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Military Expenditures and Income Inequality Evidence from a Panel of Transition Countries (1990-2015)

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ABSTRACT

This paper contributes to the literature on military spending by analyzing the relationship between military spending and income inequality in a panel of transition economies over the period 1990–2015. In particular, we exploit three different measures of military expenditures: (i) military spending in absolute terms; (ii) military expenditures per capita; (iii) military burden, namely the ratio between military expenditure and GDP. Findings highlight a positive relationship between military expenditures and income inequality captured by means of three different measures of inequality. Results are also confirmed after we performed a variety of robustness tests. Other results are worth noting and somehow puzzling. For example, military conscription appears to have a redistributional effect and when considering a non-linearity the results show that there could be a concave relationship between military spending and income inequality. In addition, when testing for the 'crowding-out argument' results show that expenditures for subsidies are negatively influenced by military spending so confirming the crowding-out argument but there is no significant evidence when considering education and health expenditures.

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Introduction

In recent years, the attention paid to the issue of income inequality has increased among scholars and policy-makers. Several channels have been highlighted to explain the rising inequality within societies (see among others Milanovic 1998; Held and Kaya 2007; Galbraith 2012; Piketty 2014; Lindert and Williamson 2016). This paper focuses on the relationship between military spending and income inequality in a panel of Eastern and transition countries over the period 1990–2015. The relationship between military spending and income inequality is a topic comparatively underexplored in literature. In fact, when analyzing military expenditure, most studies analyze its determinants whereas another wide strand of literature focuses on the impact of military spending on economic growth and development highlighting in most cases a negative relationship (see the survey presented in Dunne and Tian 2013 and among others; Kollias et al. 2017; Kollias and Paleologou 2015; Kollias 2010; Kollias, Mylonidis, and Paleologou 2007). A minor literature focuses on the relationship between military spending and public debt (see among others Abbas and Wizarat 2018; Caruso and Di Domizio 2017; Caruso and Di Domizio 2016; Paleologlou 2013; Smith and Nayaran 2009; Dunne, Perlo-Freeman, and Soydan 2004). The role of military spending as a factor of income inequality in comparative terms has received little attention from a theoretical and empirical point of view.

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The aim of this study is to investigate the relationship between military expenditure and income inequality in a panel of 26 European transition countries so contributing to both the literature on military spending and income inequality. All the countries involved in our analysis are transition economies and most of them have undergone a considerable increase in income inequality and poverty in the aftermath of the Cold War (Alam et al. 2005). In particular, in earlier years of transition toward democracy, a major recession took place in several countries. In fact, in spite of the differences between the countries, one of the most significant consequences of transition was an increase in income inequality. The widely known interpretation is that due to the privatization process, the shift of workers from the dismantled state sector to the growing private sector or unemployment led to a growing disparity in wages between the different sectors (Ivaschenko 2003; Milanovic 1998 and Milanovic 1999). Needless to say, albeit the common feature has been a rise in economic inequality, transition economies have experienced heterogeneous paths even in the light of the different reform policies adopted (Aristei and Perugini 2014) and of the asymmetries at the subnational level (Förster, Jesuit, and Smeeding 2005). For instance, as pointed out by Novokmet, Piketty, and Zucman (2018) Russia has to be interpreted as the most extreme case in this general trend. In addition, the transition countries have often been considered as plagued by corruption and low institutional quality[1]. In fact, these factors contribute to income inequality as expounded in Gupta, Davoodi, and Alonso-Terme (2002), Chong and Gradstein (2007). In brief, even if most empirical studies agree that income inequality has increased, disagreements persist on the amount, the measurement, the major causes and the impact on subsequent growth (Heyns 2005; Večerník 2012).

In such a heterogeneous and complex context, it is therefore worth investigating whether military spending also played a role in worsening income inequality or rather mitigating it. In fact, military spending in eastern countries has always been a relevant item of public spending. In particular, it has been systematically higher than western countries in relative terms. For instance, the average ratio between military and spending and government spending in 2015 was 5.1% (it was 15.6% in 1992) whereas for western European countries it was 2.7% (4.5% in 1992). If considering the military burden (namely the ratiobetween military spending and GDP), the average military burden for countries considered in this study was 1.88% in 2015 (it was 3.11% in 1992) whereas for western countries it was 1.27% (it was 2.48% in 1992)[2].

There are several competing explanations on the relationship between income inequality and military expenditures. If considering an increase of inequality due to military expenditure, the common interpretation descends from the trade-off between military spending and some welfare expenditures which would reduce income inequality. A contrasting hypothesis would be based upon the distributional effect descending from hiring military personnel so *de facto* also implying a redistribution to low-income youth. In this respect, it is worth noting that in most Eastern countries military conscription has been kept even after some years the end of the socialist system. Between 2003 and 2010, about half of the countries considered in our analysis have abolished mandatory military service. Currently, in many countries, the military conscription is still in place. In these countries, it is also likely that military spending is interpreted as a counter-cyclical economic policy. Another possible channel of impact would be the stimulus given to military industry so triggering economic growth and eventually having an impact on income inequality. However, in this respect, an opposite outcome could take shape. If military industry hires more productive workers, finally an increase in military spending could enlarge the inter-sectorial wage gaps.

Therefore, in order to investigate in depth this potential relationship, we have created a dataset for 26 transition economies in the period 1990–2015. We first exploit a baseline regression and eventually we present some robustness tests before analyzing the classical trade-off argument with respect to welfare expenditures. For sake of robustness, we employ three

different of measures of income inequality, namely two Gini indexes computed by different sources and a Theil index. In the same vein, we employ three different measures of military expenditures: (i) the military spending in levels; (ii) the military spending per capita; (iii) the military burden, namely the ratio between military spending and GDP. A set of control variables is drawn from the established literature.

In sum, results show that military expenditures are positively and significantly associated with income inequality. In simpler words, military spending appears to increase income inequality. This result appears to be robust across different specifications. However, other results are worth noting and contradictory. For example, military conscription appears to have a redistributional effect since it is negatively associated with income inequality. In addition, when considering a non-linearity, results show that there could be a concave relationship between military spending and income inequality. That is, beyond some level, any additional spending in the military would reduce inequality. The latter results, therefore, partly contradict the general result. However, plausibly this could be a short-term effect. The possible explanation is that an increase in military spending – in particular for military personnel – may perhaps reduce income inequality in the short-run. In the long-run such redistributional impact can be expected to disappear because of the detrimental impact on human capital and eventually on the wage-differentials. Among other results, it is worth noting that armed conflict appears to be a 'leveller' since it appears to reduce inequality. Therefore, the latter result suggests that there could be a significantly different impact on income inequality in wartime.

Another relevant point is related to the potential issue of endogeneity of military expenditures and income inequality. When taking into account this issue by means of an IV estimation the positive association between income inequality and military expenditures is confirmed. If using GINI and Theil provided by GID military expenditures are to be considered exogenous. When considering Gini provided by SWIID, the endogeneity test reveals that that military expenditures can be considered endogenous. Even if this does not affect the results, it recalls a critical point in the literature on inequality, namely the data quality and the data consistency.

Finally, another interesting result descends from the test of the 'crowding-out argument'. In the light of data availability, we focused on three types of welfare expenditures, namely (i) subsidies and transfers; (ii) health expenditures and (iii) education expenditures. Results highlight that expenditures for subsidies are negatively influenced by military spending so confirming the crowding-out argument. Instead, there is no evidence when considering education and health expenditures. However, since both education and health expenditures may descend from mandatory norms, it is likely that the crowding-out effect in the short-run takes the shape of a reduction in subsidies and transfers which are discretionary. In this perspective, the crowding-out effect appears to be confirmed.

