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New Evidence for Romania Regarding Dynamic Causality between Military Expenditure and Sustainable Economic Growth

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Abstract: Military spending and sustainable economic development have been widely discussed in recent decades. Especially in Romania, the defense budget is valued at \$4.8 billion, registering a compound annual growth rate (CAGR) of 23.57%. It is also expected to reach \$7.6 billion in 2023, according to a report by Strategic Defense Intelligence. There is no consensus in current research and less attention is paid to Eastern European countries. Considering the significant increase in military spending in Romania in recent years, as well as the occurrence of political events, this paper focuses on the dynamic causal relationship between military spending and sustainable economic growth in Romania. The bootstrap rolling window causality test takes into account the structural changes, and therefore, provides more convincing results. The results indicate negative effects of military expenditure on sustainable economic growth between 1996–1999 and 2002–2004. It can be attributed to the crowding-out effect of public expenditure on private investment. The positive effect between the two variables analyzed is noticed with the accession of Romania to the North Atlantic Treaty Organization. Conversely, it is found that economic growth does not have a significant effect on military spending in Romania. Policymakers should guard against the crowding out of private consumption and investment due to excessive military spending and ensure to increase military expenditure on the premise of sustainable economic development.

Keywords: military expenditure; economic growth; sustainable development; bootstrap rolling-window Granger; crowding-out effect

1. Introduction

Considered to be one of the most important budget expenditures, military expenditure (ME) has played a significant role in macroeconomics over time. At this time, many studies have tried to explain the relationship between ME and GDP [1–3]. According to the studies, a substantial amount of budgetary provisions in many developing countries is heading for defense and security, and most of the time they are at the expense of allocating them for economic, social, and investment services. Therefore, the “guns for butter” theory points out that the increased ME results in lower resource allocation in other productive economic sectors, such as education and healthcare, and then hinders sustainable development. From this perspective, the allocation of budget expenditure has raised

serious concerns among researchers and decision-makers, considering the role of military spending in sustainable economic growth.

Starting with the analysis period of 1980 in Romania, the annual budgetary laws elaborated until 1989 could be considered a paradox of the socialist system in our country. Although the overwhelming role of the state in a centralized economy was promoted, the socialist state relied on the “golden rule” of the budgetary balance in classical liberal theory. Therefore, budgets were built on income approaches, not related to the public expenditure of the political leadership that exerted the state power after 1989. Depending on the accumulated revenues, expenditures were planned, the changes that could have existed due to the occurrence of provisions, the achievements reflecting budgetary surpluses.

Since 2000, the budget for military expenditures has also been set by taking into account the costs of ensuring interoperability in the Euro-Atlantic integration actions. Moreover, other important goals were considered when establishing military expenditures, such as participation in peacekeeping operations for the involvement of the Romanian Armed Forces in the Partnership for Peace Program, for the establishment of the Rapid Reaction Force, as well as for other actions approved by law. According to historical data, the ME for Romania in 2009 recorded a significant decrease compared to 2008, but still higher than in the previous period 2005–2007. At that time, the North Atlantic Treaty Organization (NATO) data argued that at the US level, military spending was twice as high as the total expenditure of all Member States.

Romania’s military costs exceeded for the first time the \$3 billion thresholds in 2016, more than the Hungarian and Czech Republic’s cumulative military budgets, and the amounts allocated to Greece for this purpose. Additionally, this year, the executive power decided that equipment purchases or repairs of the fighting technique could also be funded from the government’s reserve fund, which would make it difficult to calculate Romania’s actual military spending. Thus, after many decades, 2016 was the first year in which Romania’s defense budget exceeded that of Greece, a country where the gross domestic product (GDP) was higher than in Romania.

In 2016, the largest defensive budgets in the eastern region of the continent, without taking into account Russia and Turkey, were allocated by Poland, Romania, Greece, Ukraine, the Czech Republic and Hungary, with the remaining states in the region having military budgets under one billion dollars. In 2016, from a logistical point of view, we can remember that Romania was distinguished by ensuring air security, one of the country’s major defense vulnerabilities, receiving the first six aircraft F16 A/B Block 15 US Airplanes upgraded to M 5.2 of the 12th Squadron, which were purchased from Portugal, and three were supplied by the United States and continued to improve the fleet through various administrative programs, the budget spending on military spending rising to the detriment of other more productive sectors. From the point of view of the security and defense of the state, Romania was involved in the CSDP (Common Security and Common Security Policy) from its incipient stages, building its profile being an active participant in this structure, both on the political dimension, dedicated supporting the interests identified by the Member States as common to the security and defense and operational ones, contributing to the many civilian missions and military crisis management operations of the EU. Romania is a major member of important CSDP structures: The EU Satellite Center in Torrejon (Spain), the European Security Studies Institute in Paris (France) or the EDA European Defense Agency in Brussels. In this context, our country is involved in several capacity development programs: Capacity Development Plan, EU/EU Battlegroups, BGS. On the military side, Romania contributes to operations such as EUFOR Althea in Bosnia and Herzegovina, EUTM Somalia, EUNAVFOR Atalanta, EUTM RCA—Central African Republic, EUNAVFOR MED Sophia.

