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DEFENSE EXPENDITURE AND ECONOMIC GROWTH IN NATO COUNTRIES

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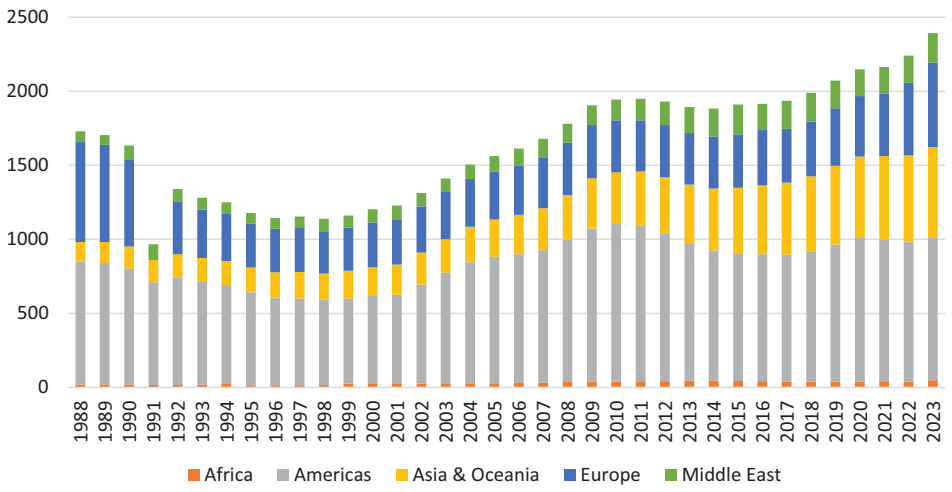
Recent years have seen a considerable rise in defense expenditure as well as a rising share of military equipment in defense budgets, particularly in the Eastern European NATO countries. This raises the question of whether and how these changes are likely to affect the economic growth rate. We examine the relationship between defense expenditure, its structure, and economic growth over the past 20 years, with a particular focus on NATO countries. We find rather weak evidence that defense expenditure, and especially its structure, is systematically related to the economic growth rate. This may indicate the crucial role of country-specific or time-specific factors, such as how defense expenditure is financed, how efficiently it mitigates military threats, whether military equipment is produced domestically, and whether it generates technology spillovers to other sectors. Moreover, one should consider the potential endogeneity of the size and structure of defense expenditure, the lack of a good proxy for military threat, and the inability to model long-term impacts and technology spillovers to other sectors.

Introduction

In recent years, significant changes in the geopolitical landscape have intensified military spending, particularly in NATO countries. In 2023, global military expenditure reached a record $2.4 trillion, an increase of 27.1% since 2014. Military expenditure in Europe grew by 61.3% over the same period, while military expenditure in the Americas increased by 10.8% (Fig. 1).

The ongoing war in Ukraine has amplified concerns over national security, prompting NATO and neighboring nations to prioritize defense. This marks a 19.0% increase in NATO countries' military expenditure since 2014[1]. The significant increase in NATO military expenditure reflects both growing security concerns and the need for advanced military technologies to address evolving military threats.

Fig. 1. Defense expenditure by region from 1988 to 2023 (billions of US dollars, constant 2022 prices)



Note: Data on defense expenditure in Europe in 1991 was not available

Source: Authors' elaboration using SIPRI data

Current economic conditions, characterized by inflationary pressures, economic instability, and national security concerns, have multiple effects on defense expenditure and budgets. First, post-COVID inflationary trends have raised the costs of military procurement and operations, further straining budgets. Second, economic instability — characterized by stagnant GDP growth, especially in Europe, and suppressed consumer spending — has influenced government priorities.

Rapid scientific and military technological advancements have also played a pivotal role in shaping defense budgets in recent years. Investments in emerging technologies, including artificial intelligence, drones, robotics, and electronic warfare, are essential for modern defense but costly, driving increased R&D and equipment expenditures in the defense sector.

Military expenditure has increased globally, driven by major powers such as the United States, Europe, China, and Russia. This trend underscores an emphasis on military preparedness amid escalating geopolitical tensions. As a result, defense spending now reflects broader national security strategies, particularly in a world facing new warfare tactics and technologies since Russia's invasion of Ukraine.

In response to security challenges, NATO countries have seen notable increases in defense spending, driven by the perceived Russian threat and the need to modernize military capabilities. NATO countries contribute approximately $1.3 trillion (55%) of total global military expenditures[2]. Older NATO members have prioritized military expenditure, achieving the 2% of GDP target for defense spending in alignment with NATO guidelines established at the 2014 NATO Summit in Vilnius. Countries closer to Russia, such as Poland, Latvia, Lithuania, and Estonia, have significantly increased defense spending, surpassing the 2% mark,

with plans to reach 3–4% of GDP in 2025 and nearly 5% by 2028[3]. Their primary concern remains the potential threat of Russian military aggression to their national security and independence.

A deeper understanding of military expenditure requires an analysis of its structure. Military expenditure is categorized into four main components: equipment, personnel, infrastructure, and other expenditures. The most significant shift in NATO spending has occurred in the equipment category[4]. In 2014, the average spending on equipment was 14%, but SIPRI estimates indicate that it will reach 33% of military spending by 2024[5]. Conversely, average personnel expenditures have declined from 61% in 2014 to an estimated 39% in 2024. Poland leads this trend, planning to allocate 53% of its defense budget to equipment. Similarly, the Baltic countries are allocating a higher-than-average share to equipment, exceeding the 33% mark[6]. NATO countries' spending trends reflect a growing focus on technologically advanced systems, including drones, robotics, air defense, electronic warfare, and cyber-capable defense mechanisms.

This article explores the relationship between defense expenditure, its structure, and economic growth over the last 20 years, with a particular focus on NATO countries.

Two hypotheses are tested in our article:

H1: Size of defense expenditure is related to economic growth.

H2: Structure of defense expenditure is related to economic growth.

The remainder of this article is structured as follows. The first section provides a literature review of key economic theories employed in defense economics to analyze the role of military expenditure in economic growth. The second section discusses methodology and data. Finally, the third section presents the results of several regression models capturing the relationship between defense spending, its structure, and economic growth.