In fact, this work has several limitations. First, because of the lack of data military spending is not disaggregated. This could be crucial while analyzing this topic. In fact, military personnel spending would reasonably have an impact on income inequality which differs heavily from spending in military equipment. Secondly, the results appear to be sensitive to the inequality measures employed. In particular magnitude of coefficients differs so implying that any quantitative interpretation of the results has to be handled with care.

The paper is organized as follows: paragraph 1 focuses on the literature review and conceptual background of the relationship between military spending and income inequality; paragraph 2 deals with the data and the methodology, while paragraph 3 displays and discusses the findings of a baseline model. In the following section, some robustness checks are presented and in paragraph 5 the crowding-out argument is empirically presented. Eventually, the last section summarizes and concludes the paper.

Literature and Conceptual Background

In what follows we expound the conceptual background of this work by surveying the existing literature on the linkage between military spending and income inequality. In particular, the survey is organized following the alternative plausible hypotheses simply labeled as the 'inequality-narrowing' and the 'the inequality-widening'.

The common explanation of the inequality-narrowing hypothesis is based upon the idea that higher military expenditure boosts aggregate demand so increasing the employment level in the economy. In particular, if the military industry is labor-intensive and if military production is mainly domestic, military spending could be expected to become a driver of economic growth so increasing income of the poorer population. Yet, this effect would be enlarged if a large share of military spending is allocated particularly to wages and salaries of military personnel. Empirical findings that corroborate this hypothesis come from Ali (2012) who focuses on Middle East and North African countries over the period 1987–2005. The author employs the Theil index as a measure of income inequality, while the military burden is the main explanatory variable. The author finds that military expenditure has an important and negative effect on income inequality. In other words, in these countries, it seems that an increase in military burden has led to a reduction in income inequality. Ali (2007) analyzed panel data of more than 150 countries for the period 1987–1997. He notes that the military expenditure and the inequality variables are both endogenous; therefore, these two variables may run both ways. As for the economic inequality measure, the author focuses on the Theil index while with reference to the military expenditure he introduces the two most important indicators of military institutions: per capita military spending and the size of armed forces. Instead, the empirical results of a two-stage least-square regression indicate a positive relationship between military spending and income inequality. Chletsos and Roupakias (2018) find that the military spending decreases income inequality also dealing with the issue of endogeneity by means of an IV approach for a panel of 14 NATO countries in the period 1977–2007.

In fact, there is little evidence on the validity of the inequality-narrowing hypothesis. Instead, the inequality-widening hypothesis has been validated in a larger number of studies. Graham and Mueller (2019) find a positive association between military expenditures and income inequality in a panel of OCED countries in the period 1990–2007. Vadlamannati (2008) analyzed four South Asian economies, i.e. India, Pakistan, Sri Lanka and Bangladesh, through a panel regression fixed-effect analysis for the period 1975–2005 finding a positive effect of military spending on income inequality. Interestingly, the authors found a direct relationship between wartime military spending and income inequality and an opposite linkage between peacetime military expenditure and income inequality. In fact, when they introduce in the equation the number of war years, they find a significant and positive relationship with military expense. On the contrary, when they replaced it with the number of peacetime years, the findings are negative and statistically significant at 1% confidence level. However, the coefficient values are different since the peace years are slightly higher than the years of war, suggesting that peace brings to a reduction in excess military spending, which could be used for the implementation of social programs.

Elveren (2012) explores the long-run causality between military spending and income inequality in Turkey by means of a Granger cointegration and VECM causality tests using the data for the period 1963–2007. The results show that military expenditure and income inequality are cointegrated and there is a unidirectional causality between said variables establishing that military spending exacerbates the income inequality. The analysis carried out by Meng, Lucyshyn, and Li (2015) by using the data of the Chinese economy for the period 1989–2012 indicates cointegration and unidirectional causality between military spending and income inequality showing that defense expenditures and inequality are associated.

Wolde-Rufael (2014) examined the long-run relationship between military expenditure and income inequality in Taiwan over the period 1976–2011 by using the bounds test approach for cointegration and causality to observe the relationship between cointegration and causality. The empirical evidences indicate a positive and significant effect of defense spending on income inequality in Taiwan and the unidirectional causal relationship runs from military spending to income distribution. The same results are obtained by Wolde-Rufael (2016) analyzing the case of South Korea for the period 1965–2011. In a recent analysis, Shahbaz et al. (2016) investigated the relationship between military spending and income inequality in Iran between 1969 and 2011 also by means of a cointegration analysis. The findings confirm a negative relationship between military spending and income inequality, even suggesting that military expenditure Granger produces income inequality in Iran. Töngür and Elveren (2015) employed the Generalized Method of Moment (GMM) to explore the effect of defense expense on pay and income inequality with respect to the welfare regime. Considering a panel data of 37 countries from 1988 to 2003, they show a positive and significant effect of military spending on income inequality.

In fact, most studies highlight empirically a positive relationship between income inequality and military spending. A smaller number of studies highlight specific mechanisms to explain such evidence: (a) the crowding-out of welfare expenditures; (b) the increase in the inter-sectorial wage gap between military and civilian sectors; (c) the long-run deterioration of human capital; (d) the internal regime of a polity. According to the first explanation, a larger military spending crowds out other government spendings which could be allocated to welfare spending. Lin, Ali, and Yu-Lung (2015), for example, show empirically that such idea holds for a panel of 29 OECD countries from 1988 to 2005 finding that there is a positive trade-off between military spending and two types of social welfare expenditures (i.e. education and health spending). In fact, the authors do not investigate punctually the relationship between inequality and military spending but their study corroborates the evidence about the crowding out-argument which is often mentioned as a plausible determinant of an increase in inequality. Abell (1994) investigates the relationship between military spending and income inequality in the United States in the period 1972–1992 finding that military spending increases income inequality because of the gap in wages between military and civilian employees. Moreover, the disparity between skilled and unskilled labor can be exacerbated if the military industry chooses to hire skilled workers rather than unskilled workers. In the same vein, Kentor, Jorgenson, and Kick (2012) examined the relationship between military spending and income inequality by using the panel data of 82 developed and less developed countries in the period 1970–2000. Their starting assumption was that high-tech weaponry defined as 'new' military cannot be considered as the means to create employment for uneducated, unskilled and unemployed people so generating effects for the whole society. They found that 'new' capital-intensive military worsens income distribution.

In fact, there could be another long-run driver of the inequality-widening hypothesis. In fact, massive military spending does determine a loss of accumulation of human capital. In several studies, Keller, Poutvaara, and Wagener (2010, 2009) show that military conscription reduces significantly the accumulation of human capital. Such evidence is produced for OECD countries. Since the veterans have lower productivity and wages than non-veterans [see on this point Griliches and Mason (1972), Rosen and Taubman (1982) and Angrist (1990)] this would worsen income inequality in favor of civilian employees.

The inequality-widening hypothesis also finds some evidence and draw insights from the Nazi Germany. The objective of Nazi economic policy was to build up a powerful army. To carry out the rearmament, the government carried a large-scale privatization policy which, on the one hand, increased the support of industrialists for NSDAP and on the other turned out to be beneficial for top-income earners: as reported by Dell (2005), between 1933 and 1938 the share of earnings for top incomes grew amazingly: more than 50% growth for the top percentile and more than 150% for the top 0.01%.

