii.org/publication/international-insurance-fact-book-2015/worldoverview; 2014 World-Bank/indicator/N.E.GDI.TOTL.Zs, data.worldbank.org/, accessed February 15th, 2015; Authors' computation

Ojo (2010). Voluntary savings in the economy is negatively influenced by low and often negative real interest rate; evidence of high level of non-performing loan; wide spread between saving and lending interest rate; high inflationary expectation; unstable macroeconomic environment which creates uncertainty in the system and low labour output per capita.

Ojo (2010) provides succinct evidence on how average interest rates in Nigeria are perverted against savings rate. Savings is not only low relative to lending rate but far lower than the inflation rate. Hence, the "savings culture" is ambiguous. Studies revealing growth of cooperative finance system in Nigeria gives credence to the formal financial repression. Though the cooperative finance option is very formidable mainly in the informal economy, it however suffers from lack of incentive for 'time preference' factor.

This paper contends that reforms targeted at involuntary savings system could promote capital formation and substitute for the lackluster voluntary saving system. As a developing economy the following questions might be relevant: why would there be a relationship between life insurance policy and capital formation and accumulation? why is capital formation growth rate relatively low in Nigeria? to what extent life insurance policy reforms improve capital formation and accumulation in Nigeria? This paper hypothesizes that there is no significant relationship between life insurance mechanism and capital formation and accumulation in Nigeria. The remaining part of the paper is divided into four sections—Literature review; Theoretical framework and methodology; Results; findings, discussions and policy recommendation; and Conclusion.

2 Literature Review

2.1 Theoretical Review

Traditional literatures of savings for capital formation which manifests in the absolute income, relative income (current), permanent income and life cycle income (long term trend) hypotheses are all relevant in the consumption of life insurance policy. Towards enhancing capital formation development, Keynes savings theory is also relevant for developing economies by promoting savings as private virtue but public vice. However, involuntary household savings can promote capital formation better through mandatory provident funding system, towards enhancing the "saving culture" (Davis 1998). Evidence from economies such as Japan, Malaysia, Singapore, and Chile (see Table 1) reveal that through the scheme, savings and capital formation improved by 3–4 % of GDP (Davis 1998; Vittas 1999).

Suter and Keller (2014) argue that insurance can contribute to formation of capital for longer term through its premium before long term claim crystallizes. Significantly, life insurance conventionally operates long lag between premium

receipts and claim payments. This opens up long investment horizon, which is of strength against short term financial market fluctuation.

To date, it seems no universal consensus exists in the macroeconomic literature on the extent of value placed on the role of finance and its mechanisms for capital accumulation, allocation and growth (Beim and Calomiris 2001: 328). Specifically however, Levine's (2004) novel paper on "Finance and Growth" theorizes that both finance and growth are symbiotically necessary, while a reverse causality does not drive the relationship.

Reforms for greater institutional output and development have attracted scholars of late. Kemal (2001) studied financial development and blamed poor institutional framework for low financial development in Pakistan. Institutional failure, particularly in the insurance subsector noted for promoting economic inefficiency is pervasive among developing economies. It manifest in the system of corporate governance, financial accounting and auditing rules, debt covenant, labour regulatory issues. It is also rather poor that former link does not exist between the informal and formal economies institutions of developing countries to developing complimentarily, and for a greater domestic resource mobilization and capital formation.

Issues on reforms and regulations are germane to buoyant insurance industry towards capital accumulation. The position of whether more reforms are needed is however not clear as Ward and Zurbruegg (2000) reveal that the relationship between legal reforms and insurance market development do not have much evidence; however Browne et al. (2000) finds that generally the legal system significantly determines the promotion of automobile and general liability insurance. Insurance contracts are rather more complex than the banking and other financial services, as contracts could be ignobly written to favour the insurer relative to the buyer. Such maladaptations which often manifests in economies with high illiteracy, poor contract and rule of law enforcements, and where culture of impunity reigns, in which case the insurer benefits highly can further weaken the life insurance market in particular.

Carmichael and Pomerleano (2002: 29, 85) list eight main regulatory tools that insurance regulators worldwide have traditionally relied on to manage and reform the industry. They are: entry requirements; solvency (capital requirement); balance sheet restrictions (including but not restricted to reserve requirements); restriction on association with other financial institutions; liquidity requirements; accountability requirement; governance requirement and consumer support schemes (such as deposit insurance and industry guarantee funds).

In Nigeria, demand for life insurance is influenced by multiple factors around social, economic and cultural factors such as health facilities, income level (per capita income), provision of social-welfare services, religion. Where life enhancing facilities are present and efficient, cost of providing life insurance would be reasonable lower. Social reforms and regulations that attempt to promote life and living conditions could otherwise improve the demand for life insurance. The culture of insurance in Nigeria is rather weak, same as risk perception. Risk is regarded as a quantitative measure of uncertainty ahead of an individual or an organization, business outcome, or a nation's economy.

The insurance theory is analogous to risk theory which claims that once there is unpredictable outcome about any endeavour, it connotes a risky situation. The utility theory is developed from the assumption that human behavior is usually guided by the desire for increases in pleasure while avoiding pain, at all time. The theory of risk reduction relies on a mathematical concept of law of large numbers. The law claims that the ability to predict losses largely improve with large group, and to an extent, encourages the risk averse person to assume risk neutrality, where upon large insured is involved (Seog 2010: 45).

Literatures on capital formation development of life insurance businesses have also received contributions from scholars recently. Thoyts (2010) reasons that the basic premise promoting life assurance is that reasonable large group pool their collective risk and pay regular premium into the pool which constitute high source of capital accumulation that are invested. Brainard (2008) argues that life insurance as institutional investors do not only provide needed long term capital to infrastructural and other investments but "professional oversights" to those investments. To reasonable have assurance of continuous premium income, Halley and Dodson cited in Thoyts (2010) opine that following Ulpian discovery, in a stable society the distribution of age at death could be mathematically modeled and therefore the life expectancy of an individual could be modeled.

Dodson's concept of "level premium" has made life insurance less risky to the assurer, and since insurance is governed by law of large numbers, the underwriter can be guaranteed with a reasonable degree of certainty. Furthermore, the general improvements in life expectancy across all ages in contemporary societies have significantly mitigated the life insurance business. Thus, for Thoyts (2010), life insurance business can be underwritten against the background of steadily improving risk. Brainard (2008) argued that insurance market generates price signal to the entire economy, which assist to allocate resources to more productive use.

It is also important to recognize the negative externality of the insurance industry and the moral hazard prevalent in the supply side of insurance, which limits annual premium targets. Ward and Zurbruegg (2000) cite evidence from Ruser (1998) and Butler et al. (1998) who contend that insurance may alter the risk attitude of the insured adversely resulting in huge loss of accumulated productive capital. Ward and Zurbruegg (2000) argue that financial intermediation role of insurance for savings and capital accumulation development are less obvious, stating that in economies with efficient financial intermediation with portfolio diversification function that makes credit easily available, the concept of precautionary savings might be unattractive.

Regulation of Life Insurance in Nigeria For the insurance industry to be well equipped to meet up it potentials in capital formation and accumulation for financial development, its operating legislation has to be relatively current. The Nigerian Insurance Industry is however governed by the Insurance Act of 2003 and the National Insurance Commission (NICOM) Act 1997. The NICOM has the statutory object to ensure effective administration, supervision, regulation and control of all insurance businesses, with regulatory purview covering insurance/reinsurance

Table 2 Capitalization of insurance industry

Companies	Prior to 2005 (₦ in million)	Post 2005 (₦ in billion)
Life insurance	150	2
Non-life	200	3
Composite	350	5
Re-insurance	350	10

Source: National Insurance Commission (NICOM)

firms, insurance brokers, loss adjusters, and agents. Prior to the global financial distress of 2007, new industry recapitalization and consolidation was administered in 2005 as follows (Table 2).

Towards improving their capital base government reforms is aimed at strengthening international competitiveness and enhance public confidence. This may improved the solvency margin (risks cover) capacity, and created enlarged technical capacity for reinsurance treaty both locally and internationally. Other area of the industry which reforms emphases include merger policy, 'no premium no cover policy', adoption of international financial reporting standards (IFRS), and ensuring that players take advantage of the Local Content Act of the Government and any relevant legislation towards expanding their capacities.

The life insurance mechanism is also being enhanced by the Nigerian Pension Industry. In furtherance to improving the social security system, the reformed 2014 Pensions Act deepened the life insurance system, as Section 5(4) now specifies that every employer is compelled to maintain a Group Life Insurance Policy in favour of her employees, for capital sum equivalent to three (3) times the annual total employees' emolument. The substituted 2014 Act now widens the life insurance base to compulsorily include organizations with three (3) employees and above, an effort towards compelling the informal sector participation, which could bust national savings. Aside, the minimum rate of pension contribution is now increased to 18 % (8 % employee plus 10 % employer) of total monthly emoluments. Though, not completely privatized, by enforcement, continuous innovation and drive, the government's implicit pension liability would be reduced and the penetration and density rate would increase. Directly, the pressure on taxes for pension liability is being reduced which had hitherto inhibited capital formation growth.

Lack of equitable insurance pricing is also a major inhibiting factor on the demand side, upon which the industry could be more impacting in capital formation and accumulation. Diverse form of price pervades different economies. In the United Kingdom and many market run economies, pricing of insurance product is market determined, while regulatory authorities focus greatly on prudential regulation on capital and reserve adequacy. In Nigeria, however, insurance price is not deregulated except for non-tariff products, a factor inhibiting the development of Insurance business.

2.2 Empirical and Methodological Review

While studies on life insurance market link to financial development in different countries is being considerably researched in development literature, studies on the relationship between life insurance and capital formation and accumulation is relative less emphasized, particularly in developing economies. It requires that more research is needed in developing countries. The works of Feyen et al. (2011), Haiss and Sumegi (2008) are rather helpful. Feyen et al. (2011) cited Beck and Webb (2003), and Li et al. (2007). Beck and Webb (2003) reflect on both demand and supply factors from 1961 to 2000 that impact life Insurance. In a panel of 68 developed and developing countries they find income, real interest rate, age dependency and financial development as drivers while inflation and religion negates life insurance. Li et al. (2007) study OECD countries and find income, age dependency, education and financial development as drivers, while inflation and social security negate life Insurance.

Furthermore, evidence also suggests mixed results of causal relationship between insurance sector development and economic growth. Webb et al. (2002) cited in Feyen et al. (2011) carry out study which suggests that life insurance and banking sectors predict growth. Ward and Zurbrueggs (2000) find support for insurance sector development and economic growth in some OECD countries. Kugler and Ofoghi (2005) also cited by Feyen et al. (2011) study the U.K. insurance market and found that long run causal relations exist from insurance to economic growth. Haiss and Sumegi (2008) study the European union markets from 1992 to 2005, producing results which suggest that life insurance drive economic growth in 15 countries, while non-life insurance has significant impact on the growth of central and eastern Europe. In Nigeria, Omoke (2011) however found no evidence that Insurance density drives growth.

Feyen et al. (2011) adopt pooled OLS and dynamic multiple regression model from 2000 to 2008 using a panel of 90 different economies of different continents to examine the causal factors that drive insurance development. The result reveal that life insurance premium is driven by per capita income, population size and density, demographic structure, income distribution, size of public pension system, state ownership of insurance companies, availability of private credit and religion. Inflation and life expectancy was found as a discouragement. The study found that while in developed countries, life insurance drives economic growth, both life and non-life drive economic growth in both developed and developing countries.