1. Literature review

This section briefly reviews the main theoretical models of defense economics regarding the relationship between defense expenditure and economic growth. In particular, it highlights the features of Keynesian (demand) approach, supply and neoclassical approaches, views of Marx and Schumpeter, as well as modern economic theories.

Keynesian approach (demand models)

Keynesian economics views military expenditure as a tool to boost aggregate demand, leading to higher resource utilization, reduced unemployment, and potentially enhanced economic growth[7]. In the Keynesian approach, fiscal multipliers play a central role by assessing the effect of government military spending on economic growth. According to Keynesian models, military spending may sometimes act as a counter-cyclical economic measure during downturns.

While Keynesian models recognize the short-term economic benefits of defense spending, many critiques focus on the long-term effectiveness of government spending, such as sustainability, resource misallocation, potential inefficiencies, and dependency on government expenditure. These concerns may limit the broader economic impact of military expenditure policies[8].

Supply-side economics

Supply-side economics emphasizes the positive effects of military expenditure through technological spillovers, human capital development, and improvements to the industrial base. However, the negative effects of such models relate to the opportunity costs of military expenditures: defense spending may divert resources from infrastructure investment, potentially affecting long-term economic growth. Additionally,

high defense spending can reduce funds allocated to sectors such as education and healthcare, ultimately impacting productivity and economic potential[9].

Neoclassical approach and the Feder–Ram model

Neoclassical models integrate Keynesian demand-side factors and supply-side constraints, seeking to balance the effects of military spending within an equilibrium framework. One of the best-known models in the neoclassical approach is the Feder–Ram model. This model examines trade-offs between military spending and economic growth. The Feder-Ram model treats military spending as a separate sector and may be useful for understanding how defense expenditures influence economic performance (Feder and Ram, 1996). Paul Dunne criticized the Feder-Ram model for multiple econometric issues, including multicollinearity, and recommended avoiding its use in quantitative analysis[10].

Marxist theory and Schumpeter's critique

Marxist theory argues that capitalism inherently drives the need for continuous military expenditures to resolve internal and external contradictions. According to this theory, the law of diminishing profit rates incentivizes capitalists to engage in military investments to protect their economic interests through government preservation and long-term vested interests in the military industry. Karl Marx contended that military spending is integral to maintaining capitalist economies, as it helps manage domestic unrest and addresses external threats, reinforcing capitalism[11].

However, some, including Schumpeter, argue that Marxist theory underestimates the complexity of defense economics in non-capitalist systems and overemphasizes the role of class struggles in shaping defense policies. According to Schumpeter, military spending can create demand, absorb surplus capital, and delay economic crises, countering Marx's idea of an inevitable capitalist collapse[12].

Defense economics as part of modern economic theories

Defense economics emerged as a specialized field within economic theory in the 1970s. Scholars like Benoit[13] and Dunne[14] laid the groundwork, highlighting the complex interrelations between military spending and economic outcomes on national and global scales. However, there is no consensus on the influence of military spending on economic growth in recent economic research. Most authors agree that military spending impacts different economic channels — supply, demand, and security — differently[15]. Moreover, different categories of military spending tend to affect economic growth in varying ways.

For example, Saeed, using panel data from 133 countries, found that military expenditure has a negative fiscal multiplier of –1.1 on economic growth[16]. Maybery[17] concluded that in some developing countries, demilitarization leads to a 1% increase in GDP per capita in the long term, while militarization results in a –2% decline in annual GDP per capita. Wang et al.[18] determined that military expenditure crowds out investments and restrains economic growth. Additionally, they found negative causality between the burden of military expenditure and democratic processes.

Conversely, Olejnik [19] concluded that military expenditure has cumulative fiscal multipliers of 0.6 in the first year and 1.5–1.6 in the second and third years. Becker and Dunne[20] found that different categories of military expenditure have varying effects on economic growth. Specifically, the negative impact is primarily driven by personnel expenses, while military spending on

equipment does not exhibit a negative effect on growth.

Alptekin and Levine[21] found positive nonlinear effect of defense expenditure on economic growth in the developed countries.

When analyzing military expenditure, it is important to distinguish between short-term and long-term effects. Per basic economic textbooks and general media references in the short term, higher defense spending can generate employment within the defense sector and related industries. However, these increases often come at the expense of other public sectors, as funds may be redirected from health, education, and infrastructure.

The long-term impact of high defense expenditures is more complex. Sustained military spending could divert resources from essential areas such as education and infrastructure, affecting economic growth patterns and societal well-being. Additionally, prolonged high defense spending could raise public debt levels and pose concerns about fiscal sustainability.

2. Data and methods

The academic literature has a long tradition of studying the relationship between defense expenditure and economic growth at the country level. These studies, however, differ substantially in their geographical coverage and methodology.

The most common quantitative methods used in defense economics literature can be split into four categories.

First, many studies employ ordinary least squares multifactor regression models in which defense expenditure is one of the factors affecting economic growth. Some authors give preference to cross-section models[22], while others rely on panel data regression models with fixed effects[23].

Second, the association between military expenditures and economic performance can be measured by Spearman Rank Correlation[24]. However, association does not imply causality. Although the Granger causality method can be employed to test whether changes in defense expenditures occur before or after changes in economic growth[25], both these methods neglect the role of other factors in shaping economic performance. Therefore, the results of one-factor models (in which economic growth is a function of only one factor — defense expenditure) are likely to be biased (omitted variable bias).

Third, defense literature often employs a Feder–Ram Model[26]. Although it analyzes trade-offs and offers insights into the complex relationship between military spending and economic development, this approach has been criticized[27].

Fourth, more complex methods using specific assumptions on the data structure include, for instance, Panel Vector Autoregression which can be used for dynamic analysis of the impact of defense spending[28]. Network General Equilibrium GVAR approach, which evaluates broader macroeconomic effects, incorporating interactions between economic agents[29], and Autoregressive Distributed Lag (ARDL) method, which captures both long-term and short-term impacts of defense expenditure on economic growth[30].

We follow the defense economics literature mainstream to employ cross-section and panel data fixed effects regression models. Unlike Spearman rank correlation and Granger causality methods, it does not rely on the assumption that defense expenditure is the only driver of economic performance, allowing for the incorporation of other factors. It also does not need specific data structure assumptions employed in more complex methods.