Finally, it is also plausible that there is no effect of military expenditure on income inequality for two main reasons: (i) the defense spending represents only a small portion of the total government spending and (ii) the labor force employed in the military-industrial sector is only a negligible part of the overall labor force. Therefore, if the government chooses to allocate the resources to the welfare system and not to the defense sector, the effect of military expenditure on income inequality would be negligible. Empirically the effect would be statistically insignificant. Hirnissa, Habibullah, and Baharom (2009) used the bounds test approach for cointegration in order to examine the linkage between military spending and income inequality in the ASEAN countries. They applied this approach to observe the direction of causal relation by using the data for the period 1970–2005. Their findings show that the variables are cointegrated for long-run relationships. Furthermore, Granger causality test to check defense spending generates income inequality in Malaysia, but the rest of the countries (Indonesia, Singapore, Indonesia Philippines, India and South Korea) are characterized by no meaningful relationship between military expenditure and income distribution. Lin and Ali (2009) applied the panel Granger non-causality tests and also found no substantial findings to confirm any causal relationship between defense expenditure and income inequality in both directions. The latter study is particularly robust since it analyzes the relationship between military spending and income inequality across 58 countries from 1987 to 1999 by using different measures of inequality as well as alternative sources of military spending.

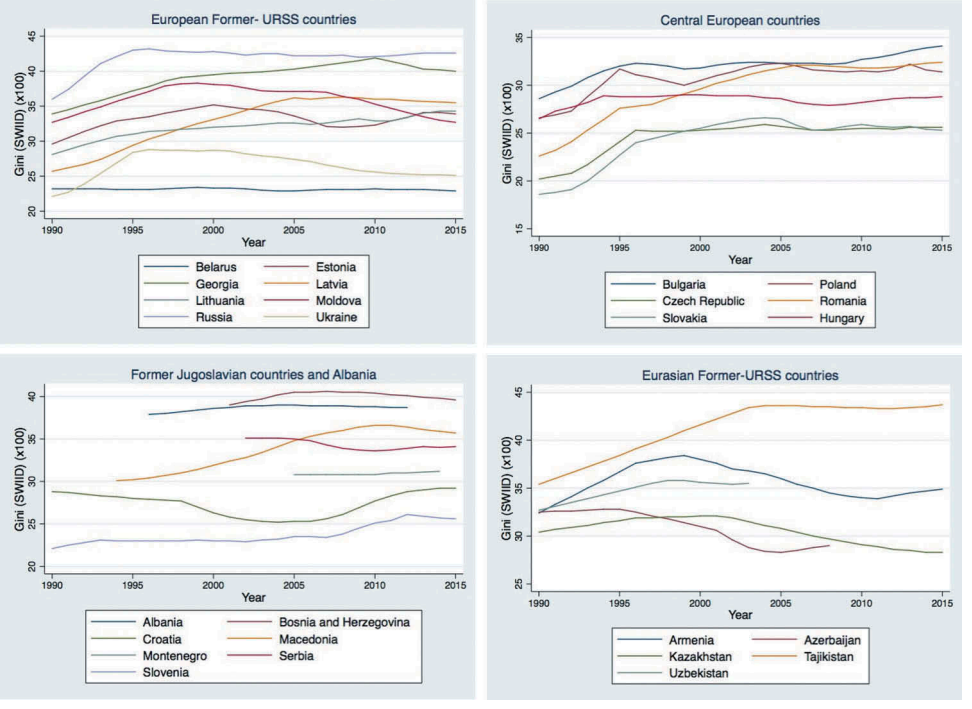
Data and Empirical Methodology

We employ three alternative dependent variables to capture income inequality[3]. In particular, we employ both a Gini and a Theil Index taken from the Global Income Dataset (GID)[4] included within the Global Consumption and Income Project (GCIP). This data set provides the estimates of monthly real consumption and income for various quintiles of the population. Data are available for most countries in the world covering the period that goes from 1960 to 2015. A different measure of Gini is taken from the Standardized World Income Inequality Database (SWIID, version 6.2). It is computed through coefficients of equalized household disposable income (post taxes and post transfer). The SWIID dataset offers Gini coefficients for a set of 192 countries and for the period 1960–2015. SWIID data allow the comparison across countries because it standardizes observations collected from several sources by using a Bayesian approach (Solt 2016).

The Gini index ranges between 0 and 1, where 0 means perfectly egalitarian distribution and 1 would denote perfect concentration. For sake of tractability, in the empirical estimation, we multiply both Gini and Theil indexes by 100. The choice of using both Gini and Theil is driven by the consideration of their own characteristics. Gini index makes a direct comparison of two populations easier regardless of their sizes. The main weakness of the Gini measure of inequality is that it cannot be decomposed into inequality within and between different population subgroups. That is, because of this, the total Gini of society does not equal the sum of the Gini coefficients of its subgroups. In this respect, the Theil index is a more appropriate tool. In fact, the Theil index is decomposable and, in fact, it is made of the sum of two components: within groups inequality and between groups inequality. Thus, the Theil index is more reliable than Gini by identifying the share of inequality attributable to the between-group component.

Graphs 1–4 simply visualize that income inequality has increased in most countries considered. In the empirical model, we employ three different measures of military expenditures as main explanatory variables: (i) military expenditure in levels; (ii) military expenditure per capita; (iii) the military burden, namely the ratio between military expenditures and GDP. Data on military spending are drawn from the Stockholm International Peace Research Institute. Eventually, we employ a set of covariates which are commonly used in the literature on inequality.

Economic openness is equal to exports and imports divided by GDP. Greater openness can impact domestic inequality between and within countries. However, there are undoubtedly several



Graphs 1–4. Trends in inequality.

channels and mechanisms – often country-specific – that shape such impact and therefore there is no clear-cut prediction on the sign of the coefficient. Classical comprehensive discussions on this are provided in Burtless (1995) and Richardson (1995). A reduction in inequality is explained in White and Anderson (2001),, Edwards (1997), Higgins and Williamson (2002) and Jaumotte, Lall, and Papageorgiou (2013). Instead, a positive impact of economic openness on inequality is explained in Silva and Leichenko (2004), Golderg and Pavcnik (2007), Verhoogen (2008), Helpman, Itskhoki, and Redding (2010), Amiti and Davis (2012) among others.

The democracy scores are taken from the Polity IV data set (Marshall et al. 2016). This variable ranges from 10 (the most democratic regime) to −10 (the most autocratic regime). Usually, democracy is expected to decrease inequality and increase redistribution whereas autocracies are expected to increase inequality. (see among many others Lee 2003; Reuveny and Li 2003; Acemoglu et al. 2015; Schwuchow 2018). A review on this relationship is in Gradstein and Milanovic (2004).