Ibiwoye et al. (2010) examine the determinants of life insurance consumption (LIC) in Nigeria using error correction framework from 1970 to 2005. The study found that real GDP and the structural adjusted programme (SAP) positively influenced LIC, while indigenization policy and interest rate were found to be inversely related to LIC. Inflation, openness and political instability were found to be predictors of LIC.

Omoke (2011) examines insurance market against economic growth in Nigeria from 1970 to 2008, adopting Johansen cointegration and error correction

framework. The study found no positive relationship between insurance density and economic growth in Nigeria, indicating low insurance market activity.

3 Theoretical Framework and Methodology

3.1 Theoretical Framework

In modeling economic time series, Granger and Newbold (1986) examine frameworks that have been developed in the forecasting literature, such as the unbiased forecasts, optimal forecasts, rational expectations, and Box-Jenkins (ARIMA) forecasting models. Pindyck and Rubinfeld (1998: 549–550) provide general specification form of the $ARIMA_{p,d,q}$ model. To obtain a forecast of y_t for period $T + l$ with $(l \geq 1)$ and given that values p, d, q have been chosen, the forecast model is of the form:

$$\varphi(B)\Delta^d y_t = \varphi(B)w_t = \theta(B)\varepsilon_t \tag{1}$$

With $\varphi(B) = 1 - \varphi_1 B - \varphi_2 B^2 - \cdots - \varphi_P B^P and \theta(B) = 1 - \theta_1 B - \theta_2 B^2 - \cdots - \theta_q B^q$, where B acts as the *backward shift operator*, $\varphi_P =$ autoregressive parameter, $\theta_q =$ moving average parameter.

$$\text{In terms of error term :} \quad \varepsilon_t = \theta^{-1}(B)\varphi(B)w_t \tag{2}$$

It intend finding the set of $(\varphi_1, \ldots, \varphi_P)$ and $(\theta_1, \ldots, \theta_q)$ that minimizes the $\sum_t \overset{\wedge}{\varepsilon}_t^2$.

On Rational expectation, Muth (1961), Lucas and Sargent (1981), Granger and Newbold (1986) disclose that expectation model can ultimately produce optimal outcome where relevant information is available, conditioned on sound knowledge of the economy. The static model is analyzed from Eqs. (3)–(7) below:

$$Cy + Ay_t^* + \Gamma x_t = u_t \tag{3}$$

Where y_t represents vector of endogenous variables, $y_t{}^*$ is the expectation of y_t made at time $t - 1$ on the information set Ω_{t-1}, x_t represents vector of exogenous variables, and u_t is the unobserved white noise input series. The reduced form of the model is:

$$y_t = \prod\nolimits_1 y_t^* + \prod\nolimits_2 x_t + v_t \tag{4}$$

Where: $\prod_1 = -C^{-1}A$, $\prod_2 = -C^{-1}\Gamma$, $v_t = C^{-1}u_t$

Assuming a forecast formation, with least square cost function, one would have:

$$y_t^* = E[y_t|\Omega_{t-1}] \tag{5}$$

Therefore, taking the conditional expectation of equation 4, while assuming $E[v_t|\Omega_{t-1}] = 0$, and denoting $E[x_t|\Omega_{t-1}] = x_t{}^*$ gives:

$$y^* = \left(I - \prod_1\right)^{-1} \prod_2 x_t^* \tag{6}$$

Following Eq. (5), the observed reduced form consistent with Eq. (3) is produced as:

$$y_t = \mathrm{P}_1 x_t^* + \mathrm{P}_2 x_t + V_t \tag{7}$$

where: $\mathrm{P}_1 = \prod_1 \left(I - \prod_1\right)^{-1} \prod_2$, $\mathrm{P}_2 = \prod_2$

Theoretical literature and empirical evidence discussed in the preceding section suggest variables that spur life insurance growth and its relationship with economic growth in different economies. This study deepens the transmission by examining the role of capital formation and accumulation to economic growth as depicted in the conceptual framework presented earlier. Therefore, the paper builds on the framework of Feyen et al. (2011), Ibiwoye et al. (2010), and Omoke (2011). Fayen's pool regression results find that drivers of life insurance, which potentially increase contractual savings, are income, population, population density, life expectancy and literary rate which were not obvious. This paper envisages that reforms capable of improving insurance penetration, insurance density, life expectancy and unemployment rate can significantly transform the capital ratio using simulation model. Pindyck and Rubinfeld (1998: 383) disclose that simulation of a model is useful for testing and evaluating the model, carry out historical policy analysis, and to forecast. Simulation also assists in predicting the future many times over.

The suggested transmission or analytical framework is such that reforms geared towards increasing premium of life insurance would boost insurance penetration rate and impact capital formation process, in line with the fundamental stage theory of capital formation. Similarly, relative increased population of life insurance contracts has the potential to improve capital accumulation through contractual savings. Improvement in life expectancy and employment rate would produce increased income and savings.

3.2 Model Specification and Data

Models are usually built either for descriptive purpose, for hypothesis testing or for forecasting (Pindyck and Rubinfeld 1998). This paper uses two-stage least square technique to achieve the first two and simulation for the third. The implicit form of the time series recursive system is presented thus:

Capital Formation

$$Cfr_t = f\left(\underset{+}{Lip_t}, \underset{-}{Umr_t}, \underset{+}{Gdp_t}, \underset{-}{Tbr_t}, \underset{-}{Inr_t}, \underset{-}{Xr_t}, \underset{+}{Cfr_{-t}}\right) \tag{8}$$

Insurance Penetration

$$Lip_t = f\left(\underset{-}{Inf_t}, \underset{+}{Dpol_t}, \underset{+}{Rqt_t}, \underset{+}{Lrt_t}, \underset{+}{Lip_{-t}}\right) \tag{9}$$

Where *Cfr* is capital formation ratio, *Lip* is life insurance penetration, *Umr* is unemployment rate, *Gdp* is gross domestic product, *Tbr* is 90 days treasury bill rate, *Inr* is maximum interest rate, *Xr* is exchange rate, *Inf* is inflation rate, *Dpol* is political dummy for years of civilian and military administrations in Nigeria with 1 for civil rule and 0 otherwise, *Rqt* represents financial regulatory index for Nigeria institutions obtained from World Governance Institute Report (2013). The annual World Bank index measures nations' institutions regulatory quality with approximate range −2.5(weak) to +2.5 (strong) governance performance, *Lrt* is literacy rate. The theoretical expectations (*apriori*) are stated beneath the respective equations.

Data capture period was from 1980 to 2013. *Cfr* and *Lip* were computed from data obtained from Central Bank of Nigeria (CBN) statistical bulletin and National Insurance Commission of Nigeria (NICOM) respectively. Other variables obtained from CBN statistics are *Tbr*, *Xr*, and *Inr*; while *Umr*, *Inf*, *Lrt*, and *Gdp* were obtained from National Bureau of Statistics (NBS) bulletin.

Classical, neoclassical and financial theories establish various models to demonstrate input-output relationships involving capital necessary for investment, growth and development which exhibit characters that are non-linear in nature (Solow 1956; Harrod 1957; Tobin 1969; Romer 1986; Grossman and Helpman 1991; Jhingan 2007; etc). Thus, the explicit functional form of a model involving capital formation, premium, growth and other development variable would be non-linear as follows:

Capital Formation

$$Cfr_t = \beta_0 Lip^{\beta_1}{}_t, Umr^{\beta_2}{}_t, Gdp^{\beta_3}{}_t, Tbr^{\beta_4}{}_t, Inr^{\beta_5}{}_t, Xr^{\beta_6}{}_t, Cfr^{\beta_7}{}_{-t}, \psi_t \tag{10}$$

Life Insurance

$$Lip_t = \xi_0 Inf^{\xi_1}{}_t, Dpol^{\xi_2}{}_t, Rqt^{\xi_3}{}_t, Lrt^{\xi_4}{}_t, Lip^{\xi_5}{}_{-t}, \varepsilon_t \tag{11}$$

The variables theoretical expectations are as stated in Eqs. (8) and (9) above. Following log Transformation the linearized form is produced:

$$\begin{aligned} InCfr_t = \beta_0 + \underset{+}{\beta_1 InLip_t} + \underset{-}{\beta_2 InUmr_t} + \underset{+}{\beta_3 InGdp_t} + \underset{-}{\beta_4 InTbr_t} + \underset{-}{\beta_5 InInr_t} \\ + \underset{-}{\beta_6 InXr_t} + \underset{+}{\beta_7 InCfr_{-t}} + \psi_t \end{aligned} \tag{12}$$

$$InLip_t = \xi_0 + \underset{-}{\xi_1 InInf_t} + \underset{+}{\xi_2 InDpol_t} + \underset{+}{\xi_3 InRqt_t} + \underset{+}{\xi_4 InLrt_t} + \underset{+}{\xi_5 InLip_{-t}} + \varepsilon_t \tag{13}$$

The *apriori* expectations for the coefficients are as follows: $\beta_1, \beta_3, \beta_7, \xi_2, \xi_3, \xi_4, \xi_5 > 0$; $\beta_2, \beta_4, \beta_5, \beta_6, \xi_1 < 0$. Pindyck and Rubinfeld (1998) describe a recursive system to be a body of equations where the endogenous variables can be determined sequentially (no simultaneity), with the errors of each equation being independent of each other. Better put, the critical assumption is that:

$$Cov(\psi_t, \varepsilon_t) = 0 \tag{14}$$

Since both equations contain lagged endogenous variable, estimates obtained thereof by Ordinary least square (OLS) though may be consistent but would not be unbiased (Mukherjee et al. 1998: 438). The Two-stage least square (2SLS) is therefore adopted for estimation due to its advantage at obtaining efficient values of structural parameters in overidentified equations. Oyinlola (2012) describes 2SLS as a special case of instrumental variable regression, which produces "instruments" that helps to eliminate the correlations between the "right hand side variables and the disturbances".

First, the identification conditions of the equations in the system were established. The necessary (order) condition for identification requires that in an equation of the simultaneous model, the number of missing variables M, must be greater than or equal to the number of endogenous variables G in the system less one, indicating over identified or exactly identified respectively, otherwise it is under identified (Asteriou and Hall 2011: 236). Algebraically, this is stated as:

$$M \geq G - 1 \tag{15}$$

Where M represents number of variables missing from a particular equation under study, and G is the number of endogenous variables in the system. Applying this to the recursive system above, the study achieved over-identification for both equations. The sufficient (rank) condition was evaluated, that is, the order of the largest nonzero determinant formed from the squared sub-matrices is at least G-1 (Asteriou and Hall 2011: 237; Kmenta 1997: 664; Gujarati and Porter, 2009: 702). This was

Table 3 Unit root test

Variables	ADFtest: Level and first difference (Intercept and trend)	Remark: Order of integration
Cfr	−4.841629*	I(1)
Lip	−7.259483*	I(1)
Umr	−4.478850*	I(1)
Lgdp	−3.594572**	I(1)
Tbr	−7.667131*	I(1)
Inr	−6.363716*	I(1)
Xr	−4.672471*	I(1)
Inf	−5.457414*	I(1)
Rqt	−5.452755*	I(0)
Lrt	−4.051408**	I(1)

Source: Authors' estimation using E-view 7.0; MacKinnon (1996) one-sided p-value
Note:*;** indicates variables that are significant at 1 and 5 % level respectively, with critical value being −4.273277 and −3.557759

achieved, hence the estimation using the two-stage least square model (2SLS). The instruments used for the system's regression are LGDP, LGDP(−1 to −5), Xr, Inr (−1 to −5), Umr(−1 to −5), Rqt(−1 to −5), Lip(−1 to −5), Cfr(−2) Cfr (−3).