Our primary data source for defense expenditures was SIPRI. We also used ACLED (Armed Conflict Location and Events Data) database[31] for military threat proxy. Data on the distance between capital cities were

obtained from distancefromto.net. Data on institutional quality comes from World Bank governance indicators database[32], while other economic data come from the IMF and the OECD.

We use Microsoft Excel software for database construction and preliminary analysis, as well as EViews software for econometric modeling.

3. Empirical results

All models are wrong, but some are useful.[33]

First, we conduct cross-section regression models in which each country represents a single observation. To ensure a sufficiently large number of observations we use a global sample of countries. In cross-section regression models we test only the relationship between total defense expenditures and economic growth, since the composition of defense expenditures is not available for the global country sample. Then we switch to panel data regression models where each observation corresponds to a country-year. The availability of a sufficiently large number of observations allows us to restrict the sample to NATO countries, allowing to test also the relationship between the structure of defense expenditure and economic growth.

Cross-section regression models

We begin our empirical analysis with single-factor regression models in which GDP growth rate is modeled as a function of a single variable — defense expenditure (measured as a percentage of GDP). Both variables represent average values over the most recent decade for which data are available (2014–2023). We use three country samples: (1) a global sample, (2) a global sample excluding outliers, and (3) an OECD country sample.

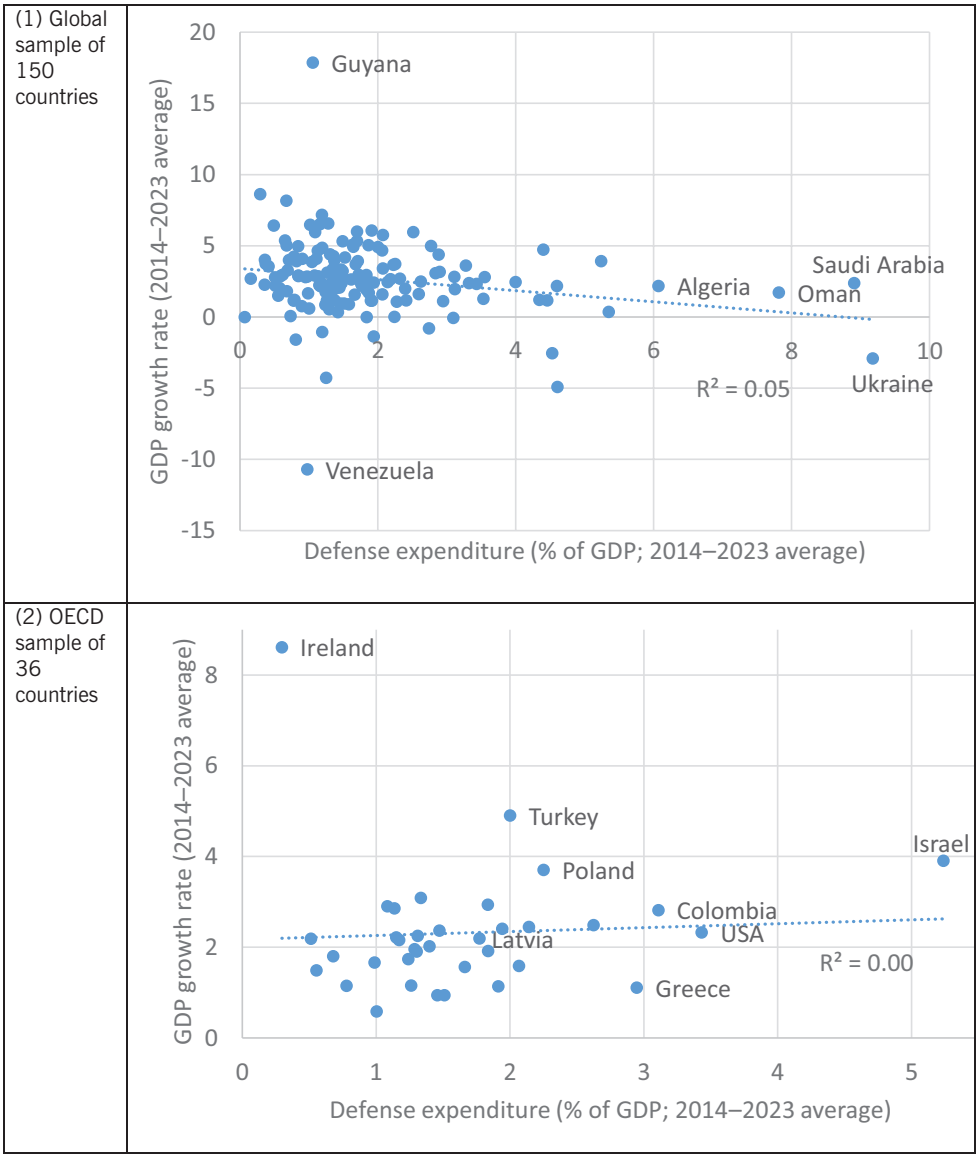
Our first sample consists of all countries with available data (150 countries). There is a weak negative relation between military spending and economic growth. Although this relationship is statistically significant at the 1% level, cross-country variations in defense expenditure explain only a small fraction (5%) of the differences in GDP growth across countries.

Since our first sample includes a few clear outliers that may significantly influence the results, the next step is to exclude outliers. We excluded countries with GDP growth more than 10% per year or less than –10% per year, as well as countries with military spending higher than 6% of GDP. By excluding these outliers (six countries) we obtained a second sample of 144 countries. Excluding outliers did not have a notable impact on our empirical results — the relationship between military spending and economic growth remained weakly negative, albeit statistically significant at the 1% level.

Our third sample consists of 36 Organisation for Economic Co-operation and Development (OECD) countries with available data. We did not find a significant relationship between defense expenditure and economic growth among OECD countries. However, this relationship becomes positive ($R^2 = 0.16$) and statistically significant at the 5% level if Ireland were excluded (which is a notable outlier exhibiting the fastest economic growth among all OECD countries over the recent decade, while maintaining the lowest defense expenditure, at approximately 0.3% of GDP (Fig. 2, Table 1).

