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Moderating Effect of Terrorism in the Income Inequality-Military Expenditure Nexus: Evidence from Transition Economies

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ABSTRACT

Prior studies point to a significant correlation between income inequality and military expenditures. This study started by questioning whether the impact of terrorism on this relationship may have been neglected. The main purpose of the study is to demonstrate whether the terrorism variable has a significant effect on the direction and strength of the nexus between military expenditures and income inequality. As such, the effect of terrorism has been analyzed using as a moderator variable. Forecasts for 26 transition economies and the 2002–2020 period have been performed using three different models. The first two models are baseline models, and in the third model, the moderator effect is included with all the control variables. Three different income groups (top 10, middle 40, and bottom 50) have been selected as indicators of income inequality. We also confirm the results by utilizing the income inequality indicator (gini_disp) of the Standardized World Income Inequality Database (SWIID). All three model findings signalize a positive finding similar to previous literature in the relationship between income inequality and military expenditure. However, the stand-alone and moderator effects of terrorism vary between income groups. For the top 10 and middle 40 income groups, terrorism correlates inversely with income inequality according to Model 1 findings, and in the same direction for the bottom 50. For the top 10 and middle 40 income groups, the moderator effect of terrorism in the inequality-military expenditure relationship is positive (Model 2). The direction of the effect is positive when control variables are added (Model 3). For the bottom 50 income group, the moderator effect of terrorism is in the same direction (positive) for Models 2 and 3. Our results illustrate that decision-makers in terrorism-affected transition economies may be puzzled regarding the opportunity cost of social welfare expenditure for low incomes against military expenditure.

KEYWORDS

Income inequality; military expenditure; system generalized method of moments (GMM); terrorism; transition economies

JEL CLASSIFICATION

C23; D31; H56; P20

Introduction

Military expenditures have substantial effects on growth, employment, inflation, and the environment (Alptekin and Levine 2012; Benoit 1978; Dunne and Smith 1990; Elgin et al. 2022; Emmanouilidis and Karpētis 2021). Military expenditures, along with general administration, justice, and general security (police) leap out as a typical public good when

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contrasted with services like education and health, which can be supplied by the market. While it may not directly contribute to consumption and production capacity, it is acknowledged as a requirement for sustainable economic activity by ensuring the economic and political stability of society. Especially in developing countries such as transitional economies, military expenditures are perceived as a relatively inelastic form of expenditure (Günlük-Şenesen 2001, 29). However, even in developed countries, military expenditure is typically funded from the general budget which also involves training, health, and transfer expenditures. Governments meet the resources allocated to military expenditures by slashing other expenses, which has a curative impact on income distribution. In other lyrics, military expenditure, which is a burden on the government budget, has a trade-off interaction with the other expenses. This bond may grow stronger in countries (transition economies) dealing with a complex and costly economic burden such as terrorism.

Terrorism manifests itself as an action motivated by issues such as poverty, unemployment, income inequality, and failed political policies. Terrorism employs a variety of arguments, such as recruiting sympathizers/militants, to impose itself directly on people. Poverty, inequality, antidemocratic practices, political instability, oppressive regimes, or exploitation policies pursued by some countries are at the core of these arguments. Apart from the military expenditures of the countries, all these arguments that provoke terrorism have an extensive role among the expenditure items of a country. The issue becomes more convoluted when the social (rehabilitation of terror-affected areas and victims of terrorism) and economic (military) expenditures generated by terrorism are added to it. In addition, the budget allocated by countries for armament has been intensifying on a daily basis. Such that, although the COVID-19 pandemic has reduced the output of countries and the quality of democracy, military expenditures have continued to rise globally in 2020. In 2021, military expenditure globally reached \$2 trillion for the first time. However, the opportunity cost of military expenditures is the difficulty in achieving Sustainable Development Goals including equity issues (SIPRI 2021, 2022). According to the report on 16 sustainable development goals, including peace, justice, and institutional quality, prepared by Institute for Economics & Peace in 2019, the biggest obstacle to development is the inability to establish peace and strong institutions (IEP 2019).

There is also growing interest in military expenditure in economics from an income inequality perspective, as denoted in the literature review (Abell 1994; Ali 2007; Biscione and Caruso 2021; Kollias and Paleologou 2011). But no study deals with the linkage between income inequality and military expenditures from the terrorism perspective to our knowledge. Only in Töngür and Elveren (2015), income inequality is associated with high levels of military expenditure and terrorist attacks affect both significantly. However, this paper is interested in whether terrorism has an strengthening, weakening or changing effect on the link between military expenditures and income inequality.

We started with the idea that the association between military expenditures and income inequality might be more complex compared to the existing studies covers. Therefore, we included a third variable, terrorism, in the analysis that could qualify the relationship rather than identifying a bivariate relation between income inequality and military expenditures. Since, the effect of the predictor on the observable relationship between the variables varies depending on the value of the moderator, terrorism has been used as a moderator variable in the paper (Dearing and Hamilton 2006). It is important to conduct analysis from this perspective, especially for transition economies where terrorism is a major problem. Hence,

this study contributes to the existing literature by taking a novel perspective in assessing the moderating role terrorism in the military expenditures-income inequality nexus.

We aim to gauge the moderating impact of terrorism in the relationship between the three income groups. As a result, the question is whether or not military expenditure may boost income inequality, especially in countries suffering from terrorism such as transition economies. To achieve this objective, the dynamic panel data method has been employed in the analysis. The rationale behind this choice is as follows: i) Missing data, a common issue in panel datasets, often arises when observations in the dataset are incomplete. This limitation restricts the advantage of working with panel data models, which typically allow for the use of extensive datasets. In cases where missing observations occur in panel data, an unbalanced panel dataset is encountered. The dynamic panel data method is well-suited for obtaining efficient estimation results even in the presence of missing observations. ii) The dynamic panel estimation technique captures the dynamic nature of the process under investigation, such as the relationship between military expenditures and income inequality. Moreover, it addresses issues such as endogeneity and nonlinearity among the variables used in the analysis by enabling preliminary preparations and diagnostic tests before conducting the analysis. iii) Since moderator variables are incorporated into the model as additional independent variables (on the right-hand side of the equation), dynamic methods offer significant advantages in resolving the aforementioned issues efficiently.

Transition Economies

Income inequality has increased dramatically in former socialist countries because of the transition period that began with the fall of the Soviet Union. The average Gini index observed in transition economies recently is about 3% higher than in the rest of Europe. High levels of income inequality in this area are associated with market reforms, privatization, liberalization, technological change, and globalization (Brzezinski and Salach 2022). The inadequacy of the institutional structure prevented the successful implementation of radical changes. There have been also substantial declines in output levels during the transition (Roland 2001). Moreover, redistributive public policies did not have a substantial effect on income distribution over time (Cevik and Correa-Caro 2020). Undoubtedly, the labor market was most adversely affected at the beginning of the transition period. The transfer of labor from the public to the private sector has caused many inequality problems and unemployment. Although it is expected for the beginning of the transition period, the persistence is surprising. Unemployment threatens growth, income justice, and social peace (Rutkowski and Scarpetta 2005). Today, although 10 of the transition economies are members of the EU, the structural problems in the economy remain partially. There has been also a lack of trust in societies in transition. According to Rothstein and Uslaner (2005), as income inequality caused by the transition process increases, individuals demand more redistribution. They even want the wealth of those who are enriched by the transition to be confiscated. Radical demands have been the cause of social violence in transition economies over the years.

In the past years, the transition area has also suffered from organized crime, ethnic and separatist conflicts, armed conflicts, and transnational terrorism. Furthermore, terrorist attacks have occurred more recently in Kyrgyzstan, Kazakhstan, Georgia, and Azerbaijan.

Currently, there are many unresolved conflicts in the post-Soviet region and terrorism is still a serious issue. The armed border conflict between Armenia and Azerbaijan and the ongoing conflicts in Ukraine were noteworthy in 2020. In addition, the tension caused by Russia because of the cyber-attacks, in Ukraine and the assassination of the opposition leader was marked in 2020. In 2021, the Russian- Ukrainian War and the border conflict between Armenia-Azerbaijan; Kyrgyzstan – Tajikistan were major developments on the side of transition economies (SIPRI 2021, 2022). Terrorist incidents and armed conflicts in transition economies for years have affected the level of military expenditures undoubtedly.

In the Appendix, scatter diagrams are describing the strength of the relationship between the variables of the transition economies.