The test for stationarity of the variables (Unit root) using Augmented Dickey–Fuller technique achieved both level and first difference stationarities as presented in Table 3.

3.3 Results: Regression

The diagnostic test for capital formation equation results (see Table 4) reveal that the regression's multiple coefficient of determination (R^2) is 72 % suggesting a measure of closeness to fit, which implies that the exogenous variables largely determines the fortune of the endogenous variable. The adjusted coefficient of determination is 63 %. The reliability of these tests is affirmed by the significance of the joint influence test (F. Stat.) at 5 % of all exogenous variables. The standard error of regression is 1.64, and while the Durbin-Watson test is inapplicable, the Durbin h test for serial correlation produced 0.055 which satisfied the null hypothesis that the model is free from serial correlation, suggesting that the regressors are efficient (Asteriou and Hall 2011: 162). The J-stat. is insignificant, suggesting that the instruments may be valid.

The exogenous variables satisfy the *apriori* expectations except for interest rate, which imply that each of the regressors (life insurance penetration, other latent and control variables) practically describes the fortunes of capital formation as proposed by theory other than interest rate in Nigeria. It suggests that a 1 % increase in life insurance penetration induces 3509 % increase in capital formation. Also suggestively a 1 % decrease in unemployment rate, treasury bill rate and exchange

Table 4 Results: Two-stage least square

Explanatory variables	Dependent variable: capital formation	Explanatory variables	Dependent variable: life insurance penetration
Constant	−51.56 (38.62)	Constant	0.05 (0.04)
Lip	35.09* (12.34)	Inf*	−0.0006 (0.0003)
Umr	−0.08 (0.09)	Dpol	0.005 (0.014)
Gdp	4.11 (3.02)	Rqt	0.0004 (0.004)
Tbr	−0.19 (0.18)	Lrt	0.0006 (0.001)
Inr	0.2 (0.16)	Lip(−2)*	0.51 (0.10)
Xr	−0.034* (0.01)		
Cfr(−1)	0.46* (0.18)		
R^2	0.72	R^2	0.58
Adj. R^2	0.63	Adj. R^2	0.49
F. Stat.	7.86	F. Stat.	5.99
Prob.(F. Stat.)	0.0001	Prob.(F. Stat.)	0.001
Durbin h. Stat. (h < Z-critical = 1.96)	0.005	Durbin h. Stat. (h < Z-critical = 1.96)	1.54
J.Stat	21.01	J.Stat	22.98
Prob. (J.stat)	0.458	Prob.(J.stat)	0.403
Obser. after adj.	29	Obser. after adj.	29

Source: Authors' Estimation using E-view 7.0. Note: Standard error in parenthesis; * indicates statistical significant at 1 % level

rate would positively induce change in capital formation by about 7 %; 19 %; and 3 % respectively. Similarly, a 1 % rise in GDP, interest rate and one period lagged Cfr induces 411 %; 20 %; and 46 % rise in capital formation respectively. The interest rate's positive relationship is theoretically implausible; it is however justified in line with 'availability doctrine' common in capital deficient economies, particularly in developing economies (Ojo 2010).

The diagnostic test for insurance penetration equation results (see Table 4) reveal that the regression's multiple coefficient of determination (R^2) is 58 % suggesting a measure of closeness to fit, which implies that the exogenous variables determines the fortune of the endogenous variable. The adjusted coefficient of determination is 51 %. The reliability of these tests is affirmed by the significance of the joint influence test (F. Stat.) at 5 % of all exogenous variables. The standard error of regression is low at 0.0026, while the Durbin h test for serial correlation

produced 1.54 which satisfied the null hypothesis that the model is free from serial correlation, meaning that the regressors are efficient. The J-stat. is insignificant, suggesting that the instruments may be valid.

The insurance equation was over-parameterized, hence a parsimonious approach was adopted resulting in five exogenous variables that satisfy the *apriori* expectations. This implies that each of these regressors practically describes the fortunes of insurance penetration as proposed by literature in Nigeria. It suggests that a 1 % increase in maintenance and continuity of the political system, regulatory quality and literacy rate induces about 0.05 %; 0.04 % and 0.06 % increase in life insurance penetration. It also suggests that a one (1 %) rise in inflation would induce 0.06 % reduction in insurance penetration.

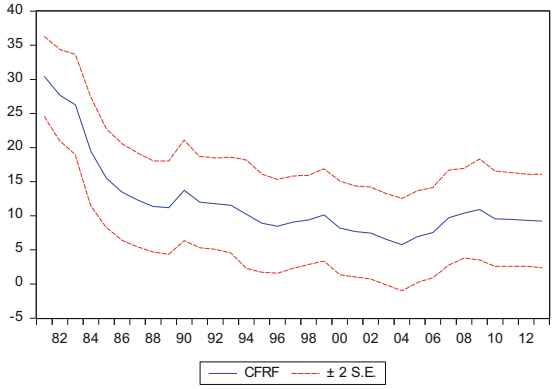
3.4 Results of Simulations and Evaluation of Forecasts

Effective and efficient result oriented simulation has to be based on appropriate theories and practical assumptions (Granger and Newbold 2001), albeit be conservative in forecasting (Armstrong et al. 2015). It is on this basis that the assumptions for the forecast section (2014–2030) are as thus follows: the Nigerian economy will operate on average annual GDP growth rate of 6 %; Tbr =100–200 basis point below 2013 rate; Inf = 8–9 %; maintain current civilian regime(1); Xr = ≤5 % above the official rate in 2014 against $; Inr = 200–500 basis point decline per annum; improve on rqt by 5 % per annum; Umr to fall by 2 % per annum; Lrt = increase by 3 % per annum ; Lip increase by 5 % per annum and Cfr increase by 8 %. The time series assumption is that following most of the variables achieving I(1) in the pre-forecasting period, the subsequent series would have zero mean and be stationary of same order.

The simulation statistics of the model suggests good fit. First, we carried out *ex-post* (historical) simulation over the estimation period 1980–2013, using historical values for lip and cfr variables. It is noted that lip appear as an explanatory variable in capital formation equation. The results are presented graphically in Figs. 2 and 3.

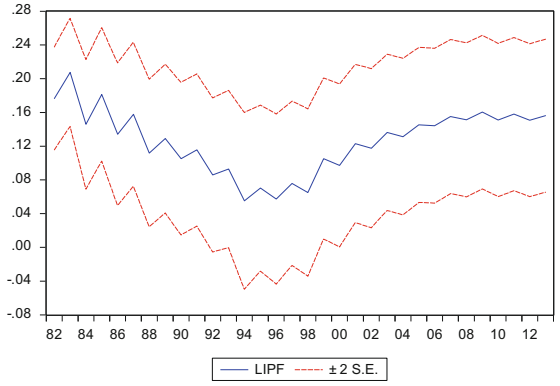
An examination of the both (Cfr and Lip) series suggest that the simulate series do seem to reproduce or match the general real behavior of the actual series. The evaluation statistics for both simulations satisfy the standard conditions. The Root mean square error (RMSE), Mean absolute error (MAE) and Theil coefficient are low. Also, both variables produced very low *bias proportion* (i.e. the systematic error of the simulation). It shows that the endogenous variables actually tracked the historical data.

Next, we examine the dynamic and static form of the *ex-post*. For Cfr model the static and dynamic *ex post* evaluations did not produce remarkable difference. Their RMSE are low, with 12 % and 14 % mean percent error respectively. The Theil coefficients are insignificant, with zero bias proportions. See Figs. 4 and 5.



Forecast: CFRF	
Actual: CFR	
Forecast sample: 1980 2013	
Adjusted sample: 1981 2013	
Included observations: 33	
Root Mean Squared Error	2.153156
Mean Absolute Error	1.719724
Mean Abs. Percent Error	15.12894
Theil Inequality Coefficient	0.080436
Bias Proportion	0.000361
Variance Proportion	0.103630
Covariance Proportion	0.896009

Fig. 2 Cfr actual (historical) simulation



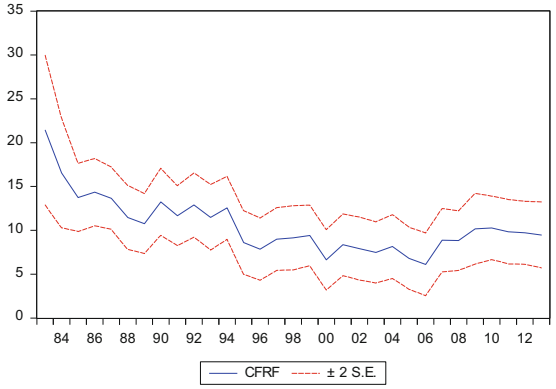
Forecast: LIPF	
Actual: LIP	
Forecast sample: 1980 2013	
Adjusted sample: 1982 2013	
Included observations: 32	
Root Mean Squared Error	0.037273
Mean Absolute Error	0.029880
Mean Abs. Percent Error	25.56448
Theil Inequality Coefficient	0.139105
Bias Proportion	0.000103
Variance Proportion	0.099258
Covariance Proportion	0.900640

Fig. 3 Lip actual (historical) simulation

For Lip model, the static and dynamic *ex post* evaluations also seen not to produce remarkable difference like the Cfr model. Their Rmse are low, with 19 % and 21 % mean percent error respectively. The Theil coefficients are however high with the dynamic having high bias proportions. See Figs. 6 and 7.

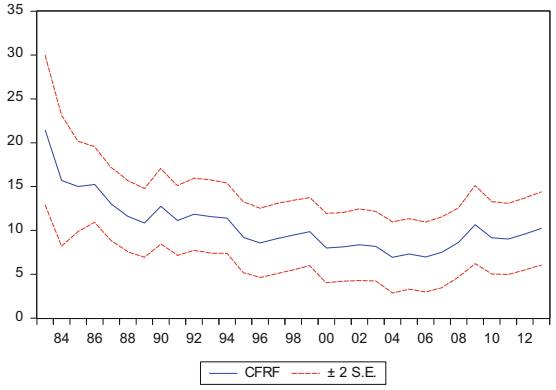
Having achieved well estimated regression, hence a model that produced good tracking performance, it beholds that the model be suitable for forecasting using both the static and the dynamic forecast methods. The Cfr equation *ex ante* forecast 2014–2030 in actual, static and dynamic forms are presented in Figs. 8, 9 and 10. Using criteria RMSE, MAE, mean percent error; and the Theil coefficient, including the bias proportion, the entire results reveal good fit and reliable forecasts. It is observed that the static exercise fits better that the actual and dynamic forecasts.