Romania’s priorities in the field of national defense policy are outlined by three vectors, namely the development of the EU defense capabilities, the common security and defense policy in complementarity with NATO, based on the declaration in the field adopted at the NATO Summit of Warsaw and the promotion of priorities in the perspective of Romania’s holding of the EU Council’s bi-annual presidency in 2019 and the revival of the national defense industry by 2026. The above-mentioned vectors are found in concrete actions targeted by the Ministry of National Defense for the period 2015–2019 with

reference, in particular, to the National Defense Strategy of the country becoming a strong Romania in Europe and the world, establishing national security and defense objectives, Romania's NATO and EU profile, strengthening the strategic partnership with the US, ensuring security in the Black Sea region, deepening cooperation with neighboring and eastern flank countries, enhancing regional cooperation, including in defense and promotion of political and economic security in regions of strategic relevance for Romania.

Security and defense are in a cause-effect relationship with growth and must be directly proportional to innovation, requiring major investment in defense. Romania is now welcoming the idea of a European Union of Defense, with the Member States being able to enjoy without discrimination the same benefits of defense unions, which are functional, equitable, accessible and transparent, promoting technological innovation, facilitating cross-border access for enterprises small and medium-sized resources and associated costs. To cope with security risks, cohesion and consensus at EU level are needed on the issues facing Romania, especially in the face of terrorist threats. By virtue of these considerations, Romania supports the correlation of the projects under the European Defense Fund with those to be planned through permanent structural cooperation (PESCO), the role of the European Defense Agency in both cases being major.

The ambitious EU and hence of Romania's "Shared Security and Defense" scenario is based on the pooling by the Member States of some financial and operational resources, such as increased solidarity. In the defense field, the EU becoming more involved in Europe's protection inside and outside its borders. The EU will take a more prominent role in areas such as strengthening the security dimension and defending internal EU policies, cybersecurity, border protection and the fight against terrorism. The most reasoned scenario, entitled "Common Security and Defense", refers to the progressive definition of a Union common defense policy that would lead to a common defense under Article 42 of the EU Treaty as stated in the Extract of the "Texts Adopted" document, 21–24 November 2016, European Parliament. The EU will be able to carry out high-level security and defense operations, backed by a high degree of integration of the Member States' defense forces.

The 21st century is the era in which each person's security is one of the most essential needs. The Sustainable Development Goals (SDGs) ask to promote peaceful societies for sustainable development, provide access to justice for all citizens. To ensure internal and external security for citizens is the mission of a state. Therefore, politicians have to decide how much money they allocate to the defense sector. This article, therefore, aims to study the existence of the causal relationship between military expenditures and sustainable economic development in Romania. Moreover, we contribute to the existing literature through the updated recently updated data set and concentrating on the Eastern European country—Romania, who joined the EU and NATO. The policy changes from EU, NATO and the own government may affect the causal relationship between these two variables, that is, structural changes will lead to inaccurate results. Furthermore, different from the Western European countries, which are mainly typical military economies, Romania is a transition economy and hence may possess distinctive characteristics. Furthermore, we innovatively employ the bootstrap rolling-window method to estimate the causality. This method is distinctive from most conventional mathematical approaches, which cannot identify the sub-sample relationships between the time series and cannot reveal how such relationships vary over time. This issue can be solved by allowing the causal relationship between ME and the GDP to be time-varying rather than using full-sample data that assume the single causality holds in every period. In consequence, the empirical results highlight that defense spending will affect economic growth positively or negatively through different channels in the 1980–2018 sample period. Accordingly, policymakers should make reasonable military expenditure plans to prevent hindering sustainable economic growth.

The following study is structured as the second part mentions the literature review. The third part analyzes the theoretical foundation. The methodology is described in the fourth part, and in the fifth part being presented the data and empirical results. The last section of the study represents the conclusions and discussion.

2. Literature Review

Empirical investigations provide evidence that causality relationships between ME and GDP are inconsistent, the results are not unitary, some negative, some highlight positive correlations, others insignificant.

In the numerous research papers, a large number of methods are identified that demonstrate that ME can affect GDP (LaCivita and Frederiksen [4]). The main factor was the overcoming of the defense budget in some states compared to the budgets allocated in other fields of activity, more productive and profit-making. Traditional arts versus butter suggests that defense spending impedes GDP by eliminating investment and consumption. In specific, there is a negative 'trade-off' between defense and education expenditures, which is not conducive to sustainable development.