Figure A1 represents the scatter diagram for the moderator variable. As can be conferred, the dots are clustered in a specific area (between 15–30 bars on the vertical axis). If we draw a (representative) line parallel to the horizontal axis (from bar 20 on the vertical axis), it is better deduced that the relationship is strong. The other eight figures (Figures A2-A9) signalize diagrams of the nexus between income inequality, terrorism, and military expenditure variables. It is comprehended clearly that the income distribution indicator p0p50 (bottom 50), which depicts the lowest fifty percent income segment, is closely related to terrorism and military expenditures. The assertion that low incomes in transition economies may be the most delicate to military expenditures and the effects of terrorism coincides with the research question.

Literature Review

Current Literature on Military Expenditure and Inequality

Military expenditures have the outcomes that redistributing income and distorting income distribution in several channels. According to the *inequality-narrowing hypothesis*, military expenditures can stimulate aggregate demand through the employment channel and thus improve income distribution. However, this depends on the fact that military production is largely domestic and labor-intensive (Biscione and Caruso 2021). If the military industry is capital-intensive, the employment channel may not work. Furthermore, it is often argued that the contribution of military expenditures to employment is much more limited than social expenditures such as health, education, and environment (Pollin and Garrett-Peltier 2011). Capital-intensive sectors need more qualified employers. Therefore, the unqualified labor force in the low-income groups is not employed in the military industry. In other words, military expenditures are likely to distort the income distribution (Kentor, Jorgenson, and Kick 2012). In addition, the higher wages in the military sector compared to the civilian sector, but the low employment of women and minorities in these sectors distort the income distribution (Abell 1994). Ali (2007) reveals the negative effect of wage differences in the military and the civilian sector on income distribution for the 1987–1997 period with panel regressions.

In the seminal paper by Russett (1969), the budgetary trade-off of military expenditures is discussed. The increase in military expenditures has an opportunity cost. Opportunity cost burden arises as *guns vs. butter dilemma* in the choice of public expenditures. According to the theory, the cost of more military expenditure is a reduction in social welfare expenditure (Dabelko and McCormick 1977). Since military expenditure crowds out

social expenditure, it is not surprising that it worsens income distribution (Biscione and Caruso 2021). Scheetz (1992) stated that the increase in military expenditures is higher than social expenditures in less developed countries, and the crowding-out effect occurs in Latin America. Apostolakis (1992) showed that military expenditures crowd out social welfare expenditures in Latin American countries with time series data. Ozsoy (2002) also examined the negative trade-off between military, health, and education expenditure in Turkey for the period 1925–1998. Fan, Liu, and Coyte (2017) confirmed empirically the crowding-out effect of military expenditure on government healthcare expenditure for 197 countries covering the years 1990–2013 using pooled cross-sectional data. Zhang et al. (2016) revealed that military expenditures increase social welfare expenditures in developed countries while reducing in emerging countries via the panel cointegration method. On the other hand, Kollias and Paleologou (2011); Ali (2011); Lin, Ali, and Lu (2015) found a positive budgetary trade-off between the military and social expenditures. These studies are in line with the Keynesian view, which argues that an increase in military expenditure will stimulate aggregate demand and employment. As a result, social expenditures increase, and income distribution improves (Lin, Ali, and Lu 2015).

The increase in military expenditure is usually financed by taxation and deficit financing (Russett 1969). Inflationary pressures caused by deficit financing mostly negatively affect the purchasing power of low-income groups. Inflation redistributes income to the disadvantage of lower income groups and thus increases income inequality (Chatterjee and Corbae 1992; Kane and Morisset 1993; Meh, Ríos-Rull, and Terajima 2010; Ribba 2003). Another channel through which military expenditure worsens income distribution is corruption. Since military projects are often capital-intensive, bidding processes are also more prone to corruption. Firm owners may be inclined to bribe bureaucrats or politicians to win the tender (Gupta, De Mello, and Sharan 2001). According to Mauro (1998), corruption occurs more easily in public expenditures whose exact value cannot be easily observed such as military equipment because of limited competition, secrecy, and manipulations. Gupta, De Mello, and Sharan (2001); Hudson and Jones (2008); Ali and Solarin (2019) confirmed empirically that corruption is associated with higher levels of military expenditure. There is extensive literature centering that corruption increases income inequality (Dinçer and Günalp 2011; Gupta, Davoodi, and Alonso-Terme 2002; Gyimah-Brempong 2002; Keneck-Massil, Clery, and Owoundi 2021; Policardo, Carrera, and Risso 2019).

Current Literature on Terrorism and Inequality

Poverty and inequality induce the perception of injustice, polarization, and political tension. Russett (1964) examined a positive relationship between land inequality and social conflicts. Muller and Seligson (1987) argued that income inequality is a key variable in existing political violence rather than land inequality. It is a well-known fact that income inequality causes social discontent and ultimately rebellion (Sen 1973). Dissatisfaction caused by income inequality triggers social conflicts and domestic terrorism (Alesina and Perotti 1996; Boswell and Dixon 1990). The direct link between income inequality and terrorism is based on the theory of *relative deprivation*. The concept of relative deprivation put forward by Gurr (1968) is the gap between the individual's expectations and the capabilities of others. Yitzhaki (1982) mentions that the marginal utility of income does

not depend only on income, but also on the income of others. In other words, the value that a person attributes to his/her welfare is related to income distribution. Individuals' dissatisfaction with their income may cause them to act collectively. The collective activities may be peaceful protests or collective violence. According to Sandler and Enders (2004), terrorists act with rational choices. At higher levels of income inequality, individuals find it more rational to change the income distribution in their favor through terrorist acts. As the income distribution deteriorates, people lose confidence in that they can earn a fair income by living legally (Krieger and Meierrieks 2019). The individuals experiencing relative deprivation are dissatisfied with unequal distribution and become a part of collective violence. This process is called *the frustration-aggression mechanism* (Davies 1962). Krieger and Meierrieks (2019) concluded that terrorist activities increase as the level of income inequality increases covering the years 1985–2012 in a sample of 114 countries. Burgoon (2006) argued that terrorism is closely related to economic conditions. The study empirically confirmed that social welfare policies that redistribute income reduce terrorism with the cross-section data. Lessmann (2015) analyzed the nexus between inter-regional inequality and internal conflicts using logit estimations and fixed effects panel regressions for 56 countries. There is a positive relationship between inter-regional inequality and internal conflicts. Ezcurra and Palacios (2016) also pointed out horizontal inequality. Using the Theil index in a panel of 48 countries covering the period of 1990–2010, the study concluded that inter-regional inequality increases domestic terrorism. On the other hand, Derin-Güre and Elveren (2014), which deals with separatist terrorism in Turkey, found that income inequality does not have a significant effect on terrorism.

Socioeconomic and demographic factors make countries more vulnerable to terrorism. Caruso and Schneider (2011) analyzed the socio-economic roots of terrorism empirically for 12 Western European countries. Income inequality leads to gender inequality, and limited access to education and health which further fuels terrorism (Easterly 2007; Ehrlich and Liu 2002; Mayer 2010). In *the economic theory of crime* analyzed by Becker (1968), education increases the compliance of individuals with the rules of law and reduces the tendency of them to take part in criminal activities. According to Østby, Nordås, and Rød (2009), limited access to education and income inequality between the regions related to more terrorism. Brockhoff, Krieger, and Meierrieks (2015) pointed out that the impact of education on terrorism is country-specific using cross-sectional data for 133 countries. The study indicates that primary education encourages domestic terrorism in countries with inadequate socio-economic, political, and demographic conditions in a negative binomial regression. Using data on domestic and transnational terrorism for 110 countries covering the years 1971–2007 Freytag et al. (2011) found that poor socio-economic conditions are associated with increased terrorist activities. The effect of income inequality on terrorism also depends on the income level of the countries. Bandyopadhyay and Ijaz (2021) noted that the positive effect of income inequality on terrorism is weak in developed countries while it is strong in middle-income countries with the semi-parametric approach. However, Krieger and Meierrieks (2010) noted that institutional factors are more decisive than economic factors in terrorism. In Krieger and Meierrieks (2019), it is argued the fact that income inequality leads to more terrorism is largely due to worsening institutional quality (e.g., corruption; weak rule of law). Higher-income groups are more motivated to influence politicians and bureaucrats via lobbying because lower-income groups demand more redistribution as income inequality increases (Alesina and Rodrik 1994; Glaeser,

Scheinkman, and Shleifer 2003; Meltzer and Richard 1981; Perotti 1993). Increased competition between income groups due to income inequality results in more institutional and judicial weakness (Jong-Sung and Khagram 2005). Easterly (2007) found a negative link between income inequality and institutional quality. Loayza, Rigolini, and Llorente (2012) provided empirical evidence that income inequality causes corruption in a large panel. Corruption makes countries more vulnerable to acts of terrorism as those who are ready to take bribes and terrorist organizations can act together (OECD 2017). Meierrieks and Auer (2022) revealed the increasing effect of corruption on terrorist activities in 174 countries. Shahzad et al. (2020), confirmed that high levels of terrorism are associated with problems in the rule of law and government effectiveness using quantile regressions and the generalized method of moments for South Asia. Similarly, Choi (2010); Gassebner and Luechinger (2011); Dragu and Polborn (2013) explored the positive link between deterioration in the rule of law and terrorism.