The Lip model *ex ante* forecast 2014–2030 in actual, static and dynamic forms are in Figs. 11, 12 and 13. Using criteria of RMSE, MAE, Mean percent error, and Theil coefficient, including the bias proportion, it reveals good forecast outcome. However, the bias proportion (systematic risk) of the forecast result for the static (Fig. 12) is lower than the dynamic (Fig. 13) and actual data. Generally, these



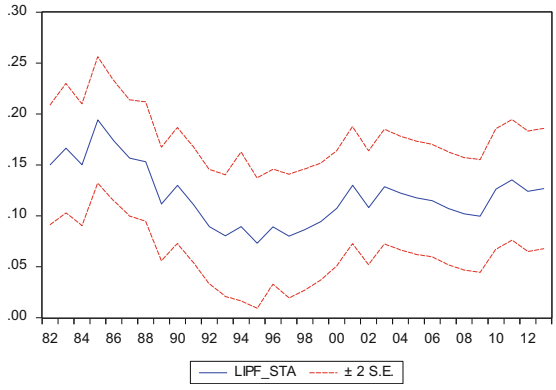
Forecast: CFRF	
Actual: CFR	
Forecast sample: 1980 2013	
Adjusted sample: 1983 2013	
Included observations: 31	
Root Mean Squared Error	1.374822
Mean Absolute Error	1.181983
Mean Abs. Percent Error	12.17014
Theil Inequality Coefficient	0.062273
Bias Proportion	0.000264
Variance Proportion	0.070708
Covariance Proportion	0.929028

Fig. 4 Cfr static *ex-post* simulation 1980–2013



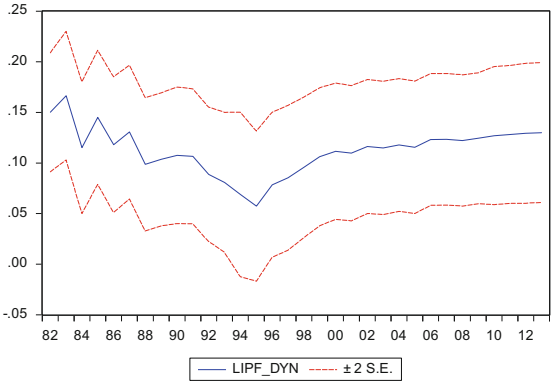
Forecast: CFRF	
Actual: CFR	
Forecast sample: 1980 2013	
Adjusted sample: 1983 2013	
Included observations: 31	
Root Mean Squared Error	1.560560
Mean Absolute Error	1.356050
Mean Abs. Percent Error	14.31536
Theil Inequality Coefficient	0.070797
Bias Proportion	0.000120
Variance Proportion	0.090396
Covariance Proportion	0.909484

Fig. 5 Cfr dynamic *ex-post simulation*: 1980–2013



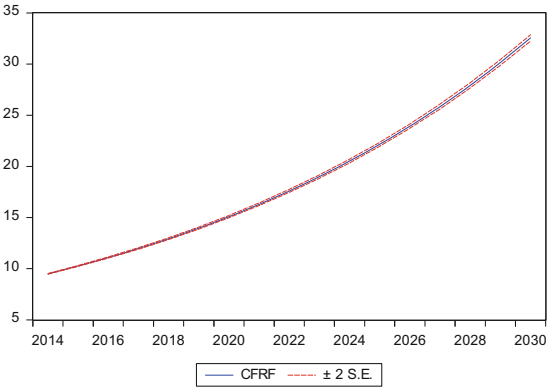
Forecast: LIPF_STA	
Actual: LIP	
Forecast sample: 1980 2013	
Adjusted sample: 1982 2013	
Included observations: 32	
Root Mean Squared Error	0.032822
Mean Absolute Error	0.024605
Mean Abs. Percent Error	19.94366
Theil Inequality Coefficient	0.126635
Bias Proportion	0.048481
Variance Proportion	0.372817
Covariance Proportion	0.578703

Fig. 6 Lip static *ex post* simulation



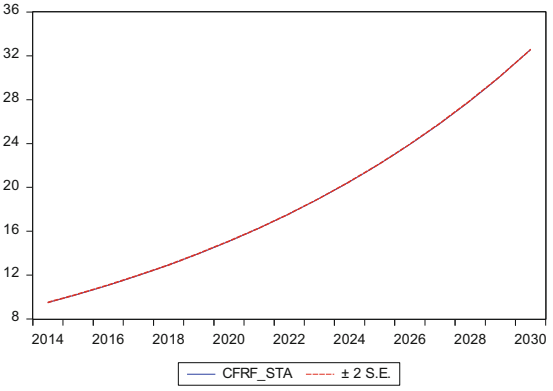
Forecast: LIPF_DYN	
Actual: LIP	
Forecast sample: 1980 2013	
Adjusted sample: 1982 2013	
Included observations: 32	
Root Mean Squared Error	0.040188
Mean Absolute Error	0.028475
Mean Abs. Percent Error	21.28067
Theil Inequality Coefficient	0.160329
Bias Proportion	0.131399
Variance Proportion	0.428637
Covariance Proportion	0.439964

Fig. 7 Lip dynamic *ex post* simulation



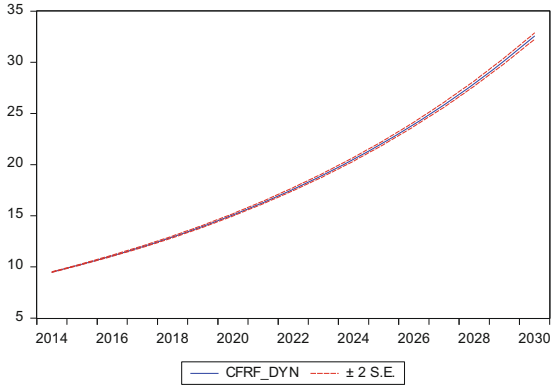
Forecast: CFRF	
Actual: CFR	
Forecast sample: 2014 2030	
Included observations: 17	
Root Mean Squared Error	0.005519
Mean Absolute Error	0.003891
Mean Abs. Percent Error	0.026344
Theil Inequality Coefficient	0.000137
Bias Proportion	0.000048
Variance Proportion	0.000087
Covariance Proportion	0.999865

Fig. 8 Cfr actual *ex-ante* forecast: 2014–2030



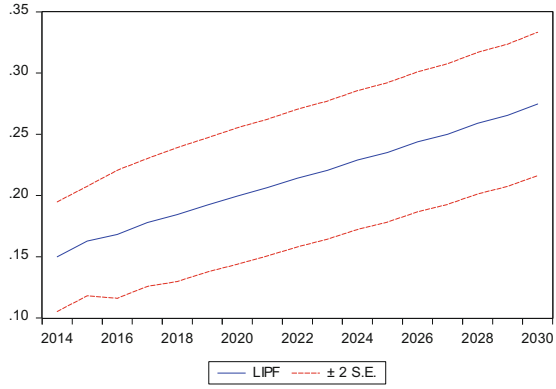
Forecast: CFRF_STA	
Actual: CFR	
Forecast sample: 2014 2030	
Included observations: 17	
Root Mean Squared Error	0.010183
Mean Absolute Error	0.007235
Mean Abs. Percent Error	0.048857
Theil Inequality Coefficient	0.000253
Bias Proportion	0.000000
Variance Proportion	0.000001
Covariance Proportion	0.999999

Fig. 9 Cfr static *ex-ante* forecast: 2014–2030



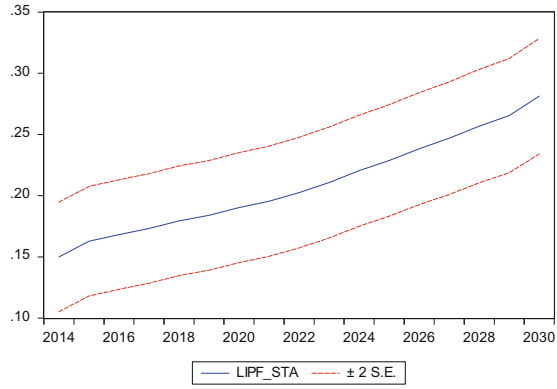
Forecast: CFRF_DYN	
Actual: CFR	
Forecast sample: 2014 2030	
Included observations: 17	
Root Mean Squared Error	0.005519
Mean Absolute Error	0.003891
Mean Abs. Percent Error	0.026344
Theil Inequality Coefficient	0.000137
Bias Proportion	0.000048
Variance Proportion	0.000087
Covariance Proportion	0.999865

Fig. 10 Cfr dynamic *ex-ante* forecast



Forecast: LIPF	
Actual: LIP	
Forecast sample: 2014 2030	
Included observations: 17	
Root Mean Squared Error	0.013154
Mean Absolute Error	0.011340
Mean Abs. Percent Error	5.607068
Theil Inequality Coefficient	0.030582
Bias Proportion	0.166160
Variance Proportion	0.437494
Covariance Proportion	0.396346

Fig. 11 Lip actual *ex ante*



Forecast: LIPF_STA	
Actual: LIP	
Forecast sample: 2014 2030	
Included observations: 17	
Root Mean Squared Error	0.008771
Mean Absolute Error	0.006882
Mean Abs. Percent Error	3.329320
Theil Inequality Coefficient	0.020604
Bias Proportion	0.006678
Variance Proportion	0.785571
Covariance Proportion	0.207750

Fig. 12 Lip static *ex ante*

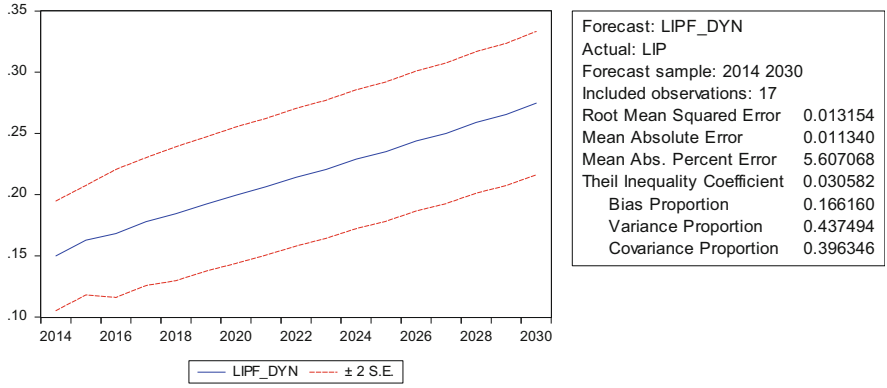


Fig. 13 Lip dynamic *ex ante*

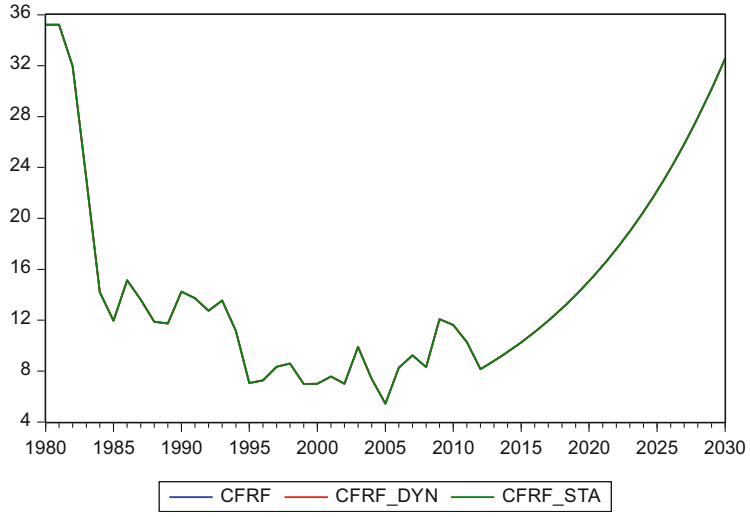


Fig. 14 Cfr group (comparison) *ex ante* forecast

results seem to indicate that simulating forward produces better forecast, thus suggesting that the model is reliable for projections.

The study also carried out *ex ante* group forecast using actual, static and dynamic methods for both variables. While Cfr group is presented in Fig. 14, Lip group is presented in Fig. 15. The Cfr group result shows that both the static and dynamic forecast tracks the actual significantly, i.e. they fit together through the period. In the case of Lip case (Fig. 15), the static forecast tracks the actual data better than the dynamic.

