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THE NEXUS BETWEEN DEFENSE EXPENDITURES, GEOPOLITICAL RISK, POLITICAL STABILITY AND MACROECONOMIC INDICATORS: EVIDENCE FROM TÜRKİYE*

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Abstract
Defense expenditures are an item that exists cyclically throughout the world in every period and covers most of the public expenditures of countries. The effect of defense expenditures on inflation, employment, balance of trade balance, gross domestic product, geopolitical risk index, and political stability index within the scope of Türkiye has been examined. The findings, while the causality relationship from defense spending to balance of trade, geopolitical risk index, and political stability index is determined and there is a positive relationship from defense spending to foreign trade balance and a negative relationship to geopolitical risk index, there is a cointegration towards gross domestic product. Empirical findings support the military Keynesian approach in the long and short term, indicating that the increase in defense expenditures in Türkiye increases exports and the balance of trade. Increasing R&D activities and implementing policies that encourage investment in higher-density defense industry products will increase positive externalities in the balance of trade. Long-term, the rise in defense spending allows one to draw the conclusion that the country tends to lower geopolitical risks by boosting confidence in its political, economic, and security realities and lowering the threat of terrorism.
Keywords: Geopolitical risk index, Defense expenditures, ARDL bounds testing approach, Political stability index, Toda-Yamamoto causality analysis
JEL Codes: E60, E62, F52, O53, C22

SAVUNMA HARCAMALARININ MAKROEKONOMİK GÖSTERGELER-JEOPOLİTİK RİSK VE POLİTİK İSTİKRAR ENDEKSİ İLE İLİŞKİSİ: TÜRKİYE ÖRNEĞİ

Öz
Savunma harcamaları dünya genelinde konjonktürel olarak her dönemde var olan ve ülkelerin kamu harcamalarının büyük bir kısmını oluşturmaktadır. Bu çalışmada Türkiye kapsamında savunma harcamalarının enflasyon, istihdam, dış ticaret dengesi, gayrisafi yurtiçi hasıla, jeopolitik risk endeksi ve siyasi istikrar endeksi üzerindeki etkisi incelenmiştir. Bulgular, savunma harcamalarından dış ticaret dengesine, jeopolitik risk ve politik istikrar endeksine doğru nedensellik ilişkisi, savunma harcamalarından dış ticaret dengesine doğru pozitif, jeopolitik risk endeksine doğru negatif bir ilişki, gayrisafi yurt içi hasılaya doğru ise eş bütünleşme olduğunu göstermektedir. Ampirik bulgular uzun ve kısa vadede Askeri Keynesyen yaklaşımı desteklemekte, Türkiye'de savunma harcamalarındaki artışın ihracatı artırdığını ve dış ticaret dengesini iyileştirdiğini göstermektedir. Araştırma ve geliştirme faaliyetlerinin artırılması ve daha yüksek yoğunluklu savunma sanayi ürünlerine yatırımı teşvik eden politikaların uygulanması dış ticaret dengesindeki pozitif dışsallıkları artıracaktır. Uzun vadede savunma harcamalarındaki artış, ülkenin güvenlik, ekonomik ve siyasi gerçeklerine olan güveni artırarak ve terörizm riskini azaltarak jeopolitik riskleri azaltma eğiliminde olacağı sonucuna ulaşılmaktadır.
Anahtar Kelimeler: Jeopolitik risk endeksi, Savunma harcamaları, Politik istikrar endeksi, ARDL sınır testi, Toda-Yamamoto nedensellik analizi
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Introduction

Defense spending, put simply, refers to the economic resources of a country allocates to support its military forces or other critical services aimed at ensuring national security. Defense expenditures (DE) are an important part of public expenditures that exist in all countries of the world in every period with cyclical accelerations. Defense expenditures, which continue to increase for survival and precautionary purposes, affect the economies of countries by preventing the effective use of scarce public resources. Countries spend different amounts on defense depending on how much internal and external security they need, their economic power, geopolitical factors, political stability, potential enemies, alliances with other countries, and geographical and strategic location.