When the previous studies associated with our study discussed above are examined, we see that the literature mainly consists of studies addressing the income inequality- military expenditures relationship and the income inequality-terrorism nexus. However, while income inequality is a factor that feeds terrorism in many ways, military expenditures often vary depending on terrorist attacks. Therefore, this study argues that terrorism may have a modifying effect on this relationship. In the few studies to date, terrorism has only been included in the analysis as a control variable (Töngür and Elveren 2015). Nevertheless, there is no study examining the impact of terrorism directly on the relation to our knowledge.

Methodologically, revealing the linkage between variables are often more complicated than basic bivariate relations between a predictor and a criterion. Accordingly, a third variable is needed to define the linkage. The moderator variable is one of them. The models established by including a moderator variable test if the prediction of a dependent variable, Y, from an independent variable, X, differs depending on levels of a third variable, Z. The moderator variable could change the direction and strength of the effect of the independent variable on the dependent variable. The presence of the moderator variable could either strengthen or weaken the empirical link (Fairchild and MacKinnon 2009).

This paper is based on the idea that the impact of military expenditures on income inequality could be moderated by terrorism. In light of this knowledge, the study's basic proposal is highlighted in Figure 1.

The hypotheses tested following this assertion are as follows:

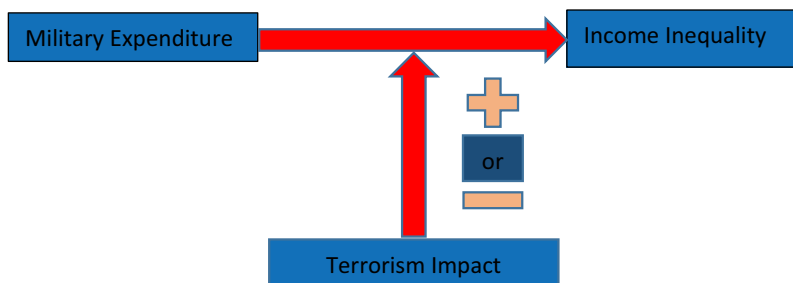


Figure 1. The basic premise of the analysis. Own edited.

H1: Military expenditure and income inequality are significantly related.

H2: Terrorism acts as a moderator in this relationship.

H3: The presence of terrorism bolsters the nexus, especially in terms of low incomes.

Data

The analysis utilizes data at an annual level, drawn from a panel dataset comprising 26 transition economies, covering the period of 2002 to 2020. Table 1 represents the basic knowledge of the variables. The data sources for this study include the World Development Indicators (World Bank), the World Inequality Database, the Standardized World Income Inequality Database (Solt 2020: Version 9.4), the Stockholm International Peace Research Institute, the University of Gothenburg Quality of Government Institute, and the Global Terrorism Index. The timeframe for the sample selection is based on the fact that many of these countries gained independence from the Soviet Union, specifically post-1991 or 1992. The Global Terrorism Index calculates the impact of terrorism for first 2002 and every year thereafter. For this, our data set is comprised of 2002–2020.

The top 10, middle 40, and bottom 50 income share indicators of the World Inequality Database (WID) are our principal inequality measures. We also utilize the Gini income inequality measurement (*gini_disp*) of the Standardized World Income Inequality Database (SWIID) for a robustness check. We use a measurement methodology and multiply the terrorism index with military expenditure to gauge the moderating effect of terrorism. Table 2 presents the summary statistics of the variables used in this study, which are reported in levels.

Table 1. Variable definition.

Variable	Definition	Source
top 10	Percentile ratio (p90/p100)	World Inequality Database (WID)
middle 40	Percentile ratio (p50/p90)	World Inequality Database (WID)
bottom 50	Percentile ratio (p0/p50)	World Inequality Database (WID)
<i>gini_disp</i>	Gini income inequality measurement (after taxes and transfers equalized with the household disposable income (robustness check))	Standardized World Income Inequality Database (SWIID)
<i>me</i>	Military expenditure (% of gross domestic product)	Stockholm International Peace Research Institute (SIPRI)
<i>ter</i>	Measurement of terrorism impact between 0 (no impact) and 10 (very high impact)	Global Terrorism Index (GTI)
<i>me*ter</i>	Moderator term which is the product of multiplying (<i>me</i>) and (<i>ter</i>).	Calculated by the author(s)
<i>inf</i>	Consumer price index (2010=100)	World Development Indicators (WB)
<i>qog</i>	Scored by the mean value of the series (corruption, law and order bureaucracy quality) of International Country Risk Guide's Political Risk Service between 0 (weak governance) and 1 (strong governance).	University of Gothenburg Quality of Government Institute (QoG)
<i>pro</i>	Gross domestic product per person employed	World Development Indicators (WB)
<i>ope</i>	The total amount of goods and services exports and imports is expressed as a percentage of gross domestic product.	World Development Indicators (WB)
<i>une</i>	Total unemployment as a share of total labor force (ILO estimation)	World Development Indicators (WB)

Own edited.

Table 2. Summary statistics.

Variable	Observation	Mean	Standard Deviation	Minimum	Maximum
top 10*	475	0.2464	0.0525	0.1212	0.4786
middle 40*	475	0.5801	0.0481	0.4204	0.7419
bottom 50*	475	0.0479	0.0209	-0.0129	0.1332
gini_disp	494	32.6854	5.1919	22.6	44.6
me	494	3.4939	6.9343	1	9.2
ter	494	4.2171	1.1382	0.01	7.199
me*ter	494	5.0442	0.9579	0.6931	6.0980
inf	494	135.1596	236.9457	36.8646	536.5426
qog	494	0.5245	0.1155	0.3287	0.7549
pro	494	105.2212	119.947	6916.9763	82186.7122
ope	494	32.7687	47.3290	26.9891	190.8590
une	494	5.1006	0.9447	2.01	37.16

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*Please note that some countries have missing values.

Table 3. List of countries in the dataset.

Albania	Croatia	Latvia	Romania	Ukraine
Armenia	Czechia	Lithuania	Russia	Uzbekistan
Azerbaijan	Estonia	Macedonia	Serbia	
Belarus	Georgia	Moldova	Slovakia	
Bosnia and Herzegovina	Hungary	Montenegro	Slovenia	
Bulgaria	Kazakhstan	Poland	Tajikistan	

Own edited.

We construct three separate models for the four inequality indicators to observe the actual strength of the impact. We put the moderator variable and control variables into the models one by one. Prior to estimating the system generalized method of moments (GMM) model, all variables are normalized with a mean of 0 and a standard deviation of 1. This normalization process enables us to interpret the marginal effects between military expenditure and income inequality. Additionally, to accommodate variables such as productivity, openness, and inflation, which exceed the value of 100, we apply a log transformation to the variables. The countries are listed in Table 3.

Tables 4–7 present the estimated correlation matrices. A correlation matrix measures the linear relationship between two variables, with values ranging between -1 and $+1$. A value of $+1$ indicates a perfectly positive correlation, while a value of -1 indicates a perfect negative correlation. Analyzing the correlation matrix before estimating the system GMM model can provide valuable insights in terms of multicollinearity. In our case, we observe

Table 4. Correlation matrix of top 10 income share.

Variable	top 10	me	ter	me*ter	inf	qog	pro	ope	une
top 10	1.0000								
me	0.2973	1.0000							
ter	-0.3526	0.3496	1.0000						
me*ter	0.8034	-0.3703	0.6037	1.0000					
inf	-0.0671	0.1490	-0.0902	0.0482	1.0000				
qog	-0.1981	-0.4118	-0.2892	-0.9023	-0.0452	1.0000			
pro	-0.0298	-0.4205	-0.3723	-0.5827	-0.1382	0.7382	1.0000		
ope	0.0173	0.1005	0.0573	0.4285	-0.0593	-0.1939	-0.2503	1.0000	
une	-0.1841	0.0183	0.2849	-0.0568	0.0205	-0.0582	0.0483	-0.0632	1.0000

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Table 5. Correlation matrix of middle 40 income share.