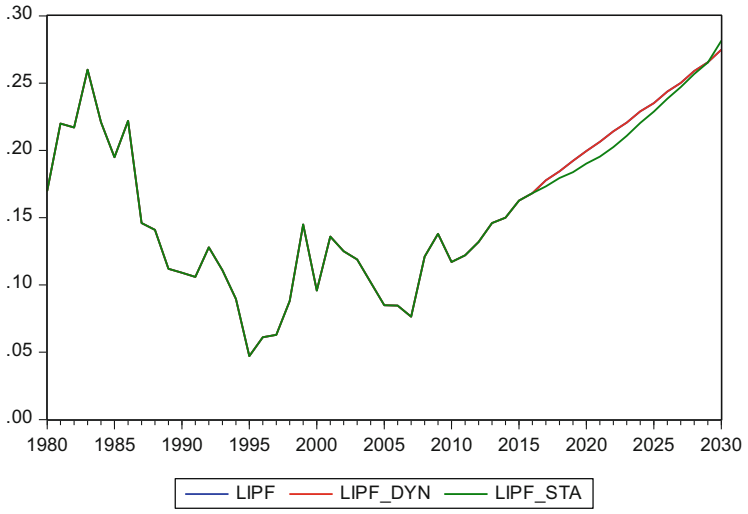


Fig. 15 Lip group (comparison) *ex ante* forecast

4 Findings, Discussions and Policy Recommendations

The Cfr regression results reveal that the principal exogenous variable LIP is highly sensitive to capital formation, while other control variables are also sensitive. Nigeria must improve the life insurance mechanism to grow capital formation. The recent policy trust of government that an employer with minimum of three employees should undertake group life insurance should be vigorously pursued to practical realization by the National Pension Commission (PENCOM) and NICOM. From the simulation result, it can be conjectured that should the policy be strictly complied with it would improve the capital accumulation. Should subsequent reform review it to one employee, it will boost the level of capital formation in the long term.

Analogous to the LIP is the GDP. The result suggests that economic growth increases the capital formation overtime. It is imperative that every growth enhancing resources should be effectively deployed. The capacity of the economy to grow and impart capital formation would depend on the nation's per capita income and savings per capita. These variables are effectively sensitive to the rate of the nation's human and material productivity (output per capita). Government must therefore improve the productive capacity of her citizen in other to realize the desired impact on capital formation.

Unemployment rate (Umr) is negatively related to capital formation. It implies that should the human and material resources be gainfully employed, the level of capital formation would be boosted. Nigeria unemployment rate of 23 % (NBS 2013) is therefore hindering the capacity for required growth in capital formation.

The treasury bill (Tbr) rate is negatively sensitive to capital formation. Being a short term investment window, an increase in rate attracts more long term investible funds, obviously due to relative risk consideration. Therefore, government and monetary authorities should consider fiscal policies to manage the inflation level, reduce the monetary policy rate (MPR) below 5 % and reduce Tbr correspondingly, in other to improve the long term investment culture.

Exchange rate (Xr) is also negatively sensitive to capital formation. This implies that adverse exchange rate or depreciation attracts long term fund from capital formation. Therefore, government and monetary authorities should reduce Nigerian external dependencies, encourage endogenous growth and effectively manage scarce foreign exchange.

The positive sensitivity of interest rate (Irt) to capital formation underscores the "availability doctrine" that has characterized capital scarce developing economies, and a disincentive to long term capital accumulation. The result is consistent with the findings of Ibiwoye et al. (2010). High interest rate regime inadvertently drives borrowers, investors and producers from acquisition of long term capital stock to short term businesses (trading) and current consumption, producing at high cost and inducing inflation. Government should ensure that the MPR is relatively reduced and eliminate all form of financial repression. These measures could reduce cost of capital for long term capital stock acquisition.

Inflation is negatively sensitive to Lip. A high inflation regime attracts scarce capital to current consumption against long term investment and capital stock acquisition. The result is consistent with other countries studies mentioned under the empirical review and Ibiwoye et al. (2010), which find inflation as negative driver of life insurance consumption (LIC) in Nigeria. Government should effectively manage fiscal system to eliminate unproductive spending, reduce cost of living and improve per capita income through improved employment and productivity. This would improve consumption of life insurance products.

The political system dummy (Dpol) is positively sensitive to Lip, implying that civil rule, aside from attracting significant measure of confidence; also attract both domestic and international investors towards life insurance policies. Aside, latent advantages accrue from the civil political dispensation, as refined policy reforms and legislations such the on-going Pension reforms are made possible. Government should maintain stable political system overriding policy. The result is consistent with Ibiwoye et al. (2010) which found that instability in political system negates life insurance consumption.

Regulatory quality (Rqt) index is positively sensitive to Lip, implies that given efficient and effective institutional regulatory regimes it would drive demand for life insurance. Quality regulation ensures that industry operators adhere strictly to contracts, perform to rules, enforce compliance and encourage business competitiveness. Government should introduce more innovative reforms that would attract more international insurance firms into the industry.

Literacy rate (Lrt) is positively related to Lip, implying that increasing education of the citizen would increase demand for life insurance products. Insurance education can eliminated ignorance and the poor religious influence detrimental to life

insurance consumption. Government should introduce insurance education course in all level of the education cadre to create more awareness.

5 Conclusion

This study advances the financial intermediation role of life insurance towards promoting long term savings and capital formation in Nigeria. The trust of the paper is how life insurance reforms can facilitate development of much needed long term capital formation and accumulation process in a finance deficient economy like Nigeria. It realizes that being the long term arm of the insurance business, with relative stable capital accumulation system, life insurance is a more reliable source for capital formation as being witnessed in economies such as Japan, South Korea, Singapore, Chile, the United States, etc.

TSLS was adopted to estimate two equations in a recursive system. The principal exogenous variable Lip and control variables Lgdp, cfr (−1) were positively sensitive to capital formation in compliance with theoretical expectation. Also in compliance with theoretical expectation, Umr, Tbr and Xr were negatively sensitive to capital formation and accumulation. Against *a-priori* expectation interest rate was positively sensitive. This may be attributed to doctrine of availability common in capital scarce economies. In the second equation, inflation was negatively sensitive to Lip, while Dpol, Rqt, Lrt and Lip (−2) were positive sensitive.

Simulation tests were employed for the two equations to objectively test and evaluate the model historically and for policy forecast. To achieve this, *ex-post* simulation and *ex-ante* forecast were used. Thus, the simulation time horizon was from 1980 to 2030. The *ex-post* simulation scheduled period was 1980–2013. For lack of current data the *ex-post* forecast simulation period (2014–2015) was excluded. The *ex ante* forecast was from 2014 to 2030. The *ex-post* (dynamic and static) simulation produced consistent results which complied with standard evaluation criteria—the RMSE, MAE and Theil coefficient, implying that the model and equations were reliable and valid as forecast tool in time beyond estimation period 2013. The resulting *ex ante* forecasts thereon generated fitted results. Overall, the forecast results seems to fit the expectations of the underlining assumptions, suggesting that on average Cfr could grow by 8 % per annum *ceteris paribus*. The study recommends that for this forecast to be met, pension regulators should step-up compliance of existing statute on compulsory life cover by employers; Insurance regulators should engage public education on life insurance; the federal government should adopt fiscal incentives to attract foreign direct investments in the industry for competitiveness and make policies for mandatory life policy for all adult working citizen.

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Innovation During and Beyond the Economic Crisis

Ayşe Saime Döner

Abstract Originated in the financial sector, the 2008 economic crisis hit severely the financial side of the economy, but also had drastic impacts on the real sector. The companies were seriously affected by the fall in demand and trade on the one hand, and by the difficulties in credit conditions and access to finance on the other hand. As a result, the economic crisis caused a decrease in companies' revenues and future investments, which hit directly their R&D and innovation efforts. Nevertheless, as Filippetti and Archibugi (2011) make the remark, the impact of this crisis on innovation didn't spur enough the interest of economists working in the field of innovation studies. Hence, very few studies analyze the relationship between the economic crisis and innovation (Filippetti and Archibugi 2011; Paunov 2012; Archibugi et al. 2013a, b; Izsak et al. 2013; Hausman and Johnston 2014; Makkonen et al. 2014; Amore 2015). Yet, the relationship between innovation and economic development has been known and discussed since Schumpeter's (1939) seminal work highlighting innovation as a fundamental factor in business cycles.

1 Introduction

Originated in the financial sector, the 2008 economic crisis hit severely the financial side of the economy, but also had drastic impacts on the real sector. The companies were seriously affected by the fall in demand and trade on the one hand, and by the difficulties in credit conditions and access to finance on the other hand. As a result, the economic crisis caused a decrease in companies' revenues and future investments, which hit directly their R&D and innovation efforts. Nevertheless, as Filippetti and Archibugi (2011) make the remark, the impact of this crisis on innovation didn't spur enough the interest of economists working in the field of innovation studies. Hence, very few studies analyze the relationship between the economic crisis and innovation (Filippetti and Archibugi 2011; Paunov 2012;

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Archibugi et al. 2013a, b; Hausman and Johnston 2014; Makkonen et al. 2014; Amore 2015). Yet, the relationship between innovation and economic development has been known and discussed since Schumpeter's (1939) seminal work highlighting innovation as a fundamental factor in business cycles.

Regarding the firms' behavior in times of crisis, the general assumption is that firms are less willing to invest in research and innovation activities due to the financial constraints and uncertainties of the economic landscape. Nevertheless, experience shows also the opposite; some firms continue to increase their expenditures in R&D and innovation activities during economic recessions (Filippetti and Archibugi 2011; Archibugi et al. 2013a; Amore 2015). Investigating whether firms reduce or increase their investment in innovation during the crisis puts forward the differences in firms' reaction to the crisis. Firm-specific characteristics such as size, age, experience with innovative activities, access to public and private finance, links with foreign markets and strategies determine mostly firms' innovation expenditures (Paunov 2012; Archibugi et al. 2013a, b; Amore 2015). Moreover country-specific characteristics like the stock and quality of the human resources, the stock of accumulated knowledge (patents, R&D expenditures. . .), the financial system of the country as well as the innovation policies are important determinants of firms' innovation performance (Filippetti and Archibugi 2011; Paunov 2012). Furthermore, firms' attitude towards risky situations may differ. While some firms see the crisis as an opportunity to try new markets and technologies, others may choose to pursue a cautious strategy. Considering these different factors at firm and country levels, it is clear that surviving the crisis and even growing despite of it is possible.

In this study, the impact of economic crisis on innovation is analyzed within the example of the latest recession. The analysis focuses especially on the different reactions across countries and firms and reasons behind these divergences. Firstly, the dynamics of innovation activities will be addressed on the basis of Schumpeter's arguments and the persistency of innovation activities will be explored. Secondly, I will analyze how the latest economic crisis affected countries' and firms' innovation efforts. I will finally examine the recovery measures concerning innovation activities and the innovation performance of different countries beyond the crisis.