The arguments made by the researchers have shown that ME prevents long-term sustainable development in some less developed countries, due to unfunded investments, inflationary pressures and the reduction of the allocation of resources in the field of investments and in other areas generating more productive jobs in order to increase the standard of living. Kollias [5] find that all these channels through which the defense sector can influence—the promotion or the delay—the increase presupposes that such expenditures are in a causal relationship with the GDP. The empirical evidence provided by Lebovic [6], Mintz [7], Scheetz [8], Ward [9], Asseery [10], Dunne [11], Dunne et al. [12], Mylonidis [13], and Pieroni [14] support the argument that military spending prevents GDP in terms of investment, health, education, and infrastructure improvements, which is not following the requirements of SDGs. Eryigit [15] also underlines the negative effect of the ME on GDP in Turkey, based on the cointegration method that allows structural breaks. Hou [16] indicates a negative correlation between ME and GDP in more developed countries. Other reports about this are available from Karagol [17], Karagol [18], Mylonidis [13], Smith [19], Abu [20]. Karadam et al. [21] attempt to analyze the use of nonlinear panels to examine the effects of ME on GDP for the countries of the Middle East. The conclusions of the analyzes show that the impact of ME on GDP is not linear and even inconclusive in some cases. The results also indicate that the increase of ME and arms imports of a state has a major influence and a negative impact on GDP.

There are also some cases where research shows that ME stimulates GDP and has a positive influence on economic well-being. For instance, Benoit [22] suggests that ME positively impacts economic development, and the impact of ME on GDP has been extensively examined in this respect. Deger [23] argues that military and security spending disproportionately hinders economic efficiency, although it otherwise ensures peace, stability, and national suffocation, which, in turn, are necessary for economic progress. Lee and Chang [24] study the correlation between ME and GDP in Taiwan over a longer period by analyzing multivariate co-aggregation, it demonstrates the ME can boost economic performance significantly. Wijeweera and Webb [25] conclude that an analysis performed based on aggregate demand is the most appropriate method to analyze the correlation between the variables studied for the case in Sri Lanka. Following their studies, it was concluded that there could be an increase in GDP in Sri Lanka if the budgetary allocations of the authorities were different and the allocations to the production and investment sectors would be higher. Their article concludes that some positive economic results depend entirely on the political decisions of the state. Sheikh [26] find the positive link between military spending and GDP apply the GMM method. Inequality is proving to be negatively associated with GDP. Daddi [27] investigate the impact of ME on GDP in Italy, the results showed that there is a military burden that has significant effects on GDP, promoting "peacekeeping" productivity and humanitarian missions that reduce insecurity from the external threat and implicitly of the investments and the jobs. García et al. [28] analyze the influence of the allocation of the defense budget in Spain and its autonomous agencies and mention the effects of the cross-sectoral effects on the rest of the economy. The results show that the activity in the military sector and the activity of the agencies generated 1.2% of the GDP of the country and 1.7% of the total employment during 2010. Su et al. [29] also demonstrate the existence of a positive bidirectional causal relationship between GDP and ME in their studies, which suggests the interdependence between variables and in China.

In the context of Eastern European countries, ME was regarded as an effective factor for the arms race in these countries during the Cold War. Since the early 1990s, these countries have developed different economic and political structures, including participation in EU membership, democracy, political and economic transformation. However, few studies conducted to examine the relationship between ME and economic growth in this region. Topcu and Arasend [30] find the end of the Cold War had a significant negative impact on defense spending in east-European countries. Topcu and Aras [31] further indicate that there is no long-term relationship between ME and GDP and there exists a unidirectional causality running from economic growth to ME in central and Eastern countries.

More comprehensively, some literature indicates that there is a heterogeneous correlation between ME and GDP among countries. Churchill and Yew [32] use the meta-analysis to prove that the positive effects of ME on growth are more pronounced for developed countries than less-developed countries. Topcu and Arasend [30] even state that the correlation is not uniformed across all EU members. Desli and Gkoulgkoutsika [33] employ the dynamic common correlated effects estimator to test the effect of ME on GDP. Overall, the worldwide effect of military spending on economic growth over the period 1960–2017 appears to be negative owing to the cold war and is especially evident for the NATO countries. However, at the country-specific level, some economies consistently benefit or suffer from military spending varying over different time periods.

According to research studies, the researchers mentioned that there is a clear relationship between GDP and GDP. However, there are still scholars who imply that there is no significant causality between the two variables, particularly when the ME is low [34,35]. Overall, it are still ambiguities regarding the interaction between ME and sustainable economic performance. Additionally, most of the studies assume the linear nexus, ignoring time-varying features of time series. Moreover, previous literature tends to focus on developed countries. The regions of Eastern Europe are prone to be less studied. Lastly, it is obvious that the unidirectional effect from ME on GDP has been widely investigated. However, the bi-directional causality regarding this topic is inconclusive.