Variable	middle 40	me	ter	me*ter	inf	qog	pro	ope	une
middle 40	1.0000								
me	0.2148	1.0000							
ter	0.2047	0.2312	1.0000						
me*ter	0.5294	0.0365	-0.4951	1.0000					
inf	-0.0577	0.1721	-0.0664	0.1045	1.0000				
qog	-0.1240	-0.3930	-0.2232	-0.3841	-0.1047	1.0000			
pro	0.0435	-0.3241	-0.2254	-0.4932	-0.1876	0.5894	1.0000		
ope	-0.0144	0.1465	0.1013	0.0302	-0.0337	-0.2368	-0.2893	1.0000	
une	0.1380	0.0156	0.0790	-0.1045	0.0432	-0.0661	0.0575	-0.0624	1.0000

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Table 6. Correlation matrix of bottom 50 income share.

Variable	bottom 50	me	ter	me*ter	inf	qog	pro	ope	une
bottom 50	1.0000								
me	-0.0863	1.0000							
ter	0.0150	0.0446	1.0000						
me*ter	-0.3723	0.0842	0.7302	1.0000					
inf	0.0409	0.5930	-0.1079	0.2831	1.0000				
qog	-0.0166	-0.4528	-0.3829	0.0451	-0.0572	1.0000			
pro	-0.0406	-0.7829	-0.1537	0.5072	-0.1042	0.6902	1.0000		
ope	-0.0595	0.2386	0.1618	-0.4731	-0.0832	-0.4921	-0.8021	1.0000	
une	-0.0584	0.0466	0.3026	0.6902	0.4031	-0.0902	0.0302	-0.0732	1.0000

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Table 7. Correlation matrix of gini_disp.

Variable	gini_disp	me	ter	me*ter	inf	qog	pro	ope	une
gini_disp	1.0000								
me	0.1322	1.0000							
ter	0.1983	0.2138	1.0000						
me*ter	-0.0562	-0.5741	0.3092	1.0000					
inf	-0.0141	0.1633	-0.0594	-0.6201	1.0000				
qog	-0.1320	-0.3627	-0.2348	0.0306	-0.1156	1.0000			
pro	-0.3389	-0.3010	-0.2232	-0.0291	-0.1962	0.6005	1.0000		
ope	0.1898	0.1616	0.0797	0.4820	-0.0469	-0.1894	-0.2475	1.0000	
une	-0.2941	0.0039	0.0845	-0.5873	0.0526	-0.0882	0.0338	-0.0840	1.0000

Edited by the author(s) using Stata.

a weakly negative correlation between all variables used and income inequality. However, some of the control variables and moderator variables are strongly and positively correlated, as anticipated. If the correlation coefficient is equal to or less than 0.40, multicollinearity may be a severe issue. To avoid issues related to heteroscedasticity and multicollinearity, we implement three models by reducing several specification biases. Additionally, we report the variance inflation factor (VIF) to ensure the robustness of the system GMM estimations and exclude any estimations that are prone to multicollinearity.

Empirical Methodology

Lagged values of dependent or independent variables are not included among the explanatory variables in static panel data models. Estimates are realized by adding changes arising from differences between units (horizontal sections), differences between units over time, or

the simultaneous occurrence of both situations. It is also presumed that there is a strict exogeneity between the explanatory variables and the dependent variable, and endogenous relations are ignored in static models (Aslaksen 2010, 424–425; Baltagi 2013, 638–639). The models have been estimated through dynamic panel data analysis using the two-stage system GMM since it allows for stronger estimations by considering the possible endogeneity issue and other standard errors such as heteroscedasticity and autocorrelation. As can be overviewed in Equation (1), the lagged values of the dependent variables are interlarded into the model as explanatory variables, thus eliminating the possible endogeneity trouble between the variables in dynamic panel data models.

$$\text{Lnine}_{i,t} = \alpha \text{Lnine}_{i,t-1} + \beta \text{LnX}_{i,t} + \varepsilon_{i,t} \quad (1)$$

It can be argued that there is no complete endogeneity between some explanatory variables and the income inequality variable in the models regarding this study. However, due to the lagged error term *AccessisdeniedAccessisdenied*, the endogeneity issue may persist. The two-stage system generalized moments method developed by Arellano and Bover (1995) and Blundell and Bond (1998) is based on the logic of combining the difference equation and level equations. If the time dimension (T) is smaller than the unit size (N) in the data set, the two-stage system GMM technique is considered to be one of the most appropriate methods (Roodman 2009). The unit size is larger than the time dimension in all models of this study. This method condenses on the endogeneity problems by disposing of economy-specific time-invariant errors *AccessisdeniedAccessisdenied* as noted in Equation (2).

$$\varepsilon_{i,t} = u_i + v_{i,t} \quad (2)$$

The system GMM methodology is premised on the first-difference GMM estimator, which assumes and requires that the error term not be associated. As illustrated in Equation (6), the system GMM estimator also presupposes that the independent variables are feebly exogenous and contain both levels and differences as instruments.

$$E = [(X_{i,t-s} - X_{i,t-s-1})(\varepsilon_{i,t} - \varepsilon_{i,t-1})] = 0 \text{ for } s = 1 \quad (3)$$

The system GMM estimator is reliable when the variables' differences and the time-invariant error *AccessisdeniedAccessisdenied* is not correlated. The estimates have been effectuated by computing the `xtabond2` command uploaded in Stata by Roodman (2009).

Meanwhile, for efficient forecasting with GMM estimators, two presuppositions should elicit at once. These assumptions are that even if there is a first-order autocorrelation between the error terms in the model, there is no second-order correlation, and the over-identifying constraints, in other words, the instrumental variables are valid. The validity of these assumptions is tested with AR(1), AR(2), and Sargan tests. AR(1) and AR(2) tests developed by Arellano-Bond (1991) validate whether the error terms have a correlation. The basic hypothesis of the AR(1) test is that there is no first-order autocorrelation, while the basic hypothesis of the AR(2) test is that there is no second-order autocorrelation. In terms of super-efficiency, it is anticipated that the AR(1) test statistic is significant and negative, and the AR(2) test statistic is insignificant, that is, the basic hypothesis is accepted at a significance level of at least 5%. The estimation that the number of instruments is greater indicates an endogeneity issue. The Sargan test is run to test whether the instrumental variables are valid, and the main hypothesis of the test is that the overidentifying restraints

are in force. Additionally, the validity of the instrumental variables has also been tested with the Hansen J-test. Several preliminary diagnostic tests have been conducted before the main analysis to prevent biased results. First, cross-sectional dependence has been tested to detect whether there is any dependence between units by using Breusch and Pagan (1980) Lagrange Multiplier (LM), Pesaran, Ullah, and Yamagata (2008) bias-adjusted Lagrange Multiplier, and Pesaran (2015) Cross-sectional Dependence (CD) tests. Second, Pesaran (2007) Cross-sectionally Augmented Dickey Fuller (CADF) test have been deployed for stationarity analysis. Both the LM, LM adjusted and CD procedures reflect cross-sectional dependence in the residuals as can be seen from Table A2. We adopted Pesaran (2007) second-generation panel unit root test to assess the variables' stationarity. CADF test findings have been presented in Table A3. The table indicates that certain variables, namely $Lnter$, $Lnme^*ter$, and $Lnqog$, are non-stationary at their natural form. These indicators have been converted into stationary ones by applying differencing to eliminate this issue. The resulting stationary series have subsequently been utilized in the ensuing models (4, 5, 6).