2 Persistency in Innovation Activities During Recessions

Schumpeter (1939) was the first economist who put forward the importance of innovation in economic development. By putting the innovation at the heart of the business cycles, he attempted to explain the economic growth in terms of technical innovation (Freeman et al. 1982). According to him, long cycles of economic development are all triggered by innovations that revolutionize not only the economic but also the everyday life. He defines the first long cycle by the diffusion of the steam engine and textile innovations in the late eighteenth century, which is the

period of Industrial Revolution. Then the second long cycle is related to the development of railways and the changes in the mechanical engineering and iron and steel industries. As for the third cycle, it is based on the advances in chemical industry, the internal combustion engine and the electric power. At each cycle, new entrepreneurs, new companies and new industries emerge to incorporate the profits made from these innovations. As a result, innovation acting in a pro-cyclical manner creates new opportunities for economic growth. Furthermore, innovation activities are stimulated by the economic growth. More precisely, during expansionary periods, the availability of abundant resources and the optimistic perspective of companies lead to increases in R&D and innovation expenditures. As a result, number of innovations introduced to the market escalates. This trend indicates the cyclical nature of the innovation. Nevertheless innovation may also follow a counter-cyclical pattern. Indeed, recessions may induce radical innovations (Mensch 1979). During the periods of economic downturn, firms realize that they can no longer continue with the old ways, so they have to try or even bring something completely new to the market. That's how radical innovations causing a discontinuity in economic life are most likely introduced during recessionary times. To sum up, the relationship between innovation and economic cycles is multifaceted. All in all, firms' innovation efforts can be cyclical as in following the expansion, pro-cyclical, as in initiating the expansion, and finally counter-cyclical as in turning a recession into an opportunity and reversing the economic trend.

Based on Schumpeter's different works (1911, 1942), two patterns of innovation can be identified (Freeman et al. 1982; Malerba and Orsenigo 1995): creative accumulation and creative destruction. Creative accumulation can be described as an innovation process based on continuous research activities and resulting in the development of organizational routines accumulated throughout the past activities. This process is mostly carried out by large incumbent firms with highly qualified human resources and interacting with universities and other research institutes. These firms tend to exploit current technological opportunities rather than exploring new ones. Thus, innovations introduced by creative accumulation follow rather incremental patterns than radical. As for the creative destruction, the innovation process is associated to dynamic and uncertain environments where small firms led by entrepreneurs and individual inventors explore new markets and technological opportunities. All the features like learned and accumulated knowledge and routines, which define the creative accumulation process, act now as a hindrance for creative destruction process. Radical innovations are introduced as a result of collaborations, ventures and strategic alliances with firms from other industries and these processes often create new industries. When the impact of the crisis on innovation activities is examined through the perspective of creative accumulation and creative destruction, one should easily understand that while the economic downturn reduces the innovation efforts of some firms, it may also fail to do so for some or even present some opportunities for others. In other words, during economic crisis, some firms still continue to innovate. Considering these firms, Archibugi et al. (2013a) distinguish two types of firms. They state that some firms may see the crisis as an advantage to take on the rivals and to introduce

new products into the market, whereas others are already the most dynamic innovators and they continue to innovate continuously no matter what the economic conjuncture is. That's the second type of firm that exhibits a certain level of persistency in innovation during recessions. While the first type is more prone to generate radical innovations that can initiate an expansionary phase in the economy, it is the second type which will protect the economy from a coming recession and help it to recover quickly.

The persistence in innovative activities is defined by the organizational routines as explained by the evolutionary economists, Nelson and Winter (1982). These routines and the necessary competencies are developed through cumulative learning processes during past innovative activities. According to Geroski et al. (1997) the innovation persistence is based on the positive feedback loops between accumulation of knowledge and innovation processes. Behind this mechanism lies the fact that knowledge as a non-exhaustible economic good is both an input and an output of innovation activities. Each innovation process results in the generation of new knowledge which is then added into the knowledge pool of the company. This knowledge pool doesn't only contain technical knowledge and competencies but also organizational routines which are defined as the way of doing things (Nelson and Winter 1982). These routines are developed as a result of the learning processes experienced by the individuals and the organization itself. By recombining the existing knowledge pieces and ideas in new ways, firms create new knowledge pieces. Thus firms innovate on the basis of past innovations. In the same vein, studies analyzing the persistency of innovation (Geroski et al. 1997; Cefis and Orsenigo 2001; Roper and Hewitt-Dundas 2008; Tavassoli and Karlsson 2015) show that innovators have always been innovators. This innovative behavior should also affect firms' reaction in times of economic recession. More precisely, these innovative firms should also be able to propose "innovative" solutions during economic downturn. So, firms with a long history of innovation activities should recover more easily and quickly after an economic crisis compared to others. Within this perspective, it should be explored whether cumulative innovation activities can work as a shield for companies and/or help them to recover quickly. This can further be extended to the question whether economic crisis is caused in a way by the lack of innovation activities.

3 Impact of the 2008 Economic Crisis on Innovation

3.1 At the Aggregate Level

As pointed out by the Schumpeterian economists, the relationship between innovation and economic fluctuations can be cyclical or counter-cyclical. On the one hand, innovation can be considered cyclical to the extent that firms decrease their innovation expenditures following a recession. On the other hand, times of crisis can present opportunities for some firms to increase their innovative efforts, and

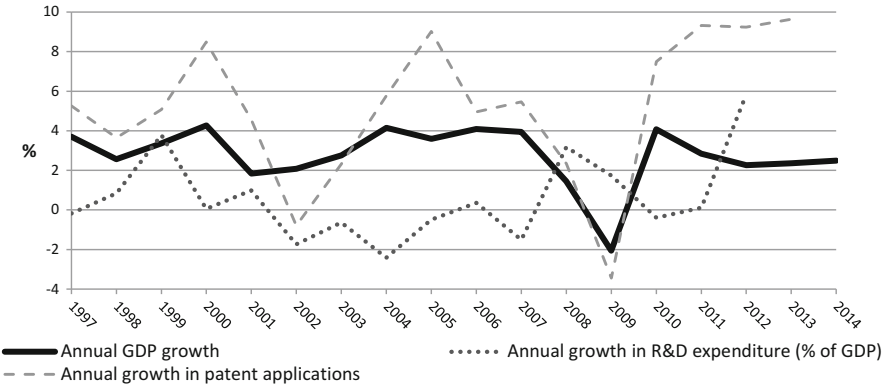

Fig. 1 Annual growth rates of GDP, R&D expenditures (% of GDP) and patent applications. Source: Worldbank, World Development Indicators

thus innovation can act counter-cyclical. The general landscape of the latest 2008 crisis brings support for the hypothesis that innovation is cyclical. Evidence collected from Worldbank database points out that innovation activities declined at the onset of global financial crisis. Figure 1 displays the patterns followed by R&D expenditures and patent applications. Historically, the trends followed by R&D expenditures and patent applications are relatively parallel with the GDP growth pattern. The parallelism is especially evident between GDP and patent applications. The relationship between these two indicators exhibits a cyclical pattern with patent applications following closely the GDP. Moreover, the changes in patent applications are deeper than the changes in GDP. In other words, during recessions, like the 2001 and the 2008 crises, the decrease in patent applications is greater than the decline in GDP. Similarly, expansionary periods induce considerable bursts in patent applications, which can be linked to the availability of financial resources and the general optimistic atmosphere.

When the changes in GDP and R&D expenditures are closely examined in Fig. 1, the pro-cyclical relationship between these two indicators can be spotted. More precisely, the increases/decreases in R&D expenditures are followed by increases/decreases in GDP with a time lag of one to two years. This behavior is expected given that the R&D process takes time and thus its results come out after a certain period of time. Concerning the pro-cyclicality between R&D and GDP growth, two arguments can be put forward regarding the 2008 crisis. The first one is about the period prior to the crisis. Examining the Fig. 1, starting around 1999 up to 2007 the R&D expenditures follow a general decreasing trend, which seems to be "cooking" the crisis. The presence of this trend supports the argument suggested by Hausman and Johnston (2014) according to whom the impacts of the crisis were worsened as a result of the lack of innovative behavior during the years before 2008. In fact, the general slowing down in R&D efforts could weaken the firms' resistance to recessions and their capability to react in an effective manner. The second argument which can be set forth concerns the period after the crisis. R&D expenditures were a priority in governmental economic stimulus packages at the onset of the global crisis

in order to help the world economy to recover from the crisis (OECD 2009). The increase in R&D expenditures in 2008 can be related to these policy measures. Although the growth rate of R&D seems to slow down after 2008 until 2010, it regains its upward pace, which is promising an increase in GDP growth for the coming years. Even the expected increase can't be reached; the negative impacts of an unexpected crisis could be cushioned by these R&D expenditures.

Considering the 2008 economic crisis, the decline in innovation expenditures and activities can be associated to several factors: fall in demand for goods and services, limited access to credit and liquidity, uncertainties about future economic landscape and changes in innovation policies. OECD report (OECD 2012) highlights three aspects concerning the negative impacts of the global financial crisis on innovation. First of all, innovative companies and especially high-technology companies suffered from the drop in demand for their products, which are often more expensive and durable goods that consumers can easily postpone the purchase of. Consequently, decrease in sales resulted in decline in revenues, which firms could have had used to finance their future innovation activities. Accompanied by huge uncertainties about the future trends, firms were nothing but cautious with respect to their investment on innovation. Accordingly, Kanerva and Hollanders (2009), analyzing Innobarometer survey conducted in Europe, find that firms in medium-high innovation-intensive sectors are more likely to reduce their innovation spending. Secondly, high levels of sovereign debts lowered the public resources and thus limited the room for maneuver in policy interventions. Priority given to fiscal consolidation challenged the governments' abilities to allocate financial resources in areas supporting long-term growth, like education, research and innovation projects. Yet, studies investigating the impact of the crisis on innovation stress the importance of public support to help firms with their innovation efforts (Filippetti and Archibugi 2011; Paunov 2012). Thirdly, crisis in the global financial system reduced liquidity and credits especially for investments in risky innovation projects. The market speculation about potential sovereign default risks restrict moreover the opportunities for innovation firms to access to external financing. Analyzing the innovation performance of 1223 firms across eight Latin American economies, Paunov (2012) confirms that one in four firms stopped innovation projects during the crisis because of the financial constraint and negative demand shock. As a result of these three dynamics, firms were less willing to invest in innovation activities and thus the innovation expenditures appear reduced at the aggregate level.

Difference in countries innovation performance during the crisis reveals the importance of national institutional settings. Put it differently, the structural characteristics of national innovation structures can explain why some countries host, more than others, firms with persistent innovation activities (Cefis and Orsenigo 2001). Filippetti and Archibugi (2011), on the basis of the National Systems of Innovation (NSI) literature, explore the role played by the country-specific characteristics in explaining the firms' innovation performance during the 2008 crisis. The National Systems of Innovation (NSI) concept is developed by Lundvall and colleagues (Lundvall 1992; Lundvall et al. 2002) and adopted as policy rhetoric by many international organizations like OECD, Worldbank, EU. The NSI

describes economic, social and institutional structures which should support firms in their innovation activities. The fundamental idea behind the NSI is based on the fact that innovation is a collective knowledge generating process involving actors from different backgrounds like enterprises, research institutes and universities. So according to this concept, the innovation performance of a country is mostly determined by the relationships among these actors. The institutions, as the rules of the game (North 1990), become important at this point. The institutions regulating the economic life at various levels such as the financial system, the education system, the industrial relationships, the industrial specialization as well as the employer-employee relationships make up of different dimensions of NSI. According to Filippetti and Archibugi (2011), among these NSI dimensions, the education system, the public and private R&D system and the financial system affect considerably the firms' innovation performance during economic recessions. The empirical study conducted by the same authors confirms their arguments. The most affected countries by the crisis in Europe are those exhibiting a weak national system of innovation, namely the new members of EU. The presence of qualified human resources shaped by the country's education system as well as a robust financial system, in terms of the dimension of private credit, play important roles protecting the country from the negative impacts of a downturn in innovation (Filippetti and Archibugi 2011).