3. Theoretical Foundation

ME affects the economic growth of a country in two ways: Demand-side effect and supply-side effect [36]. The demand-side effect implies that ME increases the aggregate demand, which stimulates the employment rate and economic progress. While from the perspective of supply-side, ME will exert complicated effects on the economy. Specifically, on the one hand, based on opportunity cost theory, if ME is in a large share of the government budget, then this will crowd out the investment and the capital from the civilian economic activities due to the limited resources. Moreover, an increase in this spending would divert domestic credit from civilian production and raises the cost of these credits for the private sector. As a result, economic growth may deteriorate [37]. On the other hand, the supply-side effect denotes that infrastructure improvement and the related consumption effects through which the ME may indirectly contribute to economic development and technological innovation by the development of the public infrastructure such as roads, bridges, railway lines, airports, canals, dams, etc. These projects are especially helpful in the less developed countries and remote areas where civilian governments have fewer resources and incentives to invest in. However, military goods generated by defense spending are mainly nonproductive, which implies that defense spending induces more demand rather than more supply, resulting in inflation [38]. Extensive inflation is disadvantageous to the sustainable economic development. In addition, adequately sized, trained, and equipped force is necessary for national security to dissuade and even defeat enemies. In this view, if military security is compromised, then economic stability appears vulnerable.

On the contrary, economic development would have either a positive or negative effect on ME. Economic growth could provide more funds and resources for ME and public service. However, the growth in an economy does not necessarily mean an increase in ME. The national military strategic plans are different in every country, depending on the external and internal environments. Thus, the nexus between economic growth and ME varies across countries. If a country is trying to protect

the national security and wealth from external threats, such as terrorism, transnational crime, ethnic separatist, etc., then a causality that runs from economic growth to ME may hold. Otherwise, economic development may not necessarily promote ME.

4. Methodology

4.1. Bootstrap Full-Sample Causality Test

In our study, we relied on the complete Granger non-causality test, namely the bivariate autoregressive vector (VAR). Given the sensitivity of this method of analysis for a certain period, we set out to use the variables for a given period of time, so that the results express a causality between ME and GDP, not a constant causal relationship [39].

In the VAR model, the time series data are assumed to be stationary in the Granger causality test. Therefore, according to the statistical data, including the likelihood ratio (LR), the Wald test and the Lagrange multiplier (LM) tests will not be in the definitive estimation in VAR models. The modified test is proposed to estimate the processing variables of the augmented VAR model, applying when the time series is I (1) [40,41].

RB and LR can be explained by the VAR framework for two variables as follows:

$$Y_t = \phi_0 + \phi_1 Y_{t-1} + \dots + \phi_p Y_{t-p} + \varepsilon_t, t = 1, 2, \dots, T \quad (1)$$

By splitting y_t into two sub-vectors, $y_t = (y_{1t}, y_{2t})'$, thus the above equation can be rewritten as follows:

$$\begin{bmatrix} GDP_{1t} \\ ME_{2t} \end{bmatrix} = \begin{bmatrix} \phi_{10} \\ \phi_{20} \end{bmatrix} + \begin{bmatrix} \phi_{11}(L)\phi_{12}(L) \\ \phi_{21}(L)\phi_{22}(L) \end{bmatrix} \begin{bmatrix} GDP_{1t} \\ ME_{2t} \end{bmatrix} + \begin{bmatrix} \varepsilon_{1t} \\ \varepsilon_{2t} \end{bmatrix} \quad (2)$$

where $\phi_{ij}(L) = \sum_{k=1}^{p+1} \phi_{ij,k} L^k$, $i, j = 1, 2$ and L is the lag operator defined as $L^k x_t = x_{t-k}$.

Starting with Equation (2), we analyze the causality hypothesis between ME and GDP, taking into account certain restrictions, such as for $k = 1, 2, \dots, p$, we consider that ME does not produce effects. Similarly, the inverse causal hypothesis is tested for $k = 1, 2, \dots, p$. Following the above analysis, we mention that it is not conclusive whether ME has an impact on GDP and vice versa.

4.2. Parameter Stability Test

If the Granger test is not conclusive, the final results can be considered null, and the causal correlations are considered unstable [39]. Therefore, before using the rolling window estimation, the parameter constant over a short period of time was tested using Mean-F, Exp-F and Sup-F tests [42] and the long-term parameter stability of the VAR model above, applying the Lc Test of Nyblom [43] and Hansen [44]. Considering these data, when the basic variables have been cointegrated, the VAR model at the first analysis may be wrongly predicted, unless the error correction is allowed. For clearer and more precise conclusions, the fully modified Ordinary Least Squares estimator (FM-OLS) proposed by Phillips [45] and Hansen [44] was used. In these analyzes, testing the constant parameters in the VAR model is compared with any possible alternative a unique structural change.

4.3. Rolling-Window Granger Estimation

In this analysis, the test used is adopted based on a modified estimation of the bootstrap [46]. Thus the complete sample is transformed into a sequence of variables Tl, i.e., $\tau-1 + 1, \tau-1, \dots, T$ for $\tau = 1, 1 + 1, \dots, T$. Non-test. Modified causality based on RB is then estimated in each sub-sample, but not in the complete sample. By calculating the p -values of the bootstrap of the observed LR statistics that are carried out through $T-1$ sub-samples, some changes can be observed between ME and GDP.