Moreover, it can be pretended that biased regression coefficients, high R square values, and inconsistent outcomes may be obtained under the multicollinearity problem. It can be claimed that the relationship between the relevant indicators is ignored, especially in the models in which the control variables are involved. Herewith, the Variance Inflation Factor (VIF) test has been enforced on the variables to specify whether there is a multicollinearity issue in the models. Variables having VIF values of 10 or more indicate that there is a multicollinearity nuisance and values of 1 prove that there is no multicollinearity. Additional investigation must also be conducted above values of 4. As can be seen in Table A1, the centralized VIF values of the variables are below 10 and between 0 and 4. To ensure that the findings are robust, we also eliminate multicollinearity estimates and report model VIF statistics in the tables. Model VIF tests are also below threshold 10 and between 0 and 4. Therefore, it can be betrayed that the findings obtained from the model predictions are trustworthy (Nasir et al. 2020). In light of this knowledge, the following three models have been generated for four inequality variables.

$$Lnine_{i,t} = \alpha Lnine_{i,t-1} + \beta_0 Lnme_{i,t} + \beta_1 Lnter_{i,t} + \varepsilon_{i,t} \quad (4)$$

$$Lnine_{i,t} = \alpha Lnine_{i,t-1} + \beta_0 Lnme_{i,t} + \beta_1 Lnter_{i,t} + \beta_2 Lnme * ter_{i,t} + \varepsilon_{i,t} \quad (5)$$

$$Lnine_{i,t} = \alpha Lnine_{i,t-1} + \beta_0 Lnme_{i,t} + \beta_1 Lnter_{i,t} + \beta_2 Lnme * ter_{i,t} + \beta_3 Lninf_{i,t} + \beta_4 Lnqog_{i,t} + \beta_5 Lnpro_{i,t} + \beta_6 Lnope_{i,t} + \beta_7 Lnune_{i,t} + \varepsilon_{i,t} \quad (6)$$

As noted above four inequality variables $Lnine_{i,t}$ have been utilized for estimations to obtain more consistent results. These are: ($Lntop\ 10\ share_{i,t}$), ($Lnmiddle\ 40\ share_{i,t}$), ($Lnbottom\ 50\ share_{i,t}$) and ($Ln\ gini_{disp_{i,t}}$) for robustness check. Income inequality damages all income groups at various levels around the world through possible factors such as expenditure, growth, welfare, and development. The repercussions of these effects are still open for debate and are the subject of numerous multidisciplinary studies. Logarithmic variables assist to interpret the coefficients therefore natural logarithmic form is used for all variables. The variables have been estimated in three different methods for assessing the moderator effect of terrorism. Model (1) has been set up with the help of Equation (6). The

impact of military expenditure on income inequality is explored by adding the just terrorism variable into the equation. Model (2) is predicted employing Equation (6) and attached a moderator factor to Equation (6) that encompasses the multiplication of military expenditure and terrorism variables. Model (3) has been generated by adding control variables to Model (2) as illustrated in Equation (6).

Results and Discussion

The findings relating to the estimates realized according to Models 1, 2, and 3 for each income inequality indicator are reported in Tables 8–10. Before proceeding with the debate on the estimated coefficients and parameters, the system GMM model is robust for all models, as it fulfills the requirements of the Arellano-Bond test for the absence of second-order autocorrelation. In the meantime, the Hansen J test indicates that the selection of the

Table 8. System gmm results of top 10 income share.

Dependent Variable Lntop10share (p90/p100)			
Variable	Model 1	Model 2	Model 3
$Lnine_{t-1}$	0.9427*** (0.0024)	0.9501*** (0.0067)	0.9306*** (0.0068)
Lnme	0.0006*** (0.0003)	0.0028** (0.0017)	0.0062*** (0.0035)
Lnter	-0.0001 (0.0002)	0.0047*** (0.0008)	0.0083** (0.0056)
Lnme*ter		-0.0050*** (0.0014)	0.0104* (0.0005)
Lninf			-0.0067*** (0.0032)
Lnqog			-0.0020** (0.0057)
Lnpro			-0.0007** (0.0007)
Lnop			-0.0022** (0.0008)
Lnune			0.0683* (0.0018)
constant	-0.0036*** (0.0013)	-0.0411*** (0.0087)	0.0052*** (0.0012)
Cross-sectional dependence tests			
Pesaran (prob. value)	0.000	0.000	0.000
Friedman (prob. value)	0.000	0.000	0.000
F-statistics	395.04***	403.36***	427.93***
Obs	449	448	421
No of inst.	10	10	9
Sargan test (prob. value)	294.44(0.290)	298.37(0.282)	314.53(0.296)
Hansen J-test (prob. value)	0.883	0.872	0.851
AR(1) (prob. value)	0.013	0.014	0.015
AR(2) (prob. value)	0.806	0.771	0.692
VIF	2.12	2.23	2.28

Edited by the author(s) using Stata.

Calculated by the author(s) using the `xtabond2` command in Stata. Two-step System GMM results are presented. Variables are in the log-transformed form. Standard errors are in parenthesis. The presented standard errors are Windmeijer standard errors, which have been adjusted to account for potential cross-sectional dependence among units through robust clustering. Before parenthesis, coefficients are listed. ***, **, * signify the probability values at %1, %5, and %10 levels respectively. *Accessisdenied* is lagged variable as a GMM instrument. The instrument variables count has been attenuated to verify the Hansen-J overidentification test. VIF (Variance Inflation Factor) test is utilized for detecting the degree of multicollinearity.

Table 9. System gmm results of middle 40 income share.

Dependent Variable Lnmiddle40share (p50/p90)			
Variable	Model 1	Model 2	Model 3
$Lnine_{t-1}$	0.97033*** (0.0028)	0.9510*** (0.0044)	0.9622*** (0.0059)
Lnme	0.0001 (0.0001)	0.0021*** (0.0003)	0.0043*** (0.0012)
Lnter	-0.0000*** (0.0000)	0.0018*** (0.0003)	0.0043* (0.0010)
Lnme*ter		-0.0032*** (0.0005)	0.0049** (0.0013)
Lninf			-0.003*** (0.0012)
Lnqog			-0.0052** (0.0019)
Lnpro			-0.0003** (0.0001)
Lnop			0.0006** (0.0002)
Lnune			0.0304*** (0.0026)
constant	-0.0137*** (0.0025)	-0.0125*** (0.0037)	0.0028*** (0.0005)
Cross-sectional dependence tests			
Pesaran (prob. value)	0.000	0.000	0.000
Friedman (prob. value)	0.000	0.000	0.000
F-statistics	528.04***	578.40***	590.04***
Obs	449	448	421
No of inst.	10	10	9
Sargan test (prob. value)	255.09(0.285)	263.00(0.330)	265.15(0.323)
Hansen J-test (prob. value)	0.773	0.756	0.737
AR(1) (prob. value)	0.026	0.028	0.068
AR(2) (prob. value)	0.584	0.526	0.505
VIF	2.35	2.36	2.46

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Calculated by the author(s) using the `xtabond2` command in Stata. Two-step System GMM results are presented.

Variables are in the log-transformed form. Standard errors are in parenthesis. The presented standard errors are Windmeijer standard errors, which have been adjusted to account for potential cross-sectional dependence among units through robust clustering. Before parenthesis, coefficients are listed. ***, **, * signify the probability values at %1, %5, and %10 levels respectively. *Accessisdenied* is lagged variable as a GMM instrument. The instrument variables count has been attenuated to verify the Hansen-J overidentification test. VIF (Variance Inflation Factor) test is utilized for detecting the degree of multicollinearity.

instruments is valid and robust. Concerning the lack of cross-sectional independence, the estimated model provides evidence against the null hypothesis of cross-sectional independence at a significance level of 1% for both the Pesaran and Friedman tests. This implies that the estimated coefficients may be subject to downward biases. To address this concern, the estimated error terms are defined utilizing the Windmeijer standard errors, and their robustness is ensured by employing the `xtabond2` routine introduced by Roodman (2009) for clustering purposes.

According to the system GMM estimation findings of the top 10 income share, military expenditures are positively associated with income inequality in all three models. Similarly, prior period income inequality is also positively correlated, and this finding provides evidence for the existence of a lag effect on income inequality. The findings are similar to the results of studies such as Russett (1969), Apostolakis (1992), Scheetz (1992), and Biscione and Caruso (2021), and provide evidence that military expenditures distort income

Table 10. System gmm results of bottom 50 income share.

Dependent Variable Lnbottom50share (p0/p50)			
Variable	Model 1	Model 2	Model 3
$Lnine_{t-1}$	0.9239*** (0.0007)	0.9580*** (0.0019)	0.9402*** (0.0026)
Lnme	0.0023*** (0.0004)	0.0068*** (0.0008)	0.0069*** (0.0009)
Lnter	0.0003*** (0.0002)	0.0063*** (0.0021)	0.0053*** (0.0014)
Lnme*ter		0.0083*** (0.0013)	0.0119*** (0.0015)
Lninf			-0.0025*** (0.0008)
Lnqog			-0.0395*** (0.0093)
Lnpro			-0.0037*** (0.0026)
Lnope			-0.0048*** (0.0008)
Lnune			0.0452*** (0.0034)
constant	-0.2053*** (0.0036)	-0.1295*** (0.0057)	0.0062*** (0.0005)
Cross-sectional dependence tests			
Pesaran (prob. value)	0.000	0.000	0.000
Friedman (prob. value)	0.000	0.000	0.000
F-statistics	657.84***	658.09***	683.45***
Obs	431	430	404
No of inst.	10	10	10
Sargan test (prob. value)	382.84(0.271)	427.06(0.282)	474.63(0.295)
Hansen J-test (prob. value)	0.732	0.729	0.812
AR(1) (prob. value)	0.083	0.081	0.073
AR(2) (prob. value)	0.126	0.131	0.169
VIF	2.68	2.51	2.57

Edited by the author(s) using Stata.