Next we add several other potential growth determinants to our regression model and test the relation between military spending and economic growth by employing multi-factor regression models. This step is crucial to addressing potential omitted variable bias. Since economic growth is influenced by numerous factors, failing to account for key growth determinants may lead to biased estimates.

Fig. 2. Relationship between defense expenditure and economic growth



Note: GDP is measured at constant prices
Source: International Monetary Fund World Economic Outlook database (October 2024) and SIPRI data; authors' calculations

First, we include initial GDP per capita to account for a probable beta-convergence effect, whereby national income growth tends to be negatively related to the initial income level. Second, we include investment (percentage of GDP) to capture the crucial role of physical capital accumulation in economic growth. Third, we add population growth

Table 1. Single-factor regressions between defense expenditure and economic growth (cross-sectional data; averages over 2014–2023)

Sample:	(1) Global	(2) Global excluding outliers	(3) OECD
Military spending	–0.39*** (0.15)	–0.45*** (0.16)	0.09 (0.26)
Constant	3.41*** (0.35)	3.50*** (0.32)	2.17*** (0.48)
R2	0.05	0.05	0.00
Observations	150	144	36

Notes: *, **, *** denote statistical significance at 10%, 5%, and 1% level, respectively.

Standard errors are in parentheses.

The dependent variable is GDP growth (percentage, at constant prices, annual average over 2014–2023).

The six outliers excluded in the second regression are Ukraine, Saudi Arabia, Oman, Algeria, Guyana, and Venezuela. The third country sample excludes two OECD countries (Costa Rica and Iceland) due to the unavailability of defense expenditure.

Source: Authors' calculations based on International Monetary Fund and SIPRI data.

rate to control for the capital-widening effect, as faster population growth necessitates greater physical capital accumulation to maintain the capital-to-labor ratio and is therefore expected to be negatively related to income growth. Fourth, we include trade openness, measured as the sum of exports and imports (both as a percentage of GDP), to capture any positive effects of international trade on national welfare. Fifth, we add the government effectiveness variable from the World Bank's governance indicators to reflect a likely positive impact of institutional quality on economic growth. Furthermore, in line with theoretical growth models, we redefine the dependent variable as GDP per capita growth instead of GDP growth. Our sample consists of 138 countries for which the relevant data are available.

Our results indicate a weak negative relationship between defense expenditure and economic growth; however, this relationship is not statistically significant (p-value = 0.13). The influence of other variables on economic growth is largely confirmed. As expected, initial income level and population growth are negatively associated with GDP per capita growth at the 1% significance level. In turn, investment and institutional quality are positively associated with GDP per capita growth, also at the 1% significance level. The only exception is trade openness, which appears to be positively associated with GDP per capita growth; however, this relationship is not statistically significant (Table 2, Model 1).

Note, however, that these results may still be biased since some independent variables in our regressions may be endogenous. For instance, another factor, such as military threat, could simultaneously raise defense expenditure and decrease GDP per capita growth, which could lead to a negative relationship between defense expenditure and economic growth even if defense expenditure itself has no causal effect on economic growth.

Except for natural experiments, these endogeneity concerns can be mitigated using

Table 2. Multi-factor regression between military spending and economic growth (cross-sectional data; averages over 2014–2023)

Model No.:	1	2	3	4
Military spending	–0.17 (0.11)	–0.15 (0.12)	–0.16 (0.12)	–0.17 (0.11)
Initial income (ln)	–1.61*** (0.27)	–1.62*** (0.27)	–1.61*** (0.27)	–1.61*** (0.27)
Investment	0.07*** (0.02)	0.07*** (0.02)	0.07*** (0.02)	0.07*** (0.02)
Population growth	–0.75*** (0.15)	–0.77*** (0.16)	–0.75*** (0.16)	–0.74*** (0.15)
Trade openness (*100)	0.47 (0.33)	0.48 (0.34)	0.47 (0.34)	0.49 (0.34)
Government effectiveness	1.72*** (0.30)	1.73*** (0.30)	1.72*** (0.30)	1.72*** (0.30)
Subjective military threat		-0.11 (0.23)		
ACLED total			–0.16 (0.94)	
ACLED danger				0.47 (1.56)
Constant	15.51*** (2.59)	15.73*** (2.64)	15.59*** (2.64)	15.45*** (2.61)
R2	0.38	0.38	0.38	0.38
Observations	138	138	138	138

Notes: *, **, *** denote statistical significance at 10%, 5%, and 1% level, respectively.

Standard errors are in parentheses.

The dependent variable is GDP per capita growth rate in % (purchasing power parity adjusted, at constant prices, annual average over 2014–2023). Initial income is GDP per capita in 2013 (purchasing power parity adjusted, at constant prices, in natural logarithms). Military spending and Investment are expressed in % of GDP (average over 2014–2023). Population growth rate is measured in % (annual average over 2014–2023). Trade openness is defined as a sum of exports and imports (% of GDP; 2014–2023 average). Government effectiveness is measured in value from –2.5 (worst institutions) to 2.5 (best institutions; 2014–2023 average). Subjective military threat is a categorical variable (0 — no external military threat; 1 — some military threat; 2 — substantial military threat).

Source: Authors' calculations based on International Monetary Fund, World Bank SIPRI, and ACLED data.

various econometric techniques but are rarely fully eliminated. For instance, the military threat variable is not directly observable. We tested three different proxies of military threat, but none of them was statistically significantly related to economic growth, nor did they alter the sign or statistical significance of the defense expenditure variable.

Our first proxy for military threat is subjective — for each of the 138 countries, we

assigned a value of 0 if no external military threat was perceived (43 countries), a value of 1 for countries with some military threat (61 countries), and a value of 2 for countries with substantial military threat (34 countries). Two other proxies for military threat are the danger and total scores from ACLED. Although two of the three military threat proxies were negatively associated with economic growth (when controlling for other growth determinants), neither had a statistically significant relationship with economic growth (Table 2; models 2, 3 and 4).