Due to the distributional impact of inflation (Ivaschenko 2003; Ferreira 1999) and considering that the early years of transition were characterized by a high level of inflation we included this indicator into the model. An increase in inflation rate generates an erosion of purchasing power so impoverishing the share of population that is in the last part on the left of income distribution, thus increasing inequality. The data about inflation rate, real GDP per employee (as a proxy for labor productivity), unemployment rate and urbanization degree are all available from the World Bank's World Development Indicator. Furthermore, we include five dummy variables. The conflict dummy equals 1 if countries are engaged in an armed conflict and 0 otherwise. Data on conflict come from the 1946–2016 UCDP/PRIO Armed Conflict Dataset Codebook Version 2–2017[5] (Gleditsch et al. 2002). The relationship between armed conflict and income inequality is worth studying because it has no clear-cut and predictable association. Scheidel (2017) explains carefully how in history large-scale violence has been in some cases a 'leveler'. In fact, wars, state collapses and great transformations

can trigger a process of 'leveling down'. In particular, in the presence of an armed conflict heavy taxation on higher income groups and mass mobilization often both contribute to reduce inequality. By contrast, for transition economies, a positive relationship between income inequality and armed conflict has been found in Ivaschenko (2003) and Aristei and Perugini (2014). The UE dummy is equal to 1 for countries belonging to the European Union while 0 and three dummies are about the political system. Military conscription is a dummy that equals 1 if the country has conscription in place in the year of observation. Table 1 summarizes data description and shows summary statistics (see Appendix 1 for the list of countries) and Table 2 shows the correlation matrix.

Table 1. Definitions and sources of variables.

Variables	Definition	Source
Inequality	Gini coefficient	The Global Consumption and Income Project (GCIP) – Global Income Dataset (GID)
	Gini Coefficent	The Standardized World Income inequality Database (SWIID)
	Theil Index	The Global Consumption and Income Project (GCIP) – Global Income Dataset (GID).
Milex	Military Expenditure (Constant 2014 US Dollar)	Stockholm International Peace Research Institute (SIPRI)
Milex per Capita	Military Expenditure per capita (Constant 2014 US Dollar)	Stockholm International Peace Research Institute (SIPRI)
Military Burden	Military expenditure as a share of GDP	Stockholm International Peace Research Institute (SIPRI)
Openness	Trade as a share of GDP	World Development Indicators of the World Bank
Productivity	GDP per employed person	World Development Indicators of the World Bank
Unemployment	Unemployment Rate	World Development Indicators of the World Bank
Inflation	Inflation Rate	World Development Indicators of the World Bank
Democracy	Democracy score is calculated by subtracting the institutional democracy score from autocracy score. Polity index ranges from −10 (perfect autocracy) to +10 (perfect democracy)	Polity IV Database
Conflict	Country in an armed conflict	Armed Conflict Dataset UCDP/PRIO
Military Conscription	Country with military conscription	The World Factbook CIA
EU	For non-EU members EU = 0 and for EU members, EU = 1	Author's computation

Table 2. Descriptive statistics.

Variables	Number of Observations	Mean	Standard Deviation	Minimun Value	Maximun Value
Inequality – Gini Index (GCIP) (x100)	646	36.804	8.130	18.210	57.747
Inequality – Gini Index (SWIID) (x100)	605	31.865	5.698	18.60	43.70
Inequality – Theil Index (x100)	648	23.603	10.742	5.136	68.10
Milex	674	212.913	164.820	1	514
Milex per Capita	674	61.271	111.347	0.019	774.915
Military Burden	648	0.006	.0100	3.73e-07	0.083
Openness	676	91.337	37.375	11.7	206.34
Productivity	650	28,357.12	16,192.94	0.045	75,039.87
Unemployment	676	5.255	1.29	0.693	6.413
Inflation	676	207.800	160.190	1	509
Democracy	600	2.598	15.59	−88	10
Conflict	676	0.114	0.318	0	1
Military Conscription	676	0.797	0.402	0	1
EU	676	0.173	0.379	0	1

The Empirical Model and the Results

The relationship between military expenditure and income inequality is analyzed by relying on a panel data model. In particular, we use the following specification:

$$lninequality_{it} = \beta_0 + \beta_1 lnmilex_{it-1} + \beta_2 X_{it-1} + \beta_3 W_{it} + \mu_i + \upsilon_{it}$$

The dependent variable $lninequality_{it}$ representing the level of income inequality in country i at time t and $lnmilex_{it-1}$ is the one-year lagged military expenditure. As noted above, inequality is captured alternatively by (i) the Gini computed by GID; (ii) the Gini computed by SWIID and (iii) the Theil index computed in GID. In the same vein, military spending is alternatively captured through three different measures, namely: (i) military spending; (ii) military spending per capita; (iii) military burden. The military spending variables have been one-year lagged to mitigate the endogeneity concerns.

The vector $\mathbf{X}_{it-1}$ is a vector of economic variables such as trade openness, unemployment rate, inflation rate and labor productivity, the vector $\mathbf{W}_{it}$ includes a set of dummy variables described above (conflict, military conscription and EU). In order to find a punctual elasticity, continuous explanatory variables are logged (to minimize the skewness). At the same time, the explanatory variables have been also one-year lagged in order to mitigate the issue of endogeneity. Finally, μ_i is a country fixed effect, and υ_{it}represents the error term. In particular, the Hausman specification test indicates that the fixed-effect model is to be preferred to the random effect model. The fixed-effect model eliminates the possibility of time-invariant unobserved effects. Table 3 reports the results.

Table 3. Military spending and income inequality – Main results.

	Dependent variables								
	Gini (source GID)			Gini (source SWIID)			Theil (source GID)		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Milex (t-1)	0.02***			0.01**			0.05***		
	(0.01)			(0.00)			(0.01)		
Milex per capita (t-1)		0.02***			0.01**			0.05***	
		(0.01)			(0.00)			(0.01)	
Milex/GDP (t-1)			0.022***			0.01**			0.05***
			(0.01)			(0.00)			(0.01)
Productivity (t-1)	0.01	0.01	0.03	−0.04**	−0.04**	−0.03	0.03	0.03	0.07
	(0.04)	(0.04)	(0.04)	(0.02)	(0.02)	(0.02)	(0.08)	(0.08)	(0.08)
Inflation (t-1)	0.02***	0.02***	0.02***	0.01	0.01	0.00	0.05***	0.05***	0.05***
	(0.01)	(0.01)	(0.01)	(0.00)	(0.00)	(0.00)	(0.02)	(0.02)	(0.02)
Democracy (t-1)	−0.04	−0.04	−0.03	−0.01	−0.01	−0.01	−0.07	−0.07	−0.07
	(0.03)	(0.03)	(0.03)	(0.01)	(0.01)	(0.01)	(0.07)	(0.07)	(0.07)
Openness (t-1)	0.05	0.05	0.05	0.05**	0.05**	0.05**	0.10	0.10	0.10
	(0.03)	(0.03)	(0.03)	(0.02)	(0.02)	(0.02)	(0.07)	(0.07)	(0.07)
Unemployment (t-1)	0.02***	0.02***	0.02***	0.01***	0.01***	0.01***	0.04***	0.04***	0.04***
	(0.01)	(0.01)	(0.01)	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)	(0.01)
EU (dummy)	−0.03	−0.03	−0.03	0.04*	0.04*	0.04*	−0.08	−0.08	−0.08
	(0.05)	(0.05)	(0.05)	(0.02)	(0.02)	(0.02)	(0.10)	(0.10)	(0.10)
Conflict (dummy)	−0.04*	−0.04*	−0.04*	−0.01	−0.01	−0.01	−0.10*	−0.10*	−0.10*
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.05)	(0.05)	(0.05)
Military Conscription (dummy)	−0.06*	−0.06*	−0.06*	−0.03**	−0.03**	−0.03**	−0.13*	−0.13*	−0.13*
	(0.03)	(0.03)	(0.03)	(0.01)	(0.01)	(0.01)	(0.07)	(0.07)	(0.07)
Constant	3.11***	3.16***	3.15***	8.16***	8.17***	8.17***	2.00**	2.10**	2.10**
	(0.35)	(0.35)	(0.35)	(0.23)	(0.23)	(0.23)	(0.76)	(0.76)	(0.76)
Observations	619	619	619	582	582	582	621	621	621
Number of countries	25	25	25	26	26	26	25	25	25
R-squared within	0.26	0.26	0.26	0.37	0.37	0.38	0.26	0.25	0.25
R-squared between	0.27	0.22	0.23	0.05	0.03	0.02	0.30	0.24	0.26
R-squared overall	0.01	0.00	0.00	0.01	0.01	0.01	0.00	0.00	0.00

Robust Standard errors in brackets; statistical significance *** p < 0.01, ** p < 0.05, * p < 0.10.