Calculated by the author(s) using the `xtabond2` command in Stata. Two-step System GMM results are presented. Variables are in the log-transformed form. Standard errors are in parenthesis. The presented standard errors are Windmeijer standard errors, which have been adjusted to account for potential cross-sectional dependence among units through robust clustering. Before parenthesis, coefficients are listed. ***, **, * signify the probability values at %1, %5, and %10 levels respectively. *AccessisdeniedAccessisdenied* is lagged variable as a GMM instrument. The instrument variables count has been attenuated to verify the Hansen-J overidentification test. VIF (Variance Inflation Factor) test is utilized for detecting the degree of multicollinearity.

distribution. While the terrorism variable is negatively associated with income inequality according to Model 1, it is positively associated with income inequality according to Model 2 and Model 3 results, where the moderator effect of terrorism is considered. In other words, terrorism exacerbates the income position of the 10% income group. Model 2 indicates the negative finding of the moderator variable. This provides evidence that the moderator effect of terrorism (-0.0050) deadens the strength of the relationship between military expenditures and income inequality when control variables are not incorporated. Conversely, when control variables are included as in Model 3, it confirms that terrorism has a moderator effect (0.0104) on military expenditures-income inequality at the 1% significance level. As inflation (Lninf), quality of government (Lnqog), productivity (Lnpro), and openness (Lnope) increase (diminish), the share of the top 10 income group decreases (heighten), while as unemployment (Lnune) augments (declines) the share of them increases (decreases).

The share of the middle 40 income group points to similar system GMM estimation findings. Military expenditures are positively related to income inequality in all three models. In a similar manner, the preceding period's income inequality is positively associated, providing evidence for the existence of a lag impact on income inequality. Whereas the terrorism variable is adversely linked with income inequality in Model 1, it has a positive correlation with income inequality in Model 2 and Model 3 results taking into account the moderator impact of terrorism. Terrorism also worsens the income status of the middle 40% income group. Model 2 denotes the negative result of the moderator variable. When control variables are excluded, this conveys proof that the moderator effect of terrorism (-0.0032) dampens the strength of the link between military expenditure and income inequality. Once control variables are inserted, as in Model 3, terrorism has a moderator effect (0.0049) on the military expenditures-income inequality nexus at the 1% significance level. Whenever inflation (Lninf), quality of government (Lnqog), and productivity (Lnpro) increase (diminish), the share of the middle 40 income group decreases (heighten). As unemployment (Lnune) and openness (Lnope) augment (decline) the share of them increases (decreases).

For the top 10 and middle 40 income groups, Model 1 findings demonstrate that terrorism is negatively correlated with income inequality, and Model 2 findings signified that the moderator effect of terrorism is negatively related whereas terrorism is positively linked with income inequality. The estimation findings, which represent the bottom 50% of income, are slightly different. Income inequality and military expenditures in the previous period are similar to the previous findings. Terrorism is positively associated with income inequality in line with Model 1, Model 2, and Model 3 results. Although Model 3 highlights that when control factors are included, the moderator impact of terrorism is associated in the same direction for all three income categories, the findings of the moderator effect in Model 2 differ in terms of the bottom 50 income group. Model 2 emphasizes that the moderator variable is positively related to the income distribution of the lowest 50% income group and that as the existence of terrorism for this income group continues, income inequality would deepen. From this point on, it is more noteworthy that the degree of significance of the coefficients and control variables gains importance for this income group. Among all three income groups, the income group with the most significant coefficients is the lowest 50% income group. As noted in the literature review, increasing income inequality may lead to higher motivation among higher-income groups to exert influence on politicians and bureaucrats through lobbying, while lower-income groups express greater demand for redistribution (please see Alesina and Rodrik 1994; Glaeser, Scheinkman, and Shleifer 2003; Meltzer and Richard 1981; Perotti 1993). The fact that bribe recipients act in cooperation with groups that support terrorist activities can distort the income distribution of low-income groups, which need more income re-transfer, in favor of high-income groups (please see Easterly 2007; Jong-Sung and Khagram 2005; Loayza, Rigolini, and Llorente 2012; Meierrieks and Auer 2022). The link between income inequality and low institutional quality (Lnqog) and corruption asserts itself in accordance with the previous literature according to Model 3 results. Model 3 results, which contain the moderator effect of terrorism, also support the rationale and findings valid for the previous two income groups. Both terrorism, moderator effect, and control variables are significant at the 1% level for the lowest 50% income group. Emphasis should be placed on the effects of

terrorism for the lowest income groups and the opportunity cost effect (Russett 1969) of military expenditures among social welfare expenditures, which is important for this income group, as indicated in the literature review section. The burden of opportunity cost is called the guns versus butter dilemma in determining public expenditure priorities. A rise in military expenditures concludes in a decline in the allocation of funds for social welfare (Dabelko and McCormick 1977). It is undeniable that this would primarily affect the low incomes in an economy.

Findings and statements for all three income groups highlight some important points for policymakers and decision-makers in transition economies: i) Terrorism is directly tied to the economic conditions of individuals (income categories) in these countries. Since the initial era of transition to a market economy, transition economies have experienced a lopsided income distribution. A policy of boosting military expenditures to combat terrorism may risk making income distribution in these countries even more unequal. ii) The discontent caused by inequality and the proclivity for collective violence (please see Alesina and Perotti 1996; Boswell and Dixon 1990; Burgoon 2006; Krieger and Meierrieks 2019; Sen 1973) make the choice between social welfare and military expenditure problematic. In transition economies, as Davies (1962) contends, this annoyance might cause individuals to mistrust that they would receive a fair wage, leading them to violence in relative deprivation and activating a frustration-aggression mechanism. iii) Furthermore, the findings could be linked to a variety of socioeconomic, demographic, cultural, political, international, or interregional or domestic violence/terrorism aspects (please see Caruso and Schneider 2011; Easterly 2007; Ehrlich and Liu 2002; Ezcurra and Palacios 2016; Freytag et al. 2011; Lessmann 2015; Mayer 2010; Østby, Nordås, and Rød 2009). These studies indicate that income inequality, poverty, and social exclusion are associated with terrorism. In these countries, factors such as low economic prospects, unemployment, inadequate educational options, and constrained social mobility may drive people to radicalize, perpetrate violence, and join terrorist organizations. iv) When combined with the control variables, the fall in economic growth and decrease in investment in areas where terrorism is prevalent in transition economies may have a detrimental impact on productivity. Terrorist acts have the potential to discourage international investment and harm the local economy. This, in turn, can increase income inequality and has the potential to create more social tensions. v) Terrorist incidents may encourage more division among regional or ethnic groupings. Targeting or intensifying discrimination against specific groups in places prone to terrorist attacks could amplify societal discontent. Boosting military expenditure to address these issues may exacerbate the income gap. vi) Reducing the risk of terrorism in regions where income inequality decreases in these countries may bring some advantages. More equitable income distribution, enhanced opportunities for social mobility, and more inclusive economic development can all aid in the battle against terrorism.

Supporting the findings with certain theoretical and managerial implications specific to transition economies would aid in understanding the relationship more comprehensively. These implications include: i) Long-term strategic planning aimed at preventing terrorism should simultaneously mitigate the exclusionary effects of military expenditures on welfare-based development and social transfer policies, while also contributing to the reduction of income inequality. ii) The establishment of a transparent, accountable, and more democratic governance structure, tailored to the relatively weak institutional framework of transition economies, can positively contribute to resolving issues related to militarization

and its implications for economic distribution/(re)allocation. iii) Additional investments in the defense industry, by fostering job creation and encouraging technology transfer, can help alleviate both the adverse effects of terrorism and income inequality.

An alternative measurement of the income inequality indicator is utilized for robustness control of the nexus, as can be seen in Table 11. Although the findings are similar, the significant level of the variables is weaker. Terrorism, the moderator effect of terrorism, and previous period income inequality are positively related to income inequality. Inflation (inf) and openness (ope) variables demonstrate insignificant findings. Estimates using inequality indicators compiled from the Standardized World Income Inequality Database (SWIID) procure evidence of household disposable income after taxes and transfers. The findings, which cannot be restricted to any income group, prevail in terms of being able to convey what income generated in an economy signifies for households and decision-makers, and therefore provide evidence for further research.