The concept of geopolitics emerged with the evaluation of factors such as economy, politics, population, etc., together with the geography of countries. Geopolitical risk (gr) refers to the potential, occurrence, and intensification of negative events linked to conflicts, terrorism, and tensions between nations and political entities that disrupt the peaceful progression of international relations. Gr, which emerges by measuring the geopolitical risks of countries in real time and evaluating the factors together, was calculated and converted into an index (gpr) by Caldara and Iacoviello (2022). They claim that geopolitical risk encompasses power conflicts that don't necessarily involve violence and disputes over land, like the Cuban Missile Crisis or the tensions between the US and Iran, or the US and North Korea. It also includes terrorism, as acts of terrorism in recent years have triggered political strains between countries and, in some instances, escalated into full-scale wars. Every month, the GPR is compiled by calculating the proportion of articles that focus on negative geopolitical events and the related risks (Caldara and Iacoviello 2022, p.1198). The recent gpr is based on automatic text searches in the electronic archives of 10 newspapers starting in 1985. Nine newspapers were chosen, six from the US, three from the UK, and one from Canada to document events with global scope and implications. A monthly specific index is computed for 44 developed and developing nations based on the proportion of all newspaper articles published since 1985 that mention the name of the nation or its major cities and satisfy the requirements for inclusion in the geopolitical risk index. This index contributes to the Final Index. The main reason for expanding the index from 26 to 44 countries is that after World War II, emerging economies have been at the center of many major geopolitical events, including coups and regional wars with major economic impacts (Caldara and Iacoviello 2022, p. 6).

The Political Stability (PS) Index (psi) provides an assessment of countries' political stability. Risk scores are assigned to a group of twelve weighted factors covering both social and political attitudes, called political risk components. Psi is a tool for analyzing a country's political stability by assessing risk scores for each of the following factors: internal conflicts, socioeconomic conditions, government stability, ethnic tensions, international conflicts, bribery, religious conflicts, legal stability, investment conditions military influence in politics, democratic accountability and the quality of the bureaucracy. It consists of 12 sub-components and is calculated by assigning risk scores for a total of 100 points. Each component is given a lowest mark of zero and a highest mark of 12, 6 or 4 points depending on the weight of the component. As the sum of the risk score of the components decreases, the risk increases, and as it increases, the risk decreases. Each component is scored based on predetermined questions. Therefore, it can be said that the psi variable is an exogenous variable that includes important factors that may have a relationship with countries' defense expenditures. Psi is an index derived from the “International Country Risk Guide” prepared by the Political Risk Group (PRS Group). Alesina & Weder (1999) state that this index is a frequently used index in academic studies. The reason for the widespread use of the index in academic studies is that it is an index that includes the

largest number of countries in the longest time and includes many different sub-components. The fact that Psi is fed from different sources makes this index more meaningful.

From a theoretical perspective, one of the two approaches that demonstrate the connection between military spending and the economy is the Military Keynesian approach with a supply channel. The other approach is the Neoclassical approach with a demand channel. The Military Keynesian approach states that positive externalities will emerge. Defense expenditures increase the consumption rate through the multiplier mechanism. The rise in technology-intensive defense industry investments may increase the demand for labor through the expansion of companies in this field. A rise in defense spending guarantees long-term economic development through beneficial side effects such as R&D, infrastructure, education, technological specialization, and the export of defense industry products. If a rise in defense expenditures occurs to support technology-intensive and value-added research and development activities for defense industry products, it may positively affect the balance of foreign trade positively through the export of high-tech products, while the purchase of these products through imports may negatively affect the balance of foreign trade. According to the neoclassical approach, an increase in distributing limited resources to defense spending might result in a decrease in productivity as it may reduce the share allocated to other areas. In addition to excluding other public expenditures, it may also reduce the allocation of resources to private sector investments. Defense expenditures may create a serious opportunity cost for investment, other public expenditures and consumption, thus creating a burden on the budget and the problem of accelerating inflation. A rise in inflation can also occur when money is printed to finance defense spending. When defense expenditures are financed through tax increases, savings and investments may decrease and national interest rates may rise. In the instance of increasing defense expenditures with debt as another form of financing, the demand for funds will be higher than the supply of funds, and investments, total supply, production and employment will decrease due to the rise in the national interest rate.