3.2 At the Firm-Level

While the changes at the aggregate level are dominated by a strong negative trend, individual firms' behavior may vary. In order to reveal the heterogeneity in firms' reaction to the crisis in terms of their innovation efforts, one should examine the surveys conducted at firm-level. This type of surveys is not easy to conduct across different countries. One of the rare studies at firm level is the Innobarometer survey under European Commission. The Innobarometer 2009 survey conducted across 29 European countries provides information about the innovation efforts of 5238 firms. More precisely, the Innobarometer 2009 survey allows us to track down the changes in innovation investment in the period before the crisis (2006–2008), right after the crisis (in 2008) and also estimations made by the managers concerning the 2009 expenditures (Fig. 2).

According to data retrieved from the Innobarometer 2009 survey report, while 35 % of firms increased their innovation investment during the period 2006–2008, only 9 % of firms reported that they have increased their spending in innovation during the crisis. As for the estimations for 2009, only 12 % anticipates an increase in their innovation budget for 2009. Furthermore, percentage of firms decreasing their innovation expenditures increases from 9 % to 22 % during the crisis. Moreover, more firms (28 %) reported to decrease their innovation spending in 2009. The drop in the percentage of firms increasing innovation expenditures as well as the increase in the percentage of firms decreasing their innovation investment reflect

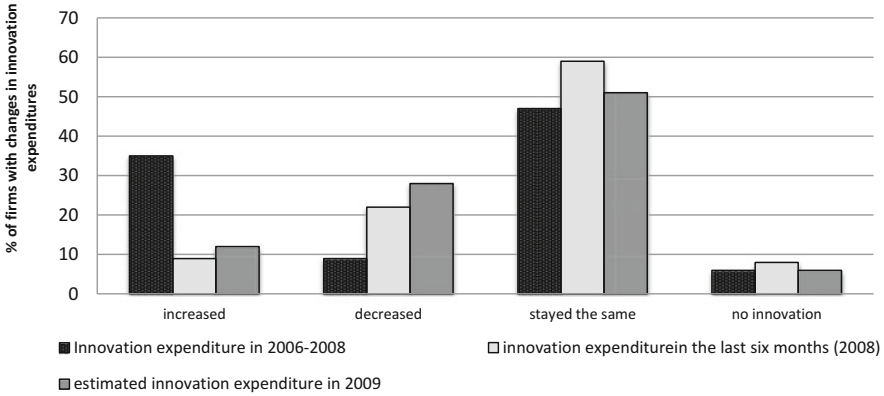

Fig. 2 Change in firms' innovation expenditures in three periods: before the crisis (2006–2008), during the crisis (2008), estimation for after the crisis (2009). Source: Innobarometer 2009

the negative impact of the crisis on innovation behavior of firms across EU countries. All the same, the most prevalent behavior among the innovative firms is to maintain the same level of innovation spending before (2006–2008) and during the crisis (2008). All in all, Innobarometer 2009 survey conducted by EU show that while firms generally reduce their expenditure in innovation and all other related activities, others maintain or even increase their effort in innovative activities.

The fact that more than half of the firms maintained the level of innovation expenditures during the crisis confirms the importance of technological accumulation and supports the argument of the persistency of innovation over time (Geroski et al. 1997; Cefis and Orsenigo 2001). Still, evidence shows also that the major innovators are more likely to exhibit a cyclical behavior, and thus are inclined to decrease their innovation expenditures during recessions (Filippetti and Archibugi 2011). In fact, firm-specific characteristics such as size, age, experience with innovative activities, access to public and private finance, links with foreign markets as well as their experiences during past recessions determine mostly firms' innovation expenditures during periods of recession (Kanerva and Hollanders 2009; Paunov 2012; Archibugi et al. 2013a, b; Amore 2015).

Considering the firm size, while some scholars (Kanerva and Hollanders 2009; Paunov 2012) find no significant relation between firm size and its innovation effort, findings of other studies are rather heterogeneous. When analyzing the role played by national innovation systems during crisis across European countries, Filippetti and Archibugi (2011) find that large firms with high innovation intensity are more likely to decrease their investment in innovation in response to the crisis. A study based on Innobarometer data displays similar findings (Archibugi et al. 2013b). According to these findings, during the crisis and the period following that, newly established small companies are more likely to increase their investment in innovation, whereas large incumbent firms decrease their innovation expenditures. Their research shows that the size and established R&D structure do not help, but

being small and flexible, collaborating with other business and exploring new market opportunities do help firms to increase investment in innovation. Interestingly, another study made by the same scholars (Archibugi et al. 2013a) using UK innovation data leads to completely different results. Based on UK data, Archibugi et al. (2013a) find that size helps firms to keep on innovating during the crisis. Large established firms with high expenditures in R&D and innovation are more prone to develop cumulative and path-dependent behaviors than other firms. However the authors state that, regarding the increase in innovation, the role played by the size loses its importance during the crisis compared to the period before the crisis. As pointed out by Archibugi et al. (2013b), firms exhibiting explorative attitude succeed to detect fresh opportunities in new markets and, in a more risk-loving manner, try to apply more radical solutions. These behaviors are more likely to be adopted by small firms that have not so much to lose in case they fail.

The firm age appears as an important factor affecting firms' innovation efforts during crisis. Several studies at firm-level show that young firms are more vulnerable against a crisis and that they are more likely to decrease or even stop their innovation activities when hit by a crisis (Paunov 2012; Archibugi et al. 2013a). Moreover, Amore (2015) indicates that firms surviving past recessions are less likely to decrease innovation spending during new downturn. Thus, old firms with some experience of past recessions are more able than young firms to resist the negative impacts of new crisis. However, there is also counter-evidence showing that age may hamper the development of creative solutions to the problems. Archibugi et al. (2013b)'s findings support this reasoning. They state that old established firms are dependent on their routines which may discourage the entrepreneurial behaviors. Analyzing the Innobarometer data, the authors (ibid) indicate that history of high levels of innovation and R&D activities coming along with experience doesn't provide an explanation for the increase in innovative behavior. As recessions bring high uncertainties about market and technological changes, incumbent firms tend to behave more in a risk-averse manner. Thus this study supports the creative destruction hypothesis during recessions rather than the creative accumulation hypothesis. Nonetheless, the same study still highlights the importance of age during expansionary periods. Before the crisis or generally in times of moderate economic expansion period, large and old firms are more likely to increase investment in innovation.

The persistency in innovation activities is also closely related to the intensity of R&D and innovation activities in firms (Geroski et al. 1997; Cefis and Orsenigo 2001). Archibugi et al. (2013b) state that during expansionary periods, firms increasing investment in innovation are characterized by high expenditure levels in innovation-related activities as well as in in-house R&D and bought-in R&D activities. Thus, period before economic downturn is characterized by creative accumulation in Schumpeterian terms. However, following the crisis large and established firms leave their places to smaller firms able to exploit new market opportunities, which would indicate creative destruction, again in Schumpeterian terms. Another study by the same authors (Archibugi et al. 2013a) reaches to completely different results. According to the latter, established firms with a long history of R&D and innovation activities are less likely to be affected by the crisis

since they are better equipped for a crisis. Especially by having a R&D department, firms are more committed to the innovation activities and more likely to continue their investment in innovation during crisis. Accordingly, firms having applied to intellectual property rights before crisis are more likely to increase their innovation expenditures. In the same vein, Cefis (2003) confirms that firms having six or more patents are more likely to persistently innovate.

Firms' innovation performance during crisis is related, as discussed above, to their R&D and innovation experiences, but also more importantly to their R&D and innovation experiences during past recessions. In a recent study by Amore (2015), firms' innovation efforts are analyzed across three downturns of the US economy. More precisely, the author investigates whether firms learn from their innovation experience during past recessions and how they react to new recessions. It is stated that there are two types of learning processes leading firms with experience of innovation in past recessions to invest in innovation activities during new recessions. The first one is the rational organizational learning related to the development of recession-specific competencies, such as reallocating resources, dealing with financial constraints etc. As a result of this rational learning process, firms are well equipped for a new recession and able to invest in high-quality and potentially high pay-off R&D projects. The second learning process is rather based on false perceptions of firms about their successful performance during the previous recessions. It is called the naïve organizational learning mechanism and lead firms to believe that they can successfully innovate again in new downturns. Firms experiencing naïve organizational learning tend to increase their innovation spending in new recessions because they survived the last one. However, as this type of organizational learning doesn't involve any development of recession-related competencies, firms risk investing in low-quality projects with low performance. The findings in Amore (2015) show that firms with increased-innovation efforts during past recessions are more likely to invest in innovation in new recessions and furthermore more likely to generate higher-quality patents in the aftermath of such new downturn. Thus, the increase in innovation must follow rather the rational organizational learning, indicating that surviving a recession is surely not happening by chance. Firms learn their lessons during recessions and those which don't disappear from the market surface after each recession even stronger than before.

4 Innovation Policies and Their Results in the Aftermath of the Crisis

4.1 Recovery Measures to Promote Innovation

The global crisis did not affect all countries and firms at the same level and the recovery processes were not the same either for all. About the impact of the crisis on innovation performance, three different scenarios for countries, industries and firms are sketched by the OECD Science, Technology and Industry Outlook 2012. The

worst case scenario involves strong negative impacts and limited or no recovery. Examples for this scenario include Greece and Spain as countries, medium-technology industries like automobile and venture capital markets. These examples refer to cases showing weaknesses and problems even before the crisis. The second scenario refers to a more neutral case where the negative impact on innovation is only temporary and the recovery follows it subsequently. Examples include many European countries and USA as well as big R&D firms. Since these examples show rather strong fundamentals prior to the crisis, they are relatively easy to recover from it as well. Finally the third, and the best case, scenario refers to the case where the crisis has no substantial impact and innovation activities continue to grow regardless of the global economic downswing. Examples include China, Japan and Korea as countries and IT firms. The examples are characterized by, on the one hand, resilient, and on the other hand, dynamic structures. The resilience and dynamism in innovation performance is rather related to high levels of public funding in R&D.

Recovery scenarios described by OECD (2012) call for serious structural reforms for the most affected countries. On the one hand, it is important to reduce the long-term skilled unemployment. For this type of unemployment might lead to a drain of human capital which is in fact indisputably needed to overcome the crisis, this trend can cause severe damages to the long-term economic performance of countries and industries. As noted by Filippetti and Archibugi (2011), qualified human resources play an important role in reducing the effects of the recessions. So the emigration of skilled workers, which is triggered by the crisis, should be counter-acted by public policies (Izsak et al. 2013). Otherwise, the country's innovation structure will be considerably weakened, which will negatively affect the long-term growth. On the other hand, national policies should support, more than ever, R&D and innovation activities when the private sector is no longer able to make investments in such areas due to the lack of access to liquidity and credit (Izsak et al. 2013).