These results suggest that either our chosen variables are poor proxies for military threat, or military threat is not statistically significantly associated with economic growth. The former might reflect the fact that all employed military threat proxies are static and measured towards the end of the research period, thus, failing to account for changes in military threat over time, which could be significant for many countries over the recent decade. In turn, the latter could stem from the fact that our regressions control the impact of investments and institutions on economic growth. If the impact of military threat on economic growth operates primarily through delays in investment or the deterioration of institutions, the military threat variable would capture only an additional effect on economic growth beyond that accounted for by investment and institutional variables.

Our findings are broadly in line with the literature. A weak negative relationship between defense expenditures and economic growth also has been highlighted by Saeed[34], Mayberry[35], Harty[36], and Wang et al.[37] Several authors have used different military threat proxies, such as proximity to Moscow[38], the number of neighboring countries experiencing interstate violence[39], and country-specific demilitarization or militarization processes[40], but have found no consistent results.

Panel data regression models

First, we check whether military spending and the variables that appeared significant in a multi-factor cross-sectional regression (global sample) are related to economic growth in a panel data setup within the OECD countries. Second, we split the OECD country sample into subsamples of old OECD, new OECD, and Eastern European OECD countries, and repeat the exercise.

In regressions with country fixed effects, the relationship between military spending and economic growth is negative, and this effect is driven mainly by the old OECD country subsample. In contrast, in regressions with both country and time fixed effects, the relationship between military spending and economic growth is positive, but not statistically significant. The impact of other growth determinants is in line with our expectations, with initial income and population growth showing a negative sign, while investment is positively related to economic growth in all regressions at the 1% significance level (Table 3).

Next we turn to the sample of 30 NATO countries. In all regressions, military spending does not have a statistically significant relationship with economic growth when included alongside other growth determinants (Table 4).

The role of other variables in economic growth aligns with expectations when the regression includes fixed effects. Initial income levels and population growth are negatively related to GDP per capita growth at the 1% significance level. Moreover, investment and institutions are positively related to GDP per capita growth, also at the 1% significance level.

We included distance to Moscow as a proxy for military threat in NATO countries, but its relationship with economic growth was not statistically significant.

Table 3. Relationship between defense expenditure and economic growth (in OECD countries over 2004–2023)

Sample:	OECD (36 countries)		Old OECD (19 countries)		New OECD (17 countries)		Eastern European OECD (9 countries)	
Model No:	1	2	3	4	5	6	7	8
Military spending	–0.83*	0.12	–1.83**	0.22	–0.62	0.33	–0.50	0.17
	(0.43)	(0.32)	(0.77)	(0.58)	(0.54)	(0.41)	(0.77)	(0.60)
Initial income (ln)	–6.38***	–7.56***	–8.83***	–4.56***	–4.96***	–9.80***	–3.68**	–13.70***
	(1.03)	(1.05)	(2.06)	(1.72)	(1.31)	(1.74)	(1.72)	(2.84)
Investment	0.41***	0.31***	0.36***	0.24***	0.52***	0.38***	0.57***	0.48***
	(0.04)	(0.03)	(0.06)	(0.04)	(0.06)	(0.04)	(0.07)	(0.06)
Population growth	–1.64***	–1.10***	–1.80***	–1.35***	–1.46***	–0.84***	–1.46***	–0.69**
	(0.29)	(0.20)	(0.43)	(0.30)	(0.38)	(0.26)	(0.55)	(0.34)
Government effectiveness	1.49*	2.03***	0.87	1.79**	1.88*	2.18***	2.96	0.75
	(0.79)	(0.59)	(1.12)	(0.88)	(1.14)	(0.82)	(1.90)	(1.23)
Constant	59.82***	72.26***	91.00***	43.02***	40.37***	91.50***	24.96	130.62***
	(11.09)	(10.85)	(22.58)	(18.38)	(13.71)	(17.60)	(18.05)	(28.57)
R2	0.31	0.70	0.22	0.67	0.39	0.75	0.40	0.81
Country fixed effects	Included	Included	Included	Included	Included	Included	Included	Included
Time fixed effects		Included		Included		Included		Included
Observations	720	720	380	380	340	340	180	180

Notes: *, **, *** denote statistical significance at 10%, 5%, and 1% level, respectively.

Standard errors are in parentheses.

The dependent variable is GDP per capita growth rate in % (purchasing power parity adjusted, at constant prices). Initial income is GDP per capita one year before (purchasing power parity adjusted, at constant prices, in natural logarithms).

The subsample of old OECD consists of 19 countries which founded OECD in 1960. The subsample of new OECD consists of 17 countries which joined OECD later than 1960. The subsample of Eastern European OECD consists of 9 countries: Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Slovakia, Slovenia, and Turkey.

Source: Authors' calculations based on International Monetary Fund, World Bank, and SIPRI data.

Finally, we examine the relationship between the structure of defense expenditure and economic growth. Since data on the structure of defense expenditure is available only for NATO countries and for the past ten years, we conduct this analysis solely on a sample of NATO countries. We divide military spending into four components — equipment, personnel, infrastructure, and other (with the latter serving as a control factor and thus not included in the regression outputs). Furthermore, we conduct

these regressions separately for old NATO and new NATO country subsamples.

Our results suggest that variables reflecting the structure of defense expenditure are statistically significant in some regression specifications. Out of nine regressions, the share of equipment spending is positively related to economic growth in four cases — two of which are statistically significant at the 5% level and the other two at the 10% level. However, since total military spending is statistically significantly negatively related to economic growth in these regressions, it cannot be concluded that equipment spending itself has a positive effect on economic growth. Conversely, the share of personnel spending is statistically significantly negatively related to economic growth in three regression specifications — two at the 1% significance level and one at the 5% level (Table 5).

Our findings regarding the relationship between the structure of defense expenditure and economic growth are broadly in line with the literature. In particular, Becker et al.[41] and Olejnik[42] also pointed out that equipment spending might be positively related to economic growth, while personnel spending is negatively related.