Both theoretical views aim to determine the optimal level of defense expenditures and maximize the efficiency of these expenditures. The neoclassical view states that the share allocated to defense expenditures has an opportunity cost. This opportunity cost may affect the economy positively or negatively. Economy, strategy and technology are interdependent elements of the same problem. Strategies are ways of using budgets or resources to achieve military objectives. Technology defines possible strategies. The economic problem is to choose the most effective or economical strategy. The realization of efficiency and effectiveness in the allocation of resources depends on the correct determination of the optimal level for ensuring national security. According to McGuire (1995), defense is inherently in the public interest. Therefore, the optimal level of defense expenditures should be the point where the sum of marginal benefits of defense expenditures equals the marginal costs. This optimal level can prevent negative effects of defense spending on the economy by providing an efficient general defense service. It can reduce the opportunity cost of foregoing other sectors and spending on defense. The determination of the optimal level of defense expenditures of countries varies according to the degree of risk of the states. High geopolitical risks and political instability of countries lead to an increase in this level. It is an important economic policy for countries to determine the optimal level of the defense budget in order to increase the positive effects and reduce the negative effects.

The theoretical approaches and the explanations above suggest that there is an interaction between defense spending and macroeconomic indicators - the geopolitical risk index and the political stability index. The primary goal of the two approaches is to identify the optimal level of defense expenditures and to determine the defense expenditures that will increase positive externalities or decrease negative externalities. The theory states that the optimal level of defense spending should be where the additional cost matches the additional gain. However, the costs and benefits of countries' defense expenditures cannot be determined solely by macroeconomic

indicators. Countries with high geopolitical risks and political instability necessarily spend high defense expenditures to maintain their political existence without considering the cost of defense expenditures. To identify the optimal level, the nexus between defense spending and macroeconomic indicators, political stability and geopolitical risk index should be determined. Determining to what extent and in what direction the macroeconomic balances, geopolitical risk and political stability of countries are affected by this relationship is of utmost importance as it will determine the defense expenditures and economic and political policies to be made. In this framework, the following hypotheses will be tested for Türkiye;

1) Does geopolitical risk decrease when defense spending increases?

2) Does the increase in defense expenditures cause an inflationary effect?

3) Does the rise in defense spending boost gross domestic product through a productive effect?

4) Does the rise in defense spending affect the balance of trade negatively through imports?

5) Does political stability increase with increased defense spending?

6) Does the boost in defense spending boost employment?

Thus, the primary aim of this study is to examine the nexus between defense spending and economic variables that determine the macroeconomic balances of countries, political stability index and geopolitical risk index, and to test the above hypotheses within this framework. For this purpose, after the introduction, first the literature is presented and then the dataset and methodology are outlined the empirical outputs are then analyzed and the study is concluded with conclusions and policy recommendations.

1. Literature

Defense and security spending has been around since the founding of the country. The effects of defense spending on the economy were first studied following World War II and the Great Depression. The literature on defense spending began to emerge with Benoit's (1973) analysis of the nexus between DE and economic growth (EG). Sezgin and Yıldırım (2002) found that EG in Türkiye has a reverse impact on DE. Kalyoncu and Yücel (2006) found a causal connection between EG and DE. In Türkiye, Görkem and Işık (2008) found no correlation between DE and EG. Erbaykal (2007) discovered that DE and EG were negatively correlated over the long run. DE and GDP are causally related, according to Yılancı and Özcan (2010). A oneway causal relationship between DE and GDP and a two-way causal relationship between DE and employment were found by Kaya (2013). In Türkiye, there is a one-way causal relationship between national income and DE, according to Destek (2016). EG and DE did not correlate, according to Durgun and Timur (2017). According to Bayraktar (2019), DE has a one-way relationship with unemployment and a reciprocal relationship with inflation and EG. Gül and Torusdağ (2019) concluded that in BRICS-T, there is a one-way causal relationship between EG and DE. DE has a long-term negative impact on EG in MIST (Mexico, Indonesia, South Korea, and Türkiye) countries, according to Huskić, Satrovic, & Muslija (2020). It was determined by Sürücü, Eminer, and Sağbaş (2022) that DE and EG are unrelated. According to Taçyıldız and Çukur (2022), there is no causal relationship between unemployment and the trade balance, but there is a one-way causal relationship between DE and EG. Naimoğlu and Özbek (2022) investigated the connection between DE and EG in Türkiye from 1960 to 2019. Using the FourierSHIN and SHIN cointegration tests, the long-term relationship between the variables was examined. According to the study, there is a cointegration relationship between DE and EG in Türkiye, meaning that over the long and short terms, EG rises when DE rises. Bilgin (2022) used the Hatemi-J asymmetric causality test and the NARDL (nonlinear autoregressive distributed