The main result we would claim is that one-year lagged values of the different measures of military expenditure are significantly and positively associated with current values of income inequality. The magnitude of the effect of military spending on income inequality is quite substantial. If using the Gini index computed by GID, the estimated coefficient on military expenditure in equation five shows that a 1-point percent change in military expenditure in the previous year leads to a change slightly greater than 0.02% in the income inequality in the current year. The impact appears to be even greater when using the Theil index: a 1-point percent change in military expenditure in the previous year leads to a change close to 0.05% of the Theil measure. Interestingly, when using the Gini index computed by SWIID the coefficients appear to be lower. Consider that the latter takes into account the disposable income whereas there is no clear-cut information in this respect for the GID dataset.

Besides the magnitude of the coefficients, it is worth noting that the linkage between military expenditures and income inequality is robust across different estimations. Therefore, this result fully confirms the inequality-widening hypothesis. Interestingly, military conscription appears to be negatively associated with income inequality. In brief, military conscription has had a redistributional effect in transition countries in the period considered. In this respect, the plausible interpretation is that military conscription served also as a form of redistribution particularly in favor of low-educated and low-skill youth. Yet, the relationship between involvement in an armed conflict and the inequality measures is generally negative and statistically significant. It seems that income inequality declines when a country is involved in an armed conflict. There is a confirmation on the 'leveling down' effect of armed conflict as expounded by Scheidel (2017).

Most control variables exhibit the expected signs. The lagged value of GDP per employee, as a proxy of labor productivity, exhibits a negative effect on the current level of inequality. In other words, when aggregate labor productivity increases income inequality seems to decrease. Trade openness exhibits a robust and statistically significant positive association with income inequality only when using the Gini index computed by SWIID. Above all, unemployment and inflation show a predictable a robust positive association with income inequality.

Alternative Estimations and Robustness Checks

Alternative Samples of Countries

As a robustness check, we eventually examined the relationship between military expenditure and income inequality in sub-samples of countries. For the sake of clarity, coefficients of control variables are not displayed because all control variables confirm the expected signs. Also in the following estimations, the Hausman test has been performed and so the fixed-effect model is always preferred. First in Table 4, we show the estimations excluding Russia that could be considered an outlier. Main results are confirmed. Eventually, Table 5 shows the findings obtained excluding alternatively the countries with a population below 40% (in panel 5.1), below 60% (in panel 5.2) and below 80% (in panel 5.3) of median of population. Eventually, in Table 6, we report the results when excluding former Jugoslavian countries (panel 6.1) and when excluding Armenia, Azerbaijan and Georgia (panel 6.2). The latter tables, in particular, exclude those countries which have been involved in severe-armed conflicts. That is, by excluding these countries we are willing to mitigate the impact of warfare as 'leveller' which could have driven the general results.

In sum, in general, with respect to the main estimation presented in the previous paragraph, the main results do not change. The impact of lagged military spending on current inequality is always positive and significant thus confirming the baseline results.

Table 4. Military spending and income inequality – Excluding Russia.

	Dependent variables								
	Gini (source GID)			Gini (source SWIID)			Theil (source GID)		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Milex (t-1)	0.02***			0.01**			0.04***		
	(0.00)			(0.00)			(0.01)		
Milex per capita (t-1)		0.02***			0.01**			0.04***	
		(0.00)			(0.00)			(0.01)	
Milex/GDP (t-1)			0.02***			0.01**			0.04***
			(0.00)			(0.00)			(0.01)
CONTROL VARIABLES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Constant	3.54***	3.58**	3.58**	3.60***	3.60***	3.61***	2.94***	3.02***	3.02***
	(0.32)	(0.35)	(0.33)	(0.25)	(0.25)	(0.25)	(0.76)	(0.77)	(0.77)
Observations	594	594	594	557	557	557	596	596	596
Number of ID	24	24	24	25	25	25	24	24	24
R-squared within	0.34	0.34	0.34	0.37	0.37	0.37	0.33	0.33	0.33
R-squared between	0.03	0.03	0.02	0.00	0.00	0.00	0.04	0.04	0.03
R-squared overall	0.06	0.06	0.06	0.05	0.06	0.08	0.05	0.05	0.06

Robust Standard errors in brackets; statistical significance *** p < 0.01, ** p < 0.05, * p < 0.10.

Non-linearities

In what follows we employ another simple robustness test seeking for a non-linear relationship between military spending and the inequality measures. In fact, we add to the regressions the quadratic term of the different measures of military spending. Table 7 reports the findings. First, results suggest the existence of non-linearities in the relationship we are investigating. At the same time, results are puzzled and deliver a more nuanced evidence. Above all, the relevant finding is a non-linear relationship between military spending and income inequality. In other words, as the military spending increases beyond some level, the income inequality appears to decrease. In this respect, the plausible interpretation is that an increase in military spending is likely to be determined through either an increase in military compensation or an increase in the military personnel. If this is the case, it would be plausible that income inequality decreases. It ought to be noted that such evidence is robust in particular when we employ the lagged military spending in levels as explanatory variable. That is, the lagged level of military spending exhibits a positive coefficient so confirming the main results of this work but the coefficient of its squared term is negative so indicating a negative relationship with the inequality measures. No significant results emerge when we employ the ratio between military spending and GDP. A different result takes shape when we employ the military spending per capita. In fact, in one model both military spending per capita and its squared term appear to be negatively associated with income inequality. In other words, military spending appears to reduce income inequality and such relationship is linear. This contrasts with the main results expounded above. However, this takes shape only when we employ the Gini index computed by SWIID. To some extent, this suggests that results can be sensitive to the different measures of inequality used.

The Issue of Endogeneity

In what follows we investigate more in depth the issue of potential endogeneity of our main explanatory variables, namely the different measures of military spending. To deal with a endogeneity issue we have employed an instrumental variable estimator (IV model) following Chletsos and Roupakias (2018). They employ a *shift-share*[6] as instrument so taking into account that current military expenditure is heavily influenced by past spending because of bureaucratic inertia[7]. Then, we follow the same strategy.

Results are presented in Table 8. Differently, from the main estimation, we do not use one-year lagged variables. When testing for endogeneity evidence differs when considering the alternative measures of income inequality, in particular those from different datasets. For both Gini and Theil

Table 5. Military spending and income inequality – Different samples.