Table 11. System gmm results of gini_disp (robustness check).

Dependent Variable: Lngini_disp (SWIID)			
Variable	Model 1	Model 2	Model 3
$Lnine_{t-1}$	0.7839*** (0.0131)	0.8933*** (0.0104)	0.9045** (0.0074)
Lnme	0.0017*** (0.0004)	0.0011* (0.0005)	0.0762** (0.0303)
Lnter	0.0002*** (0.0002)	0.0011** (0.0012)	0.0005* (0.0097)
Lnme*ter		0.0005** (0.0015)	0.0512** (0.0252)
Lninf			0.0079 (0.0134)
Lnqog			-0.0103*** (0.2849)
Lnpro			-0.0264** (0.0174)
Lnope			0.0156 (0.0077)
Lnune			0.0426** (0.0033)
constant	0.177*** (0.0364)	0.0082*** (0.0064)	0.0068*** (0.0009)
Cross-sectional independence tests			
Pesaran (prob. value)	0.000	0.000	0.000
Friedman (prob. value)	0.000	0.000	0.000
F-statistics	475.08***	481.21***	404.32***
Obs	467	466	438
No of inst.	10	10	9
Sargan test (prob. value)	304.22(0.311)	289.42(0.318)	296.19(0.313)
Hansen J-test (prob. value)	0.739	0.792	0.502
AR(1) (prob. value)	0.052	0.044	0.037
AR(2) (prob. value)	0.201	0.218	0.633
VIF	1.39	1.54	1.40

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Calculated by the author(s) using the xtabond2 command in Stata. Two-step System GMM results are presented. Variables are in the log-transformed form. Standard errors are in parenthesis. The presented standard errors are Windmeijer standard errors, which have been adjusted to account for potential cross-sectional dependence among units through robust clustering. Before parenthesis, coefficients are listed. ***, **, * signify the probability values at %1, %5, and %10 levels respectively. *AccessisdeniedAccessisdenied* is lagged variable as a GMM instrument. The instrument variables count has been attenuated to verify the Hansen-J overidentification test. VIF (Variance Inflation Factor) test is utilized for detecting the degree of multicollinearity.

Concluding Remarks and Possible Directions for Further Research

Empirical studies examining the relationship between income inequality and military expenditure in transition economies have been conducted to comprehend the impacts of social, political, and economic factors. Research investigations on the connections between terrorism and military expenditure have largely focused on grasping the dynamics of terrorism and protection costs. Although this study identifies a significant relationship between military expenditure and income inequality similar to previous studies, it presents the following novelties. i) Unlike the previous literature, the study investigates the moderator effect of terrorism in the income inequality-military expenditures relation for transition economies and the period 2002–2020. There has been little emphasis on the link between inequality and terrorism. While this emphasis examines the direct relationship, this study analyzes the moderating effects of terrorism by focusing on the inequality effects of military expenditures in transition economies where the terrorism matter is profound. ii) It has been concluded that the moderator effect of terrorism is also significant for three income groups and the degree of significance is more important for low-income groups. As an outcome, the most crucial evidence put forward in this paper is that an option between military and social welfare expenditures, particularly for low incomes, is extremely sensitive when it comes to terrorism. iii) Transition economies have faced certain internal problems in the transition from mainly socialist or centrally governed economies to market economies. Some of these include: corruption, which stifles economic growth, harms the investment climate, and fosters distrust in society; institutional deficiencies such as a lack of efficient businesses and institutions; high inflation caused by the elimination of price control and regulation; unemployment and employment issues; restructuring of social safety nets; and the trouble sustaining fiscal discipline and economic balances. Meanwhile, the social disturbances created by internal turmoil and terrorism are considered, and it is discernible that decision-makers must exercise greater caution to handle these challenges.

While there is a contention that social policies frequently, though not universally, mitigate inequalities, and that income disparities and horizontal inequalities can foster terrorism, it is important to note that there were a few challenges in formulating the study. i) Comprehending the correlation between policies related to income inequality and terrorism presents a challenging endeavor, as it requires understanding how the intricate realm of social policy influences the equally intricate phenomenon of terrorism. In simpler terms, social policies encompass measures such as social security, unemployment benefits, health-care, disability support, and other initiatives that actively promote social welfare. These policies render the concept of the “welfare state.” However, numerous developing or underdeveloped countries (such as transition economies) disregard such social policies while implementing diverse public expenditure programs, ranging from industry investments to military budgets, which indirectly provide a form of social security (Rodrik 1998). ii) The impact of terrorism on income inequality depends on how it interacts with the dynamic aspects of the public economy, which in turn influences extremist political movements. Terrorism is a complex phenomenon with varying interpretations. It involves politically motivated violence targeting civilian populations, but multiple definitions differ in their understanding of who qualifies as “civil people,” the meaning of political intent, and other specifics. Domestic terrorism differs from international terrorism, where the attacker and victims are from different countries. Moreover, the origins of terrorism are diverse and encompass nationalist struggles, ethnic conflicts, religious conflicts, apartheid struggles,

political administration conflicts, economic disputes, and anti-colonial uprisings. iii) When examining the impact of terrorism on income inequality, it is essential to consider the vast array of terrorism as a political phenomenon. Acknowledging the complexity of income inequality and terrorism, the evidence of this study suggests that diverse income distribution policies can significantly influence individuals' opportunities and ability to thrive, thereby reducing various forms of terrorism. Specifically, implementing a range of social welfare policies is expected to alleviate poverty, inequality, political and religious extremism, as well as overall economic insecurity. While the occurrence of terrorism may decline, these policies could simultaneously enhance the capability to organize and carry out acts of terrorism. Thus, it can be inferred that by improving income distribution policy, the overall balance of these factors will generally lead to a reduction in terrorism.

The following constraints also emerged throughout the data accumulation and estimation stages of the investigation. First, household income calculations do not adequately represent the income and wealth levels and shifts of the highest-income individuals. To solve this issue, World Inequality Database (WID) integrates financial statements and fiscal data with questionnaire responses. The top decile's income share is the focus of the majority of attention in terms of inequality. The Standardized World Income Inequality Database (SWIID) provides methodological superiority using the WID series and many other databases through a Bayesian approach. The measurement of a phenomenon with ideological, political, and socioeconomic varieties, such as terrorism, may affect the consistency of estimates due to the quantification of its impact. To eliminate this, we used different indicators of inequality, investigated dynamic effects by eliminating endogeneity issues, added several control variables, and accounted for multicollinearity. In addition, this variable has been calculated since 2002. The study's terrorism variable is an indicator that measures the effect. It should not be overlooked that the effect may not always manifest as planned. Hence, alternative measures can be subject to further research. Estimates can be reanalyzed and findings can be improved with threshold and/or causality regressions in which time and sample size are larger.

Disclosure Statement

No potential conflict of interest was reported by the author(s).

Notes on contributors

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Appendix

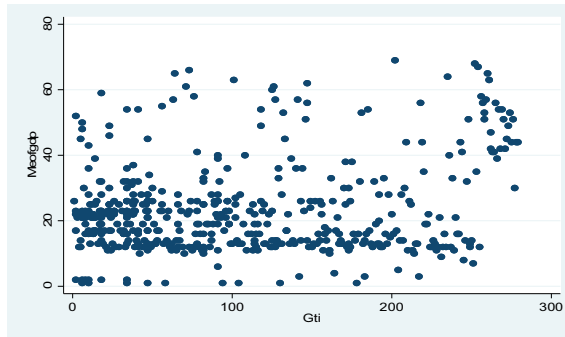


Figure A1. Scatter plot of military expenditure and terrorism. Edited by the author(s) using Stata.

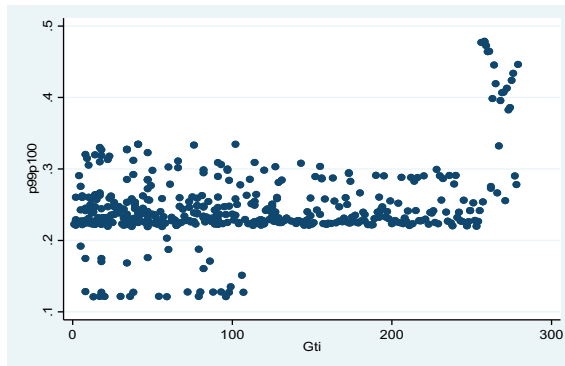


Figure A2. Scatter plot of top 10 share and terrorism. Edited by the author(s) using Stata.