Table 4. Relation between military spending and economic growth (in NATO countries over 2004–2023)

Sample:	NATO 30 countries		
Model No:	1	2	3
Military spending	–0.01 (0.23)	–0.03 (0.46)	0.43 (0.33)
Initial income (ln)	–0.93 (0.58)	–5.43*** (1.09)	–7.35*** (1.08)
Investment	0.29*** (0.03)	0.41*** (0.04)	0.29*** (0.03)
Population growth	–1.28*** (0.23)	–2.09*** (0.29)	–1.46*** (0.18)
Government effectiveness	0.30 (0.36)	2.68*** (0.93)	2.44*** (0.66)
Distance to Moscow (ln)	0.24 (0.31)	–1.46 (10.31)	–3.93 (6.54)
Constant	3.14 (6.42)	58.06 (78.63)	98.87* (50.99)
R2	0.23	0.35	0.75
Country fixed effects		Included	Included
Time fixed effects			Included
Observations	600	600	600

*Notes:**, **, *** denote statistical significance at 10%, 5%, and 1% level, respectively.

Standard errors are in parentheses.

The distance to Moscow is measured as air distance from the capital city of respective country in kilometers.

Source: Authors' calculations based on International Monetary Fund, World Bank, SIPRI, and distancefromto.net data.

Table 5. Relation between military spending and economic growth (in NATO countries over 2014–2023)

Sample:	NATO			Old NATO			New NATO		
Model No:	1	2	3	4	5	6	7	8	9
Military spending	–0.69*	–3.41***	–1.63***	–0.38	–4.87***	–1.18	–1.67*	–4.11***	–2.95***
	(0.36)	(0.95)	(0.56)	(0.46)	(1.36)	(0.83)	(0.89)	(1.45)	(0.88)
Initial income (ln)	–1.95**	–19.23***	–8.54***	–3.51**	–47.06***	–14.75**	–2.29	–12.08**	–7.57
	(0.95)	(3.47)	(2.76)	(1.57)	(6.28)	(5.88)	(1.52)	(4.77)	(5.66)
Investment	0.11**	0.29***	0.01	0.10	0.52***	0.37***	0.07	0.17	–0.25**
	(0.06)	(0.10)	(0.07)	(0.07)	(0.16)	(0.10)	(0.09)	(0.15)	(0.10)
Population growth	–1.47***	–1.75***	–1.34***	–1.13**	–1.00	–1.09**	–1.86***	–1.87***	–1.27***
	(0.27)	(0.34)	(0.20)	(0.53)	(0.70)	(0.42)	(0.37)	(0.41)	(0.24)
Government effectiveness	0.61	2.27	1.53	0.69	1.91	1.83	1.04	1.59	1.48
	(0.65)	(1.59)	(0.98)	(0.87)	(2.06)	(1.27)	(1.03)	(2.58)	(1.60)
Equipment share	0.07**	0.02	0.05*	0.07	–0.01	0.04	0.10*	0.00	0.09**
	(0.03)	(0.05)	(0.03)	(0.05)	(0.06)	(0.04)	(0.05)	(0.08)	(0.04)
Personnel share	0.01	–0.21***	–0.05	–0.01	–0.28***	–0.01	0.03	–0.24**	–0.03 (0.06)
	(0.03)	(0.05)	(0.04)	(0.03)	(0.07)	(0.05)	(0.05)	(0.10)	
Infrastructure share	0.01	0.02	0.00	0.20	0.31	–0.03	0.03	–0.13	0.00
	(0.08)	(0.11)	(0.07)	(0.15)	(0.20)	(0.13)	(0.11)	(0.14)	(0.09)
Constant	18.72*	212.01***	94.64***	35.65**	516.43***	152.16**	22.68	141.15***	89.85
	(9.93)	(37.28)	(28.73)	(17.00)	(69.75)	(64.49)	(15.81)	(50.44)	(57.25)
R2	0.20	0.37	0.80	0.12	0.44	0.83	0.23	0.36	0.80
Country fixed effects		Included	Included		Included	Included		Included	Included
Time fixed effects			Included			Included			Included
Observations	300	300	300	160	160	160	140	140	140

Notes: *, **, *** denote statistical significance at 10%, 5%, and 1% level, respectively.

Standard errors are in parentheses.

The subsample of old NATO consists of 16 countries: Belgium, Canada, Denmark, France, Germany, Greece, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Turkey, United Kingdom, United States.

The subsample of new NATO consists of 14 countries: Albania, Bulgaria, Croatia, Czech Republic, Estonia, Finland, Hungary, Latvia, Lithuania, Montenegro, Poland, Romania, Slovakia, Slovenia.

Source: Authors' calculations based on International Monetary Fund, World Bank and SIPRI data.

Conclusions

Our quantitative analysis suggests that the relationship between defense expenditure, its structure, and economic growth is not universal. In the majority of regressions the relationship between defense expenditure and economic growth was found negative, but this negative relationship was statistically significant in only some cases. Also, while in some cases spending on military equipment appears to be more growth-friendly than spending on military personnel, the empirical results are not unambiguous.

First, this may indicate the crucial role of country-specific or time-specific factors. For instance, whether an increase in defense expenditure has a positive or negative impact on economic growth may depend on how efficiently it mitigates military threat, whether it has technology spillovers on the other sectors or the extent to which military equipment is produced domestically. Moreover, it can reflect whether an increase in defense expenditure is financed by larger budget deficits, cuts in other public spending categories, or increases in tax rates.

Second, one should consider that there is currently too little empirical evidence that an increase in military spending enhances economic growth. Therefore, if one expects that the recent rise in military spending in Eastern European NATO countries will necessarily be growth-enhancing, this may be wishful thinking. However, this does not imply that increasing defense expenditure is unnecessary — it may be essential for other reasons, such as national security considerations, which are beyond the scope of this article.

Third, research limitations should be considered. Potential endogeneity in the size and structure of military spending, the unobservability of military threat, and the inability to model long-term impacts and technology spillovers to other sectors suggest that the results of this and similar studies should be interpreted with caution. Further research may identify better proxies for military threat, explore the role of military equipment exports, and consider incorporating additional factors, such as the investment climate, into growth regressions.

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About the Authors

Dr. **Oleg Krasnopjorovs** is an associate professor in the Faculty of Economics and Social Sciences of the University of Latvia. He obtained a PhD in Economics (subfield of Econometrics) from the University of Latvia in 2013. Moreover, he completed several study courses in macroeconomics and econometrics in Austria, Germany, Switzerland and the UK. He has nearly 20 years of experience in economic analysis, data analysis, and research at the Bank of Latvia, where he is currently a Chief Economist in the Monetary Policy department. He is the author of several Bank of Latvia working papers, discussion papers, and more than 200 newspaper columns. He has gained professional experience as a deputy director of University of Latvia Productivity Institute (think-tank "LV PEAK"), member of Strategic Management Council in education research of the Ministry of Education and Science, and chairman of the board of the Latvian Econometricians' Association. His research interests cover the topics of economic growth and productivity, urban economics and well-being, labor market, as well as economics of education and healthcare.