	5.1 Excluding countries with a population < 40% of the median population								
	Dependent variables								
	Gini (source GID)			Gini (source SWIID)			Theil (source GID)		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Milex	0.025***			0.005*			0.052***		
	(0.006)			(0.003)			(0.013)		
Milex per capita		0.024***			0.005*			0.051***	
		(0.006)			(0.003)			(0.013)	
Milex/GDP			0.024***			0.005*			0.050***
			(0.006)			(0.003)			(0.012)
CONTROL VARIABLES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Constant	3.232***	3.287***	3.280***	8.134***	8.147***	8.147***	2.253***	2.368***	2.353***
	(0.349)	(0.346)	(0.348)	(0.256)	(0.256)	(0.255)	(0.769)	(0.762)	(0.765)
Observations	497	497	497	452	452	452	499	499	499
Number of ID	20	20	20	20	20	20	20	20	20
R-squared within	0.297	0.295	0.296	0.367	0.367	0.369	0.282	0.280	0.281
R-squared between	0.193	0.14	0.147	0.065	0.029	0.028	0.212	0.155	0.162
R-squared overall	0.007	0.011	0.009	0.002	0.007	0.006	0.006	0.01	0.008
	5.2 Excluding countries with a population < 60% of the median population								
	Dependent variables								
	Gini (source GID)			Gini (source SWIID)			Theil (source GID)		
	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
Milex	0.026***			0.005*			0.055***		
	(0.006)			(0.003)			(0.013)		
Milex per capita		0.026***			0.005*			0.054***	
		(0.006)			(0.003)			(0.013)	
Milex/GDP			0.026***			0.006*			0.054***
			(0.006)			(0.003)			(0.013)
CONTROL VARIABLES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Constant	2.812***	2.872***	2.863***	7.977***	7.991***	7.989***	1.317*	1.443*	1.423*
	(0.337)	(0.334)	(0.334)	(0.312)	(0.311)	(0.310)	(0.731)	(0.724)	(0.724)
Observations	422	422	422	385	385	385	424	424	424
Number of ID	17	17	17	17	17	17	17	17	17
R-squared within	0.339	0.338	0.340	0.383	0.383	0.386	0.327	0.326	0.328
R-squared between	0,282	0.28	0.303	0.179	0.119	0.115	0.302	0.298	0.322
R-squared overall	0.003	0.003	0.001	0.002	0.000	0.000	0.003	0.002	0.001
	5.3 Excluding countries with a population < 80% of the median population								
	Dependent variables								
	Gini (source GID)			Gini (source SWIID)			Theil (source GID)		
	(19)	(20)	(21)	(22)	(23)	(24)	(25)	(26)	(27)
Milex	0.025***			0.004			0.053***		
	(0.008)			(0.003)			(0.017)		
Milex per capita		0.025***			0.004			0.053**	
		(0.008)			(0.003)			(0.018)	
Milex/GDP			0.025***			0.004			0.053***
			(0.008)			(0.003)			(0.018)
CONTROL VARIABLES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Constant	2.812***	2.872***	2.863***	7.977***	7.991***	7.989***	1.317*	1.443*	1.423*
	(0.337)	(0.334)	(0.334)	(0.312)	(0.311)	(0.310)	(0.731)	(0.724)	(0.724)
Observations	347	347	347	320	320	320	349	349	349
Number of ID	14	14	14	14	14	14	14	14	14
R-squared within	0.295	0.295	0.296	0.413	0.413	0.415	0.284	0.283	0.285
R-squared between	0.233	0.283	0.325	0.285	0.261	0.273	0.249	0.300	0.339
R-squared overall	0.001	0.000	0.002	0.010	0.01	0.015	0.000	0.001	0.002

Robust Standard errors in brackets; statistical significance *** p < 0.01, ** p < 0.05, * p < 0.10.

provided by GID, in fact, the Durbin-Wu-Hausman reveals that the OLS coefficient is more consistent than IV regression. In brief, the endogeneity test gives a p-value that exceeds 0.05

Table 6. Military spending and income inequality – Different samples.

	6.1 excluding former Jugoslavian countries								
	Dependent variables								
	Gini (source GID)			Gini (source SWIID)			Theil (source GID)		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Milex (t-1)	0.02***			0.01*			0.04***		
	(0.01)			(0.00)			(0.01)		
Milex per capita (t-1)		0.02***			0.01*			0.04***	
		(0.01)			(0.00)			(0.01)	
Milex/GDP (t-1)			0.02***			0.01**			0.04***
			(0.01)			(0.00)			(0.01)
CONTROL VARIABLES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Constant	3.61***	3.66***	3.65***	3.52***	3.53***	3.53***	3.06***	3.15***	3.14***
	(0.37)	−0.36	(0.37)	(0.25)	(0.25)	(0.25)	(0.82)	−0.81	(0.81)
Observations	498	498	498	473	473	473	500	500	500
Number of ID	20	20	20	20	20	20	20	20	20
R-squared within	0.26	0.26	0.26	0.37	0.37	0.38	0.25	0.25	0.25
R-squared between	0.02	0.01	0.01	0.07	0.02	0.02	0.03	0.02	0.02
R-squared overall	0.03	0.04	0.03	0.01	0.01	0.01	0.03	0.03	0.03
	6.2 Excluding Armenia, Azerbaijan and Georgia								
	Dependent variables								
	Gini (source GID)			Gini (source SWIID)			Theil (source GID)		
	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
Milex (t-1)	0.02***			0.01**			0.05***		
	(0.01)			(0.00)			(0.01)		
Milex per capita (t-1)		0.02***			0.01*			0.05***	
		(0.01)			(0.01)			(0.01)	
Milex/GDP (t-1)			0.02***			0.01**			0.05***
			(0.00)			(0–00)			(0.01)
CONTROL VARIABLES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Constant	2.72***	2.77***	2.77***	3.52***	3.53***	3.53***	1.15***	1.26***	1.25***
	(0.43)	(0.43)	(0.43)	(0.28)	(0.28)	(0.28)	(0.90)	(0.90)	(0.90)
Observations	544	544	544	514	514	514	546	546	546
Number of ID	22	22	22	23	23	23	22	22	22
R-squared within	0.29	0.28	0.29	0.41	0.41	0.41	0.28	0.27	0.28
R-squared between	0.35	0.31	0.33	0.09	0.06	0.05	0.37	0.33	0.35
R-squared overall	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Robust Standard errors in brackets; statistical significance *** p < 0.01, ** p < 0.05, * p < 0.10.

threshold. Therefore, we cannot reject the null hypothesis that military spending is exogenous. The only exception is given by the estimate considering the military burden as an explanatory variable of Theil index. On the contrary, when considering the Gini provided by SWIID the endogeneity test indicates that the IV regression has more consistent coefficients so suggesting that military expenditures have to be considered endogenous and therefore the IV estimation ought to be preferred. In any case, the positive association between income inequality and military expenditures is confirmed. However, the reliability and consistency of data, therefore, appear to be crucial in this respect.

The Crowding-Out Argument

The evidence produced in the previous sections highlights mostly a negative relationship between income inequality and military spending. As noted above, among the plausible interpretations, one of the most common arguments is the crowding-out effect on welfare expenditures. The crowding-out hypothesis has been analyzed in several studies and it is confirmed in most of them [see among others HongLi, Wei, and Coyte (2018), Lin, Ali, and Yu-Lung (2015), Ali (2011), Ozsoy (2002),

Table 7. Military spending and income inequality – non-linearity.