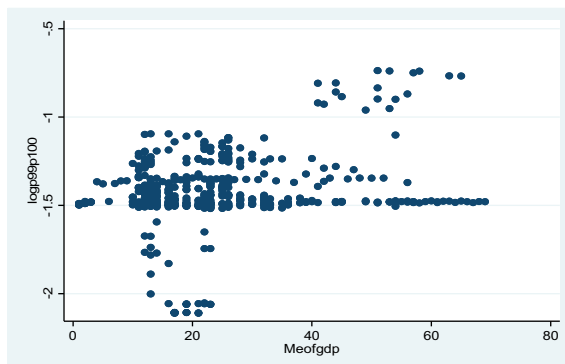


Figure A3. Scatter plot of top 10 share and military exp. Edited by the author(s) using Stata.

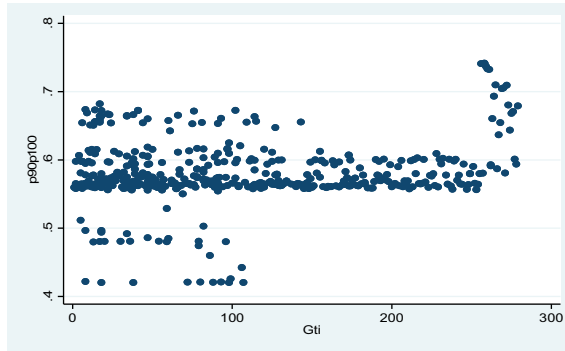


Figure A4. Scatter plot of middle 40 share and terrorism. Edited by the author(s) using Stata.

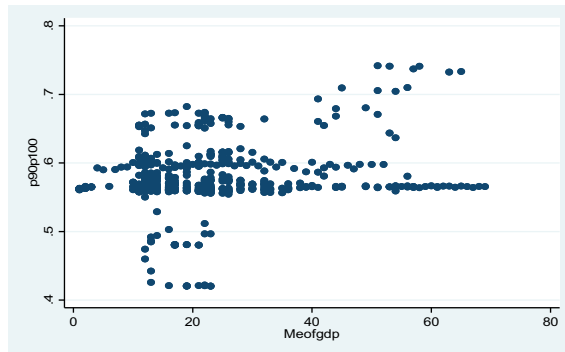


Figure A5. Scatter plot of middle 40 share and military exp. Edited by the author(s) using Stata.

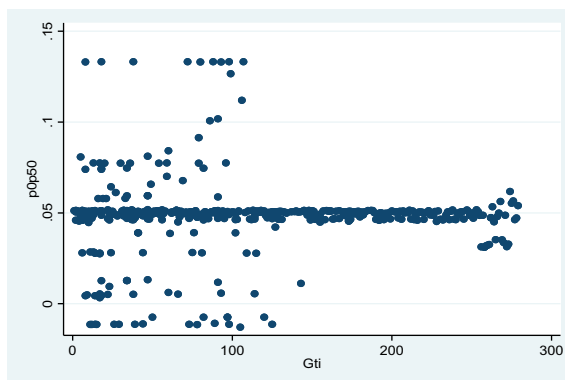


Figure A6. Scatter plot of bottom 50 share and terrorism. Edited by the author(s) using Stata.

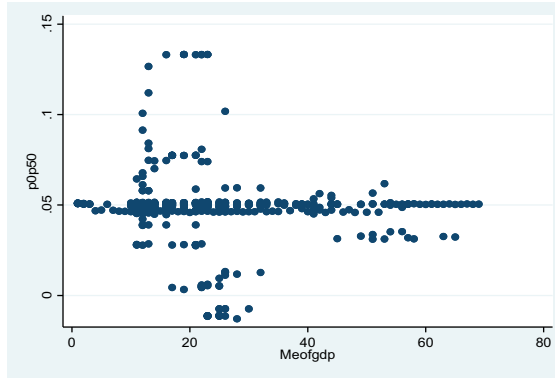


Figure A7. Scatter plot of bottom 50 share and military exp. Edited by the author(s) using Stata.

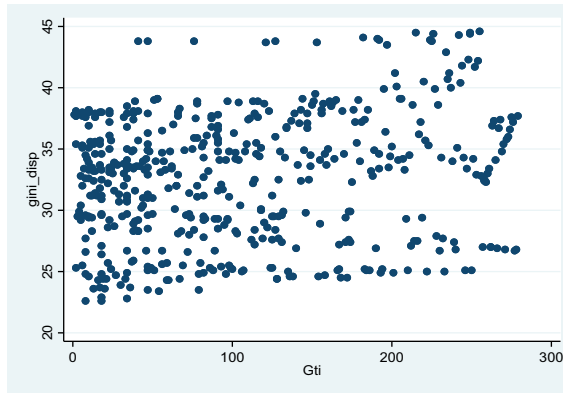


Figure A8. Scatter plot of gini_disp and terrorism. Edited by the author(s) using Stata.

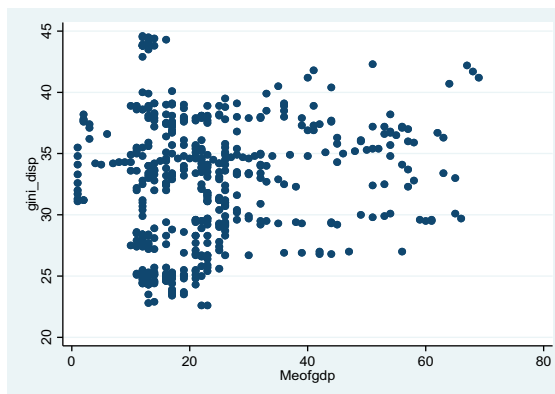


Figure A9. Scatter plot of gini_disp and military exp. Edited by the author(s) using Stata.

Table A1. Variance inflation factor test of variables.

Variables	VIF
Lntop10	3.44
Lnmiddle40	2.89
Lnbottom50	3.12
Lngini_disp	2.05
Lnme	3.78
Lnter	1.10
Lnme*ter	2.68
Lninf	3.34
Lnqog	3.82
Lnpro	3.53
Lnope	1.73
Lnune	1.47
Average VIF	3.16

Edited by the author(s) using Stata.

Table A2. Cross-sectional dependence test results.

Variables	Breusch-Pagan LM		Pesaran-Ullah-Yamagata bias-adjusted LM		Pesaran CD	
	Statistic	p-value	Statistic	p-value	Statistic	p-value
Lntop10	812.34	0.000	17.56	0.000	23.15	0.000
Lnmiddle40	781.04	0.000	13.48	0.000	11.73	0.000
Lnbottom50	833.28	0.000	14.89	0.000	26.04	0.000
Lngini_disp	893.05	0.000	18.92	0.000	9.04	0.000
Lnme	739.38	0.000	32.45	0.000	20.04	0.000
Lnter	1183.92	0.000	46.33	0.000	67.04	0.000
Lnme*ter	1137.06	0.000	11.29	0.000	29.06	0.000
Lninf	749.57	0.000	27.92	0.000	17.89	0.000
Lnqog	806.71	0.000	18.43	0.000	15.32	0.000
Lnpro	935.28	0.000	15.03	0.000	36.27	0.000
Lnope	888.95	0.000	16.83	0.000	55.90	0.000
Lnune	738.39	0.000	13.30	0.000	27.17	0.000

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Table A3. CADF unit root test results.

CIPS Statistics				
Variables	Level	1 st difference	2 nd difference	Result
Lntop10	-2.461***	-	-	<i>l</i> ₀
Lnmiddle40	-2.048***	-	-	<i>l</i> ₀
Lnbottom50	-2.904***	-	-	<i>l</i> ₀
Lngini_disp	-3.038***	-	-	<i>l</i> ₀
Lnme	-3.523***	-	-	<i>l</i> ₀
Lnter	-2.673	-3.739***	-	<i>l</i> ₀
Lnme*ter	-2.439	-2.842	-3.948***	<i>l</i> ₀
Lninf	-3.363***	-	-	<i>l</i> ₀
Lnqog	-2.267	-2.582***	-	<i>l</i> ₀
Lnpro	-2.590***	-	-	<i>l</i> ₀
Lnope	-3.849***	-	-	<i>l</i> ₀
Lnune	-3.693***	-	-	<i>l</i> ₀
Const. and trend	-2.67	-2.63	-2.63	-
Constant	-2.47	-2.37	-2.28	-

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***Demonstrates rejection of the null hypothesis at 1% level.