The causal relation index is observed by calculating the effect value, and the GDP on the impact on the ME is mentioned as the average of all derived bootstrap estimates from the formula,

with $N_b^{-1} \sum_{N-1}^p \hat{\phi}_{21,k}^*$ with N_b the number of bootstrap repetitions. Similarly, the impact of MEs on GDP is measured by the formula $N_b^{-1} \sum_{N-1}^p \hat{\phi}_{12,k}^*$. Both $\hat{\phi}_{21,k}^*$ and $\hat{\phi}_{12,k}^*$ are bootstrap estimates from the VAR models in Equation (2). The 90% confidence intervals are provided, in which the lower and upper bounds are the same as the 5th and 95th quantiles of $\hat{\phi}_{21,k}^*$ and $\hat{\phi}_{12,k}^*$ respectively [46].

5. Data and Empirical Results

In this study, we base annual data from 1980 to 2018 to examine the nexus between ME and GDP in Romania. The dataset of GDP is present in current prices (purchasing power parity, billions of international dollars), which is sourced from the International Monetary Fund (IMF). The ME data, in millions of US dollars, current prices, converted at the exchange rate for the given year, is from SIPRI Arms Industry Database. The trend of these two variables is shown in Figure 1.

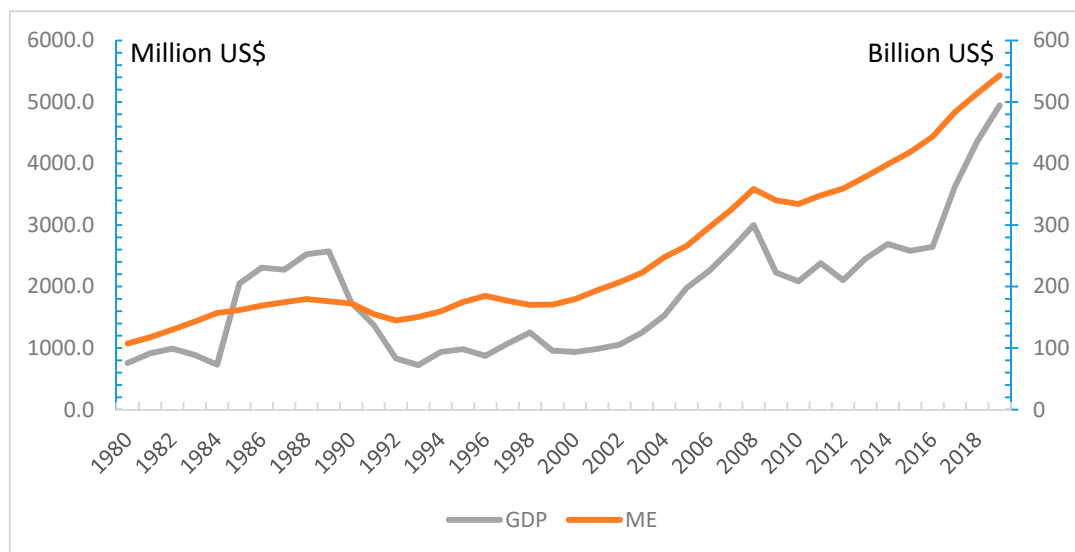


Figure 1. The trend of ME and GDP.

To test the data stationarity test, we performed the Augmented Dickey–Fuller test (ADF, 1979), the Phillips–Perron test (PP, 1988) and the Kwiatkowski Phillips Schmidt Shin test (KPSS, 1992). Table 1 mentioned the conclusions in which it was found that both ME and GDP are stationary processes in the first differences, which suggests that both are a process I (1).

Table 1. Unit root tests.

Series		ADF	PP	KPSS
ME	Level	−1.345 (0)	−1.486 (2)	0.399 (4) ***
	1st difference	−5.098 (0) ***	−5.067 (2) ***	0.088 (2)
GDP	Level	−0.019 (1)	−0.155 (2)	0.683 (5) **
	1st difference	−2.839 (0) *	−2.632 (5) *	0.125 (2)

Source: Authors' calculations. Notes: *, ** and *** denote significance at 10, 5, and 1 percent, respectively.

We choose the optimal lag-lengths of ME and GDP 2 based on the Schwarz Criterion (SC). Therefore, the next Table 2 shows the full-sample causality results. We can infer that there is a relevant relation running from ME to GDP while GDP has no significant impact on ME over the full-sample perspective. This finding is basically consistent with Braşoveanu [47].

Taking into account the above, we argue that the estimation of a complete causality neglects the unknown structural changes. The structural changes in the ME and the GDP consequently have unstable and meaningless causal relationships of the analyzed sample. Therefore, we use Sup-F, Mean-F, Exp-F,

and Lc tests to investigate whether this result is supported by the constancy of the parameters, and the results are presented in Table 3. The results suggest that there is a strong change once in ME, GDP and VAR system at 1% level. The conclusion is also rejected considering the p values of the second and third lines, which indicates equations from ME, GDP and VAR system could evolve gradually. The results of the Lc test do not demonstrate the consistency of the parameters for the VAR model.