	Dependent variables								
	Gini (source GID)			Gini (source SWIID)			Theil (source GID)		
	(1)	(2)	(3)	(4)	(4)	(6)	(7)	(8)	(9)
Milex (t-1)	0.09***			0.03***			0.20***		
	(0.018)			(0.011)			(0.038)		
Milex per capita (t-1)		−0.021			−0.024**			−0.051	
		(0.029)			(0.010)			(0.062)	
Milex/GDP (t-1)			−0.018			−0.018*			−0.019
			(0.030)			(0.010)			(0.01)
Productivity (t-1)	0.01	0.05	0.03	−0.03**	−0.01	−0.03*	0.03	0.12	0.07
	(0.033)	(0.039)	(0.037)	(0.016)	(0.020)	(0.017)	(0.072)	(0.084)	(0.08)
Inflation (t-1)	0.015*	0.02**	0.02**	0.002	0.002	0.003	0.031*	0.038**	0.04**
	(0.008)	(0.007)	(0.007)	(0.004)	(0.003)	(0.003)	(0.016)	(0.015)	(0.02)
Democracy (t-1)	−0.043	−0.035	−0.035	−0.014	−0.012	−0.013	−0.089	−0.071	−0.073
	(0.030)	(0.033)	(0.033)	(0.010)	(0.011)	(0.011)	(0.069)	(0.074)	(0.08)
Openness (t-1)	0.047	0.040	0.042	0.046*	0.043*	0.049	0.094	0.079	0.084
	(0.028)	(0.028)	(0.029)	(0.023)	(0.024)	(0.033)	(0.064)	(0.063)	(0.07)
Unemployment (t-1)	0.02**	0.02**	0.02***	0.002	0.02**	0.02**	0.04***	0.04***	0.04***
	(0.01)	(0.01)	(0.01)	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)	(0.01)
EU (dummy)	−0.027	−0.039	−0.039	0.038*	0.036*	0.035*	−0.066	−0.092	−0.094
	(0.045)	(0.049)	(0.049)	(0.019)	(0.020)	(0.020)	(0.095)	(0.104)	(0.104)
Conflict (dummy)	−0.043	−0.05*	−0.05*	−0.013	−0.015	−0.016	−0.10*	−0.11**	−0.11**
	(0.025)	(0.025)	(0.025)	(0.015)	(0.015)	(0.015)	(0.054)	(0.053)	(0.052)
Military Conscription (dummy)	−0.06**	−0.07*	−0.07*	−0.03**	−0.03**	−0.03**	−0.13**	−0.15*	−0.15*
	(0.029)	(0.035)	(0.034)	(0.013)	(0.014)	(0.014)	(0.060)	(0.074)	(0.073)
Milex squared	−0.01***			−0.01***			−0.02***		
	(0.003)			(0.001)			(0.006)		
Milex per capita squared		−0.003			−0.002***			−0.006	
		(0.002)			(0.001)			(0.004)	
Milex/GDP squared			−0.003			−0.002**			−0.006
			(0.002)			(0.001)			(0.004)
Constant	3.16***	3.06***	3.07***	3.55***	3.50***	3.52***	2.10***	1.88**	1.90**
	(0.328)	(0.341)	(0.343)	(0.213)	(0.222)	(0.220)	(0.717)	(0.746)	(0.751)
Observations	619	619	619	582	582	582	621	621	621
Number of countries	25	25	25	26	26	26	25	25	25
R-squared within	0.295	0.272	0.272	0.409	0.401	0.394	0.287	0.264	0.264
R-squared between	0.221	0.283	0.284	0.064	0.037	0.064	0.24	0.312	0.318
R-squared overall	0.006	0.000	0.000	0.002	0.000	0.001	0.005	0.000	0.000

Robust Standard errors in brackets; statistical significance *** p < 0.01, ** p < 0.05, * p < 0.10.

Table 8. Military expenditures and income inequality – IV estimation.

	Dependent variables								
	Gini (source GID)			Gini (source SWIID)			Theil (source GID)		
Milex	0.077**			0.060**			0.173**		
	(0.033)			(0.028)			(0.073)		
Milex per capita		0.076**			0.059**			0.172**	
		(0.033)			(0.027)			(0.073)	
Milex/GDP			0.098**			0.060**			0.222**
			(0.048)			(0.029)			(0.106)
CONTROL VARIABLES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Observations	573	573	573	552	552	552	575	575	575
Number of countries	25	25	25	26	26	26	25	25	25
P-value Hausman Test	0.090	0.09	0.06	0.001	0.001	0.001	0.07	0.070	0.04

Yildirim and Sezgin (2002), Apostolakis (1992), Dabelko and McCormick (1977), Russett (1969) and Carter and Palmer (2015) (Carter and Palmer 2016) in particular with regard to public finance in wartime]. In brief, to complement the previous evidence we also try to highlight whether such a trade-off does exist in our panel countries. In the light of data availability, we focus on three types of welfare expenditures, namely (i) subsidies and transfers;[8] (ii) health expenditures[9] and (iii)

Table 9. Descriptive statistics.

Variables	Number of Observations	Mean	Standard Deviation	Minimun Value	Maximun Value
Milex/Government Expenditure	475	16.68741	141.1497	0.0000336	1513.446
GDP Constant Dollar 2014	626	9.77E+10	2.52E+11	1.18E+09	2.34E+12
Population	676	1.01E+07	1.16E+07	604,950	5.20E+07
Subsidies and Transfers	434	1.82E+10	4.07E+10	501,002.4	3.41E+11
Health Expenditure	416	6.64E+09	1.52E+10	5.08E+07	1.19E+11
Education Expenditure	334	4.47E+09	8.53E+09	1.24E+05	8.70E+10
Time Trend	676	13.5	7.505553	1	26

education expenditures.[10] Source of these data is the World Bank. In particular, since the World Bank only provides the ratios of such items on the total governmental expenditures, we have derived the expenditures in absolute terms and eventually, they have been converted in constant terms (base year 2014). Table 9 reports the descriptive statistics of these variables.

Then, in order to test the crowding-out effect, we use the following empirical model:

$$lny_{it} = \beta_0 + \beta_1 \ln\left(\frac{milex}{totalGE}\right)_{it-1} + \beta_2 X_{it} + \mu_i + \tau + \upsilon_{it}$$

where y_{it}denotes alternatively (i), (ii) and (iii), X_{it-1} is the vector of control variables, μ_i is the country fixed effect, τ is a time trend and υ_{it}represents the error term. All variables are logged. Table 10 reports the results. The crowding-out argument is only partly confirmed. It is clear that the expenditures for subsidies are negatively influenced by one-year lagged military spending so confirming the crowding-out argument. In particular, the estimation returns an estimated percent change of −0.72% in subsidies and transfers for 1% percent change in the ratio between military expenditures and total government expenditures. Instead, there is no evidence when considering education and health expenditures. In other words, there is no compelling evidence on the crowding-out effect of military expenditures. However, since both education and health expenditures may descend from mandatory norms, it is likely that the crowding-out effect in the short-run takes the shape of a reduction in subsidies and transfers which are often more discretionary. In this perspective, the crowding-out effect appears to be confirmed.

Conclusion

This paper attempted to investigate empirically the relationship between military spending and inequality in a panel of European transition countries in the period from 1990 to 2015. In order to observe the relationship between military expenditure and income inequality, we have employed an OLS-fixed effect model. In sum, the general result to be claimed is that military expenditures are positively and significantly associated with income inequality. In other words, military expenditures contribute to increase inequality so confirming the prevailing literature.

For the sake of robustness, we have employed three different measures of income inequality, namely two Gini indexes computed by different sources and a Theil index. Yet, in the same vein we have employed three different measures of military expenditures: (i) the military spending in absolute terms; (ii) the military expenditures per capita; (iii) the military burden, namely the ratio between military expenditure and GDP. The main results are robust when employing different measures of both income inequality and military expenditures. The magnitude of the effect of military spending on income inequality appears to be relevant. If using the Gini index computed by GID, the estimated coefficient on military expenditure shows that a 1-point percent change in military expenditure in the previous year leads to a change slightly greater than 0.02% in the income inequality in the current year. The impact appears to be even greater when using the Theil index: a 1-point percent change in military expenditure in the previous year leads to a change close

Table 10. The crowding-out argument.