The main objective behind the increase in public funding of R&D is to avoid long-term risks and damages to innovation systems caused by the crisis. This is especially important for those countries with a weak innovation structure, because they are the most affected ones by the crisis (Filippetti and Archibugi 2011). The crisis deepened the technological gap between them and the developed countries. Consequently they face the risk that the temporary effects of the crisis transform into structural ones, which will hamper substantially the long-term growth. In order to counter-act these risks, increasing the public expenditures on R&D is proposed as one of the recovery measures. This proposition is also supported by Paunov (2012) who finds that firms with access to public funding are less likely to abandon their innovation projects. Public funding becomes even more important when the crisis affects the liquidity availability and credit market conditions, which is the case in the latest crisis. However, evidence shows that governments' reaction to the crisis is rather cyclical. So following the decrease in the available economic resources, governments shrink their budget for innovation activities as well. Indeed, Kanerva and Hollanders (2009) analysis points out that for some firms, especially those operating in countries considered as catching-up (Bulgaria, Hungary, Latvia,

Lithuania, Malta, Poland, Romania, Slovakia), the decrease in innovation expenditures follows a cyclical pattern. In the same vein, a study made by Makkonen (2013) on European countries shows that the catching-up countries, which were steadily increasing their budget on science and technology activities prior to the crisis, are the most affected by the crisis. While the cyclical reaction to the crisis can be considered necessary to some extent, deep reductions in governmental support in R&D and innovation activities may have drastic consequences in the long run. Given that the crisis' impact on those countries where firms' innovation activities were supported by public funding was relatively mild (Filippetti and Archibugi 2011; Makkonen 2013), continuous public support for firms' innovation efforts appears important. However, given the fact that development of competences and knowledge necessary to promote the country's innovation of performance takes time, there will definitely be a time lag until the positive effects of these policies appear. Accordingly, in the meanwhile, it is substantial to maintain the skills, competences, knowledge and human resources within the borders and to prevent the emigration of the human capital.

4.2 Innovation Performance Beyond the Crisis

As pointed out in OECD Report (2009) concerning the policy responses to the economic crisis, the governments acted subsequently to the first signs of the crisis. Thus they started to launch economic stimulus packages in order to help raise the aggregate supply and secure the real sector for innovation and growth. Along with these packages, increases in R&D expenditures were also considered in most of the countries affected by the crisis. Figures 3 and 4 display the change in patent applications from 2009 to 2013 resulting from the change in R&D expenditures respectively in developed and emerging countries. The lists of countries are provided from Dow Jones Country Classification System 2011. All the data is provided from Worldbank Database. In case of no data for the given period, the country is dropped from the list. Eventually, out of 26 developed countries 22 were maintained, and out of 21 emerging countries, 15 were kept.

At the first sight, there seems to be no relationship between the change in R&D efforts and the change in patent applications in neither of the country groups. In other words, patent applications representing the innovation performance seem to move independently from the R&D efforts for the given period, which represents an unexpected result considering all the innovation literature arguing otherwise. Of course one should not jump to conclusions by just looking at the dyadic relationship presented in the Figs. 3 and 4, because the relationship between R&D spending and innovation needs a more complex analysis including various variables about education level, financial system, technology infrastructures etc. over a certain period of time. The scatter plots in Figs. 3 and 4 give merely an idea about the differences in countries' response to the crisis in terms of R&D efforts and the differences in countries' innovation performance after the crisis.

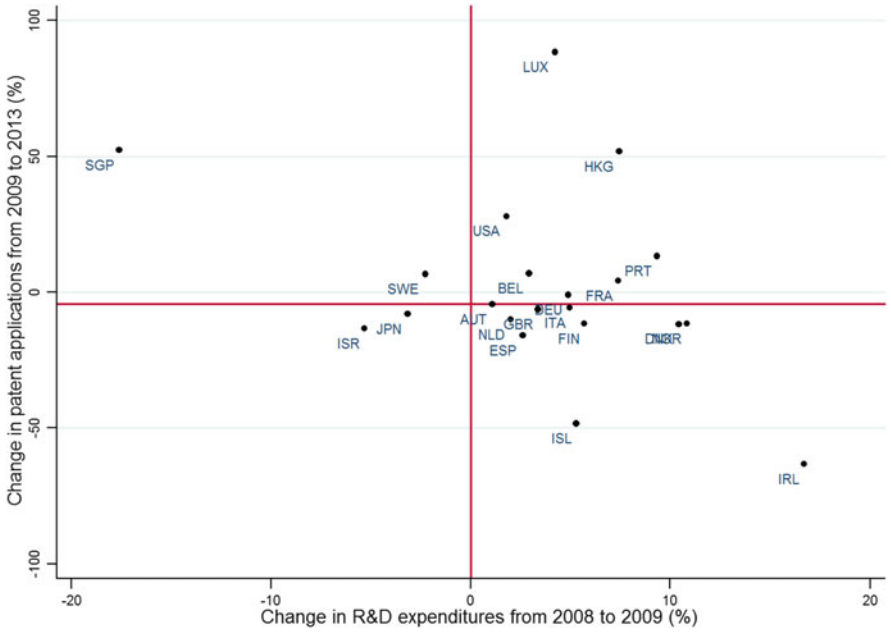

Fig. 3 Change in patent applications from 2009 to 2013 and change in R&D expenditures from 2008 to 2009 in developed countries. Source: author's calculation based on Worldbank data

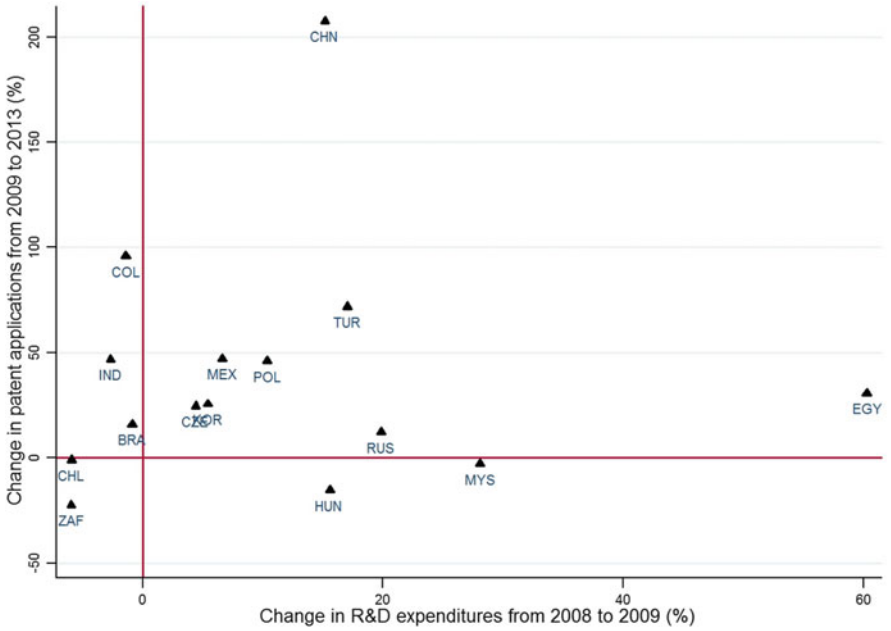

Fig. 4 Change in patent applications from 2009 to 2013 and change in R&D expenditures from 2007 to 2009 in emerging countries. Source: author's calculation based on Worldbank data

What is interesting about the Figs. 3 and 4 is that when the changes in R&D efforts and innovation performance are considered separately for developed and emerging countries, there are some divergences coming out. About the changes in R&D expenditures, while 1/3 of the emerging countries (5 in 15) chose to reduce their expenditures, approximately 20 % of the developed countries (4 in 22) moved in the same direction. All in all, most of the countries in both groups increased their R&D efforts despite of the crisis. In other words, the immediate response to the crisis was not only addressed to the short-run issues but also to the long-term growth.

When analyzing closely the changes in patent applications from 2009 to 2013, the expected result concerning the innovation activities doesn't seem to be realized. More than half of the developed countries (12 in 22) experienced a decrease in patent applications over the four years after the crisis. The worst performing countries are Iceland and Ireland where in spite of the increase in R&D expenditures, the patent applications dropped significantly. As for the emerging countries, in most of them (11 in 15) the number of patent applications has increased over the same period. All in all, emerging countries have had a higher innovation performance between 2009 and 2013 than developed countries. Among the emerging countries, China stands out with more than 200 % increase in patents, whereas the others exhibit relative increases. Moreover, in emerging countries the change in patent applications appears relatively more responsive to the change R&D expenditures than in developed countries. While developed countries have already a certain level of established R&D and innovation structure, changes in patents applications as a response to changes in R&D efforts are relatively limited. However, for emerging countries the change in patent applications appears higher for a similar variation in R&D efforts. Of course, the responsiveness of patent activities to the R&D expenditures needs to be analyzed in further studies using time series across different countries.

5 Conclusion

When hit by a crisis, the economic landscape is characterized on the one hand by considerable fall in demand and trade and on the other hand by uncertainties about the future. Thus companies' sales and revenues plummet, which tie their hands for their future investments. Furthermore, because of the uncertainties about the new demand conditions and new market opportunities, determining the direction of new investments implies challenges. The objective of this study was to highlight that periods of recessions present both threats and opportunities for innovation activities. Although during recessions, firms' innovation efforts are threatened by the financial constraints, depressions are also fertile times for the emergence of new ideas, which can lead to the emergence of new markets and new technological opportunities. Accordingly, this study starts with discussing the persistence of innovation activities during recessions. All in all, innovations can surface in

expansionary as well as recessionary times. As pointed out by Schumpeter (1911, 1942), innovations are generated through two different dynamics: creative accumulation and creative destruction. The first mechanism refers to the fact that innovators today have always been innovators in the past. The second mechanism is related to bold entrepreneurs with new ideas which bring radical innovations to economic life and create new markets and new technological opportunities. As pointed out in the second section of this study, these dynamics operate differently according to country-specific and firm-specific characteristics. Archibugi et al. (2013b) find evidence about the importance of creative accumulation through R&D activities carried out in old and large firms during expansionary periods and the relevance of creative destruction with the presence of small entrepreneurial firms during recessionary times. Other studies (Paunov 2012; Archibugi et al. 2013a; Amore 2015) on the other hand, state that large established firms with long experiences of innovative activities continue to innovate during recessions, which would confirm the creative accumulation hypothesis. Finally, when recovery packages are examined in terms of innovation activities, public support for R&D and innovation activities turns out to be critical in economic crisis (Izsak et al. 2013). If the negative impacts of the crisis become structural problems for firms and countries, the economic growth can be severely hampered in the long run. Thus the main concern in most of the stimulus packages is to keep firms producing and innovating, which is the solution to the long term economic prosperity. When analyzing the situation beyond the crisis, countries' innovation performances exhibit different patterns. Based on the number of patent applications in emerging and developed countries, emerging countries appear better performing than developed ones. While more than half of the developed countries experience reductions in the number of patents from 2009 to 2013, most of the developed countries' patent applications have increased during the same period.

So, the real question in this study was to what extent the innovators (firms and/or countries) are affected by the crisis. If innovation capacity is the ability to propose new solutions to problems, then innovative firms regardless of their sector should be more capable to adapt themselves to the new economic setups than other firms. The same reasoning can also be applied at country-level. Countries which have been investing in education, research and development and innovation activities must have developed a certain level of human capital which would provide them out-of-the-box solutions, or in other words, innovative solutions to the crisis. In the same vein, Hausman and Johnston (2014) suggest that even though the financial decisions are to blame as far as the 2008 economic crisis is concerned, other factors like the relative lack of innovation among the firms contributed as well to the continuing downswing of the economy. So, innovative behaviors of companies can be considered the driving force of the economic development whereas the lack of innovation dooms the economies to failures and continuing downturns. Furthermore, as the experience shows, some firms still continue to innovate during recessionary times, which would help economies to recover faster than otherwise. Policy makers should therefore analyze in detail the factors which lead to the persistency of firms in innovative activities during economic recessions and put in place the necessary

measures that would replicate these factors. Accordingly further studies should be carried out to examine whether continuous innovation activities can be a solution for firms and countries to stay immune to economic crisis and whether it was the lack of innovative behavior that worsened the situation after the financial crisis.

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