Table 2. Full-sample Granger-causality tests.

Tests	H_0 : ME Does Not Granger Cause GDP		H_0 : GDP Does Not Granger Cause ME	
	Statistics	p -Values	Statistics	p -Values
Bootstrap LR Test	0.312	0.530	6.923 ***	0.000

Source: Authors' calculations Notes: *** denotes significance at one percent.

Table 3. Stability tests.

	ME_Equation		GDP_Equation		VAR_system	
	Statistics	p -Value	Statistics	p -Value	Statistics	p -Value
<i>Sup-F.</i>	26.493 **	0.041	88.077 ***	0.000	34.250 ***	0.008
<i>Mean-F.</i>	18.522 *	0.069	28.435 ***	0.000	20.378 **	0.032
<i>Exp-F.</i>	6.843 *	0.097	39.119 ***	0.000	14.091 *	0.069
L_c^b					13.524 *	0.074

Source: Authors' calculations Notes: We calculate p -values using 10,000 bootstrap repetitions. *, ** and *** denote significance at 10, 5 and 1 percent, respectively.

We will take into account the results obtained from the estimation of the model based on the rolling window, which gives us a greater accuracy of the data. Considering the null hypothesis, we concluded that there was no causal relationship between ME and GDP. According to Pesaran and Timmerman [48], we choose a period of 15 years in adopting the estimation of the rolling window so that we have greater clarity and accuracy of the data. Moreover, different time periods will be used, such as 18–20-year tests and the impact of ME on GDP is estimated and vice versa, the results coinciding with those following the 15-year analysis. From this, we deduce that the conclusions are the same regardless of the period. Figure 2 shows the starting system of p values of LR statistics using GDP as dependent variable in Romania. Figure 3 shows the estimates of the bootstrap test for the sum of the running coefficient, measuring the impact of ME on GDP. Exceeding the zero value of the prominent line represents a positive impact, otherwise, the effect is negative.

Specifically, the null hypothesis is rejected from 1996 to 2006. Figure 3 indicates that in 1996–1999 and 2002–2004, the ME exerted a negative effect on the GDP, while in the sample of 1999–2002 and 2004–2006, the relationship between the two series was positive. From 1996 to 1999, the economy in Romania experienced a continued three-year decline [49]. The decline has been largely accounted for the severe reduction in fixed investment and private consumption. The Kosovo crisis had a modest impact on increasing ME. However, parliament still approved a tough austerity budget, including much higher excise taxes on fuels and property taxes. In this situation, military spending may adversely affect investments, savings, human capital, infrastructure programs, and market-oriented technological innovation. This verifies the ME can impede sustainable economic development by crowding-out private investment.

Starting with 1999, the decrease in purchasing power and the deterioration of the economic well-being in the country, led to several demonstrations among the population in the country. One of these was triggered by the miners' dissatisfaction with the economic situation and the employment prospects in the Jiu Valley, the unemployment rate [50]. The government increases ME can generate economic benefits because it provides security, which promotes a stable social and economic environment. It also contributes to improving the educational level of the workers and may act as a stabilizing influence in society by expenditure on defense training. As Braşoveanu [47] has mentioned,

the war, corruption, security and defense policy of a state strongly impact the sustainable development of a society. At that time, Romania made all the necessary steps to join the EU. On 18 June 1999, a new national security and security strategy was adopted by the Supreme Defense Council of the country where the idea of EU membership was one of the main priorities for Romania. Increasing the ME shows the improvement of comprehensive national power, which is prone to be accepted by the EU. Overall, the rise in ME in this period (1999–2002) stimulated economic development.