Dr. **Joseph Menaker** started his career at the Institute of Economics of the Latvian Academy of Sciences. He continued his research work at the NYC Department Finance and

Taxation after immigrating to the USA in 1989. Dr. Menaker's dissertation topic was the Econometric Modeling of Regional Economies. During his years as a research scientist, Dr. Menaker published over twenty research papers and books, and participated in numerous scientific conferences as a panelist and keynote speaker. As a serial entrepreneur, over the years, Dr. Menaker, cofounded ISP Optics Corporation and UAV Factory, with the high-tech manufacturing locations in Latvia and USA. Both companies were acquired by USA corporations in 2016 and 2021, accordingly. In 2022, Dr. Joseph Menaker was awarded Honorary Doctorate Degree of Latvian Academy of Sciences. Dr. Menaker actively participates in growing a new generation of young entrepreneurs in Latvia as visiting professor at the University of Latvia and Riga Technical University. Currently, Dr. Menaker serves as a Board Member of Edge Autonomy Holdings (USA), Light Path Technologies (USA), European Policy Research Institute (Riga, Latvia), Alpha Unmanned Systems (Madrid, Spain), Military Technologies Association (Riga, Latvia), and Tsal Kaplun Foundation (a non-for-profit organization).

Par autoriem

Dr. **Oļegs Krasnopjorovs** ir Latvijas Universitātes Ekonomikas un sociālo zinātņu fakultātes asociētais profesors. 2013. gadā ieguvis doktora grādu ekonomikā (ekonometrijas apakšnozarē). Ir pabeidzis arī vairākus studiju kursus makroekonomikā un ekonometrijā Austrijā, Vācijā, Šveicē un Apvienotajā Karalistē. O. Krasnopjorovam ir gandrīz 20 gadu pieredze ekonomiskajā analīzē, datu analīzē un pētniecībā Latvijas Bankā, kur viņš šobrīd strādā par galveno ekonomistu Monetārās politikas pārvaldē. Viņš ir vairāku Latvijas Bankas darba dokumentu, diskusiju rakstu un vairāk nekā 200 laikrakstu sleju autors. Profesionālo pieredzi ieguvis kā Latvijas Universitātes Produktivitātes institūta (domnīcas "LV PEAK") direktora vietnieks, Izglītības un zinātnes ministrijas Stratēģiskās vadības padomes loceklis izglītības pētniecībā un Latvijas Ekonometristu asociācijas valdes priekšsēdētājs. Viņa pētnieciskās intereses ietver ekonomiskās izaugsmes un produktivitātes, pilsētu ekonomikas un labklājības, darba tirgus, kā arī izglītības un veselības aprūpes ekonomikas tēmas.

Dr. **Džozefs Menakers** darba gaitas uzsāka Latvijas Zinātņu akadēmijas Ekonomikas institūtā. Pēc imigrācijas ASV 1989. gadā viņš turpināja pētniecisko darbu Ņujorkas Universitātes Finanšu un nodokļu nodaļā. Dr. Menakera disertācijas tēma bija Reģionālo ekonomiku ekonometriskā modelēšana. Pētniecības gadu laikā Dr. Menakers publicējis vairāk nekā divdesmit zinātniskus rakstus un grāmatas, kā arī piedalījies daudzās zinātniskās konferencēs — gan paneļdiskusijās, gan kā galvenais runātājs. Būdams sērijveida uzņēmējs, Dr. Menakers gadu gaitā līdzdibināja *ISP Optics Corporation* un *UAV Factory*, ar augsto tehnoloģiju ražotnēm Latvijā un ASV. Abus uzņēmumus ASV korporācijas iegādājās attiecīgi 2016. un 2021. gadā.

2022. gadā Dr. Džozefam Menakeram tika piešķirts Latvijas Zinātņu akadēmijas goda doktora grāds. Dr. Menakers aktīvi piedalās jaunās jauno uzņēmēju paaudzes izaugsmē Latvijā kā viesprofesors Latvijas Universitātē un Rīgas Tehniskajā universitātē. Pašlaik Dr. Menakers ir valdes loceklis uzņēmumos *Edge Autonomy Holdings* (ASV), *Light Path Technologies* (ASV), *European Policy Research Institute* (Rīga, Latvija), *Alpha Unmanned Systems* (Madride, Spānija), *Military Technologies Association* (Rīga, Latvija) un *Tsal Kaplun Foundation* (bezpeļņas organizācija).