	(10.1)	(10.2)	(10.3)	(10.4)	(10.5)	(10.6)
Dependent variables (logged)	Subsidies and Transfers	Subsidies and Transfers	Health Expenditure	Health Expenditure	Education Expenditure	Education Expenditure
Milex/GE t-1 (logged)	−0.724***	−0.713***	−0.000	0.006	0.014	0.009
	(0.069)	(0.050)	(0.006)	(0.007)	(0.011)	(0.010)
GDP t-1 (logged)	0.494***	0.972***	0.966***	0.885***	0.980***	0.914***
	(0.115)	(0.262)	(0.043)	(0.053)	(0.058)	(0.074)
Population (logged)	−5.178***	−6.312***	0.600	1.513***	0.135	1.046
	(1.640)	(2.123)	(0.389)	(0.535)	(0.927)	(1.018)
Unemployment (logged)	0.065*		0.010		0.055***	
	(0.032)		(0.027)		(0.020)	
Unemployment t-1 (logged)		0.020		0.035*		0.043**
		(0.038)		(0.018)		(0.017)
Openness t-1 (logged)		0.158		0.309**		0.395**
		(0.262)		(0.140)		(0.170)
EU (dummy)		0.084		0.084		−0.071
		(0.125)		(0.058)		(0.055)
Time Trend		−0.061**		−0.001		−0.001
		(0.025)		(0.005)		(0.009)
Constant	88.396***	95.021***	−11.255*	−25.041***	−4.986	−19.393
	(27.003)	(30.973)	(6.290)	(8.399)	(15.324)	(16.189)
Observations	369	369	379	379	306	306
Number of countries	23	23	26	26	23	23
R-squared within	0.670	0.680	0.874	0.884	0.882	0.889
R-squared between	0.250	0.216	0.879	0.715	0.956	0.807
R-squared overall	0.060	0.053	0.885	0.734	0.943	0.793

Robust Standard errors in brackets; statistical significance *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

to 0.05% of the Theil measure. The control variables exhibit the expected signs. Among them, it is worth noting that armed conflict appears to be a 'leveller' since it appears to reduce inequality. Instead, military conscription appears to have a redistributional effect because its coefficient is negative. General results are also confirmed after we performed a variety of robustness tests. In sum, it is possible to maintain that military spending has contributed to increase income inequality in the countries considered. When considering a non-linearity the results show that there could be a concave relationship between military spending and income inequality.

In order to deal with the issue of endogeneity, we have also employed an additional IV estimation. If using GINI and Theil provided by GID, general results are confirmed and military expenditures are to be considered exogenous (with only one exception). When considering the Gini provided by SWIID, the endogeneity test reveals that military expenditures can be considered endogenous. In any case, the positive association between income inequality and military expenditures is confirmed. As it is widely known in an established literature on inequality, the reliability of data is crucial and different measures of inequality may lead to different results. In brief, even considering this issue, the general results appear to be confirmed. Military spending appears to increase income inequality.

Eventually, we have investigated the 'crowding-out argument'. Empirical results show that expenditures for subsidies are negatively influenced by military spending so confirming the crowding-out argument but there is no significant evidence when considering education and health expenditures. In other words, there is no clear-cut compelling evidence on the crowding-out effect of military expenditures. The plausible interpretation we propose is that since both education and health expenditures are mostly mandatory, it is highly plausible that the crowding-out effect in the short-run takes the shape of a reduction in subsidies and transfers which are often more discretionary.

Finally, the results of this paper suggest that military expenditures can have a detrimental impact on the national economy through an increase in income inequality. However, at the same time, these results confirm that unveiling the channel through which military expenditures have an impact on the national economy is not an easy task.

Notes

1. If considering the Transparency International CPI index, it would be easy to verify that the average score of transition countries considered in this study is systematically worse than the European average in the period 1995–2017.
2. Data are drawn from SIPRI.
3. We have chosen to employ alternative measures of income inequality in the light of the [see among others Atkinson and Brandolini (2001) (Atkinson and Brandolini 2009), Jenkins (2015), Deininger and Squire (1996)].
4. See http://gcip.info/about.
5. The dataset and the codebook are accessible following the link: http://www.prio.no/CSCW/Datasets/Armed-Conflict/UCDP-PRIO/.
6. Please refer to Chletsos and Roupakias (2018) for explanations and literature employing a shift-share. To calculate our shift-share, we interpolate the data on military expenditure in order to obtain a series without missing values, namely a complete time series. Then, we compute the share of each country on total defense spending of the sample of countries taken into account (on total military spending of transition countries) for the base year 1990. After that, we multiply the initial share of each country by the total military expenditure in each year. Finally, we divide the result of multiplication by the GDP.
7. Differently from Chletsos and Roupakias (2018), we do not use a second instrument.
8. Definition: Subsidies, grants, and other social benefits include all unrequited, non-repayable transfers on current account to private and public enterprises; grants to foreign governments, international organizations, and other government units; and social security, social assistance benefits, and employer social benefits in cash and in kind (World Development Indicators, World Bank).
9. Definition: current health expenditures include health-care goods and services consumed during each year. This indicator does not include capital health expenditures such as buildings, machinery, IT and stocks of vaccines for emergency or outbreaks. (World Development Indicators, World Bank).
10. Education expenditures include expenditure funded by transfers from international sources to the government. General government usually refers to local, regional and central governments (World Development Indicators, World Bank).

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Appendix

Table A1. List of countries included in the analysis.

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

Table A2. Military conscription.

Countries	Military Conscription	Year of Abolition
Albania	NO	2010
Armenia	YES	
Azerbaijan	YES	
Belarus	YES	
Bosnia and Herzegovina	NO	2006
Bulgaria	NO	2008
Croatia	NO	2008
Czech Republic	NO	2004
Estonia	YES	
Georgia	YES	
Hungary	NO	2004
Kazakhstan	YES	
Latvia	NO	2004
Lithuania	YES	
Macedonia	NO	2006
Moldova	YES	
Montenegro	NO	2006
Poland	NO	2006
Romania	NO	2007
Russia	YES	
Serbia	NO	2011
Slovakia	NO	2006
Slovenia	NO	2003
Tajikistan	YES	
Ukraine	YES	
Uzbekistan	YES	

Source: CIA world factbook.

Table A3. List of countries included in the first robustness check.

> 40% of Median Population	> 60% of Median Population	> 80% of Median Population
Albania	Azerbaijan	Azerbaijan
Armenia	Belarus	Belarus
Azerbaijan	Bosnia and Herzegovina	Bulgaria
Belarus	Bulgaria	Czech Republic
Bosnia and Herzegovina	Czech Republic	Hungary
Bulgaria	Georgia	Kazakhstan
Czech Republic	Hungary	Poland
Georgia	Kazakhstan	Romania
Hungary	Moldova	Russia
Kazakhstan	Poland	Serbia
Lithuania	Romania	Slovakia
Moldova	Russia	Tajikistan
Poland	Serbia	Ukraine
Romania	Slovakia	Uzbekistan
Russia	Tajikistan	
Serbia	Ukraine	
Slovakia	Uzbekistan	
Tajikistan		
Ukraine		
Uzbekistan		