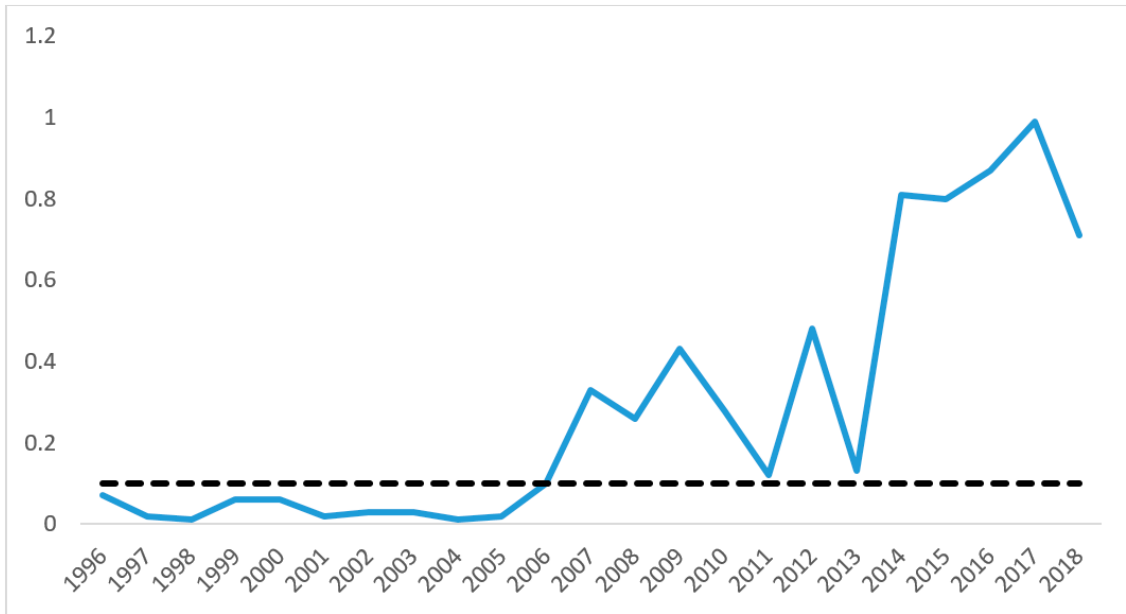


Figure 2. ME does not Granger cause GDP.

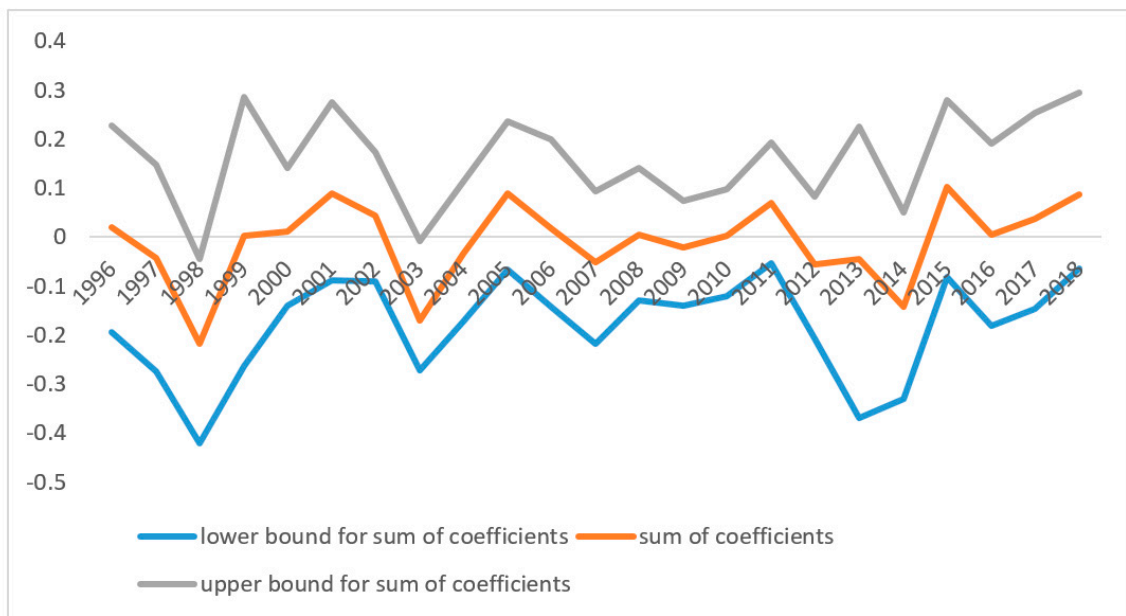


Figure 3. Bootstrap estimates of the sum of the rolling window coefficients for the impact of ME on GDP.

The causality from ME to GDP was negative in 2002–2004. Having inherited Soviet-era equipment, Romania could postpone major military purchases. Combined with reductions in defense budgets, Romania has reduced spending on military maintenance, operations and training for the majority

of the armed forces. For example, Romanian Chief-of-Staff General acknowledges that 70 percent of Romania's air force pilots were not operational due to budgetary constraints [51]. Since mid-2000, GDP has remained robust, inflation and unemployment have been steadily declining, and it is imperative to revitalize the economy in Romania [52].

Romania became a member of NATO in 2004. The Land Forces have overhauled their equipment, which participates in a peacekeeping mission in Afghanistan and Iraq, together with the other NATO countries. They are forced to develop more professional elements within their armed forces that are more suited to deployment abroad in multinational military operations, Cottey et al. [51]. Furthermore, in order to complete preparations for EU accession, Romania makes efforts to improve legitimation and regulation on the military. ME may be considered a tool of fiscal policy and can be increased to stimulate demand. Moreover, the trade of EU exports to Romania has significantly increased [52]. Therefore, we can conclude that Romania achieves expansion of aggregate demand and exports through the fiscal policy of ME. The accession to NATO and planning to join the EU also provide a more open and stable economic environment. This contributes to the positive relationship between ME and GDP in 2004–2006.