Avoti un piezīmes

1 SIPRI (2025). *SIPRI Yearbook 2024 Armament, Disarmament and International Security.* Oxford University Press.
2 SIPRI (2024). Global military spending surges amid war, rising tensions and insecurity. https://www.sipri.org/media/press-release/2024/global-military-spending-surges-amid-war-rising-tensions-and-insecurity
3 LSM.lv (2025). Premjere: Latvija jau šogad varētu aizsardzībā tērēt 4% no IKP. https://www.lsm.lv/raksts/zinas/ekonomika/04.03.2025-premjere-latvija-jau-sogad-varetu-aizsardziba-teret-4-no-ikp.a590230/?utm_source=lsm&utm_medium=article-body&utm_campaign=admin ; DELFI.ee (2025). https://www.delfi.ee/artikkel/120350986/video-koalitsioon-haaletas-erikomisjonis-riigisekretari-ametikoha-teema-maha-kovalenko-kolvart-michal-peidab-end
4 NATO (2024). Defense Expenditures of NATO countries 2014–2023. https://www.nato.int/cps/en/natohq/news_223304.htm
5 SIPRI (2024), op cit.
6 NATO (2024), op cit.
7 Keynes, John Maynard (1936). *The General Theory of Employment, Interest, and Money.* Harcourt.
8 Watterton, Joshua J. (2023). Military Spending and Economic Development: a theoretical note. *Human Geography*, Vol. 16 (2).
9 Krugman, Paul (1994). *Peddling Prosperity: Economic Sense and Nonsense in an Age of Diminished Expectations.* Norton & Co.
10 Dunne, John Paul (2002). *The Economic Impact of Military Expenditures*. Routledge.
11 Marx, Karl (1867). *Capital: Critique of Political Economy*. (2010 Edition). Penguin Classics; Watterton, 2023, op cit.
12 Schumpeter, Joseph Alois (1942). *Capitalism, Socialism, and Democracy.* Harper & Brothers.
13 Benoit, Emile (1973). *Defense and Economic Growth in Developing Countries.* Lexington Books.
14 Dunne, 2002, op cit.
15 Herrera, Remy, Gentilucci, Eleonora (2013). Military spending, technical progress, and economic growth: a critical overview on mainstream defense economics. *Journal of Innovation Economics & Management,* Vol. 2, (12), 13–35.
16 Saeed, Luqman (2023). The Impact of Military Expenditures on Economic Growth: New Instrumental Variables Approach. *Defence and Peace Economics*, Vol. 36 (1), pp. 86–101.
17 Mayberry, Anthony (2023). Demilitarization and Economic Growth: Empirical evidence in support of peace dividend. *Journal of Comparative Economics,* Vol. 51 (3), pp. 960–988.
18 Wang, Xinyi, Hou, Na, Chen, Bo (2022). Democracy, military expenditure and economic growth: A heterogenous perspective. *Defence and Peace Economics,* Vol. 34 (8), 1039–1070.
19 Olejnik, Lukasz Wiktor (2023). Short-run multiplier effect of military expenditures in NATO Eastern Flan Countries in 1999–2021. *Journal of Comparative Economics,* Vol. 51 (4), pp. 1344–1355.
20 Becker, Jordan, Dunne, John Paul (2021). Military Spending Composition and Economic Growth. *Defence and Peace Economics,* Vol. 34 (6), pp. 1–13.

[21] Alptekin, Aynur, Levine, Paul (2012). Military Expenditure and Economic Growth: a meta analysis. *European Journal of Political Economy*, Vol. 28 (4), pp. 636–650.
[22] Kuokštyte, Ringaile, Kuokštis, Vytautas, Miklaševskaja, Ieva (2021). External and domestic political determination of defense spending: a time series and cross section analysis of EU member states. *European Security*, Vol. 30 (2), pp. 197–217.
[23] Saeed, 2023, op cit.; Becker & Dunne, 2021, op cit.
[24] Waszkiewicz, Grzegorz, Taksás, Balázs (2023). Military Spending Among European NATO Members: the importance of strategic factors after 2014. *Journal of Security and Sustainablity Issue*s, Vol. 13 (1), 53–63.
[25] Harty, Nathaniel (2012). The Impact of Defense Spending on Economic Growth in the United States. *EEB Undergraduate Journal*. Vol. 5.
[26] Feder, G., Ram, R. (1996). The role of military spending in economic growth. *Journal of Development Economics*, Vol. 50 (1), 43–72.
[27] Dunne, 2002, op cit.
[28] Wang et al., 2022, op cit.
[29] Economidou, Claire, Karamanis, Dimitris, Kecrinioti, Alexandra, Konstantakis, Konstantinos N., Michaelidos, Panayotis (2024). Unpacking the dynamics of military spending in a globalized world: economic impacts with a network GVAR model. *Journal of Economic Studies*, Vol. 51 (3), pp. 501–527.
[30] Becker & Dunne, 2021, op cit.
[31] ACLED (Armed Conflict Location and Events Data), 2025. https://acleddata.com/
[32] World Bank (2024). World Development Indicators. https://datatopics.worldbank.org/world-development-indicators/
[33] Box, George E. P. (1976). Science and Statistics. *Journal of American Statistical Association*, Vol. 71, 791–799.
[34] Saeed, 2023, op cit.
[35] Mayberry, 2023, op cit.
[36] Harty, 2012, op cit.
[37] Wang et al., 2022., op cit.
[38] Kuokštyte et al., 2021., op cit.
[39] Saeed, 2023, op cit.
[40] Mayberry, 2023, op cit.
[41] Becker, Jordan, Benson, Seth, Dunne, John Paul, Malesky, Edmund (2024). Disaggregated defense spending: introduction to data. *Journal of Peace Research*, Vol. 62 (3).
[42] Olejnik, 2023, op cit.

AIZSARDZĪBAS IZDEVUMI UN EKONOMISKĀ IZAUGSME NATO VALSTĪS

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Kopsavilkums

Atslēgvārdi: *aizsardzības izdevumi, ekonomikas izaugsme, daudzfaktoru regresijas, paneļa dati*
JEL kodi: *C31, C33, H56*

Pēdējos gados vērojams ievērojams aizsardzības izdevumu pieaugums, kā arī militārā aprīkojuma īpatsvara pieaugums aizsardzības budžetos, īpaši NATO Austrumeiropas valstīs. Tas rada jautājumu par to, vai un kā šīs izmaiņas varētu ietekmēt ekonomikas izaugsmes tempu. Mēs pētām saistību starp aizsardzības izdevumiem, to struktūru un ekonomikas izaugsmi pēdējo 20 gadu laikā, īpašu uzmanību pievēršot NATO valstīm. Mēs atrodam diezgan vājus pierādījumus tam, ka aizsardzības izdevumi un jo īpaši to struktūra ir sistemātiski saistīti ar ekonomikas izaugsmes tempu. Tas var liecināt par konkrētai valstij vai laika periodam raksturīgu faktoru izšķirošo lomu, piemēram, par to, kā tiek finansēti aizsardzības izdevumi, cik efektīvi tie mazina militāros draudus, vai militārais aprīkojums tiek ražots iekšzemē un vai tas rada tehnoloģiju pārnesi uz citām nozarēm. Turklāt ir jāņem vērā aizsardzības izdevumu apjoma un struktūras iespējamā endogenitāte, rādītāja neesamība, kas precīzi atspoguļotu militārus draudus, un nespēja modelēt ilgtermiņa ietekmi un tehnoloģiju pārnesi uz citām nozarēm.