In Figure 4, we observe that the null hypothesis is not considered rejected for all the analyzed periods, which means that the GDP has no significant effects on the ME in Romania. ME can be regarded not necessarily as a purely economic problem, but rather as a strategic political, social, economic and psychological effect [53]. In such studies, Gleditsch and Njølstad [54], Intriljgator [55] have also mentioned such correlations between the two variables and strategies. Romania has done its utmost to join NATO and the EU at the end of the Cold War, thus supporting US operations in Iraq and Afghanistan [56].

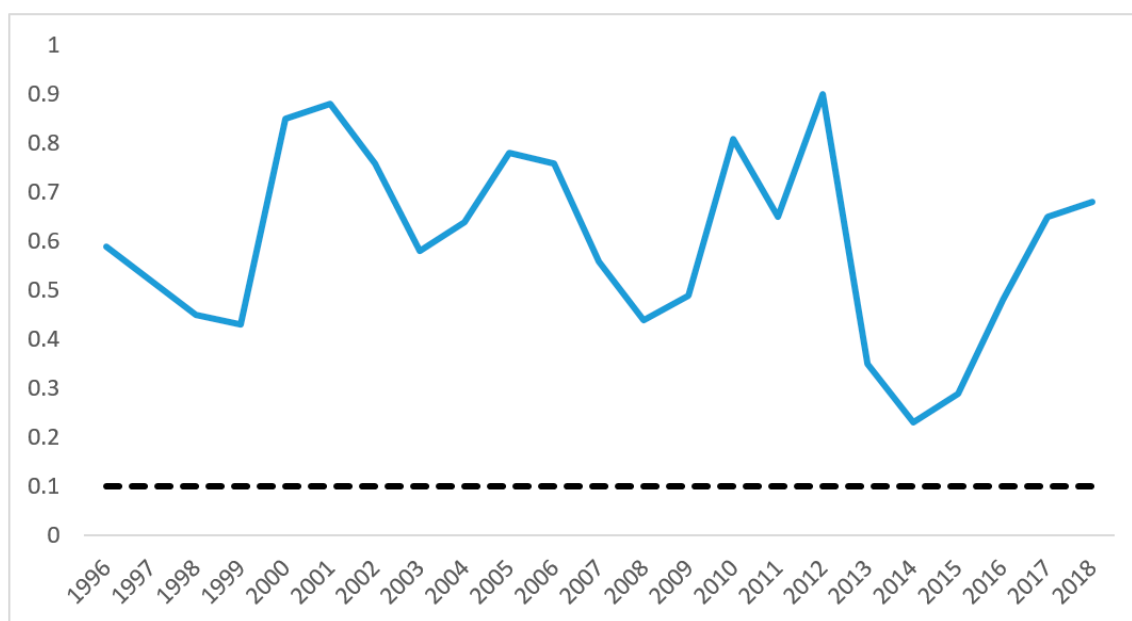


Figure 4. The null that GDP does not Granger cause ME.

6. Conclusions and Discussion

In this paper, we have tried to investigate the relationship between ME and GDP in Romania since 1980. In order to obtain conclusive results on the correlation between the two variables, the Granger non-causality test with full sample and rolling window estimation was used in the analysis. The results show that the ME would have both positive and negative effect on GDP in Romania. In specific, the impact of ME on GDP was negative during 1996–1999 and 2002–2004. It can be inferred that during the periods of turbulence in neighboring countries, the increase of ME would crowd out private

investment and consume, which is harmful to GDP. From 1999 to 2002 and 2004–2006, GDP was positively associated with ME. We can conclude that, in the period of domestic turmoil and participation in NATO, rising ME contributes to stabilize the domestic environment and thus stimulate the sustainable development of the economy. This finding is in accordance with the Dunne et al. [11], who propose that the positive effect of ME on GDP is particularly significant in less developed countries, where war and turmoil are major obstacles to sustainable development. In specific, raising ME can protect society from violence and invasion of other countries or groups. Moreover, training in the armed forces can improve the quality of human capital, which makes them more competitive when they are employed. Therefore, the improvement of the employment rate is associated with higher economic output. However, the empirical result indicates that GDP does not have a significant effect on ME, which is contrary to the result of Su et al. [29]. It can be attributed that the ME in Romania is lack of independence, which would be affected by the policy of NATO, EU and US.

Therefore, the implication for the policymakers can be summarized as: The government should adjust its ME according to the military or political environment at home and abroad to promote economic development. Excessive ME in peacetime will squeeze out private investment and civilian resources, which is harmful to sustainable development. While in the period of chaos, increasing ME can maintain a safe social order and increase economic output. Moreover, mastering the independence of military policy should be considered by authorities. The analysis proposal could contribute both to the decision-making at the governmental level and the allocation of military sector funds in the current context, as well as to the foundation of a political decision-making process aimed at increasing the efficiency of the expenditures by the executive power of a state.

Considering the nonlinear nexus between ME and sustainable economic development, future research can further explore if there exists threshold value, before and after which, ME will have a different effect on output. In addition, the limitation of this article is that the conclusion is confined to the context of Romania, hence, it cannot be extended to the general situation. A future study could provide a more general analysis of this topic.

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