lag) model to examine the impact of De on EG in Türkiye from 1960 to 2019. The study found that DE has asymmetric effects on EG based on both models.

Esener and İpek (2016), in their study examining the balance of trade and DE, analyzed 36 developing countries including Türkiye and found that DE negatively affects the balance of trade. Murat (2020), in his study on BRICS-T countries, found a oneway causality from DE to the balance of trade for Türkiye. According to Şentürk (2020), there is a oneway causal relationship between DE in Türkiye and the balance of trade.

According to Buzdağlı and Özdemir's (2021) research, which included the geopolitical risk index, there is a mutual causal relationship between DE and exports in 17 developing nations, including Türkiye. When the geopolitical risk index rises, DE rises as well. According to Demirci and Ayyıldız (2023), the geopolitical risk index and DE in MIST countries are positively correlated. According to Khan, Su, & Rizvi (2022), there is a causal relationship between DE and the geopolitical risk index in South Korea and Türkiye. In the short and long term, Sweidan (2023) discovered a positive causal relationship between US DE and the geopolitical risk index. Efe and Aydın (2023) investigated whether Türkiye's DE is affected by inflation, economic growth, the balance of trade, unemployment, and the geopolitical risk index with ARDL bounds test and TY analysis. They discovered a long-term negative correlation between EG and the balance of trade, and a positive correlation between DE and both unemployment and inflation. Song & Chen (2024) stated that the effect of GPR on DE was positive until 2008 and then negative in China.

In the short term, there is a one-way causal relationship between DE and inflation in Türkiye, according to İpek (2014), one of the studies looking at the relationship between inflation and DE. However, no long-term relationship was discovered. According to Odehnal and Neubauer (2020), who included Türkiye in the group of new NATO members, there is no correlation between inflation and DE in the traditional group and it does in the group of new members.

By incorporating the political stability index into his analysis of DE, Balan (2015) discovered a positive and reciprocal causal relationship between political instability and DE in Türkiye. In the fight against terrorism, Asongu, Le Roux, and Singh (2021) discovered that DE and PS work in tandem and have a positive overall impact on 53 African nations. Njamen Kengdo, Nchofoung, & Kos A Mougnol, (2023) concluded that political stability reduces military spending in their analysis for Africa. In the BRICS-T countries, Barış & Barış (2024) discovered a positive long-term correlation between DE and the geopolitical risk index. Efe and Aydın (2024) investigated the connection between PSİ and DE for BRICS-T nations and geopolitical risk. Over time, the geopolitical risk index rises when the political stability index rises, while the DE falls when the DE rises. They discovered a short-term negative correlation between DE and the geopolitical risk index. They claimed that there is no causal connection between DE and either the geopolitical risk index or the political stability index. They highlighted that the use of DE in dollars, or the exchange rate effect, may have contributed to the observed decrease in DE in India, South Africa, and Türkiye because of the increase in the geopolitical risk index. Değirmenci, Ünsal & Cengiz could not find a significant relationship between political stability and DE in Türkiye.

According to Yıldırım and Sezgin (2003), one study examining the connection between DE and employment and unemployment, there is a negative causal relationship between the two. Korkmaz (2015) stated that DE increases unemployment in 10 Mediterranean countries and Türkiye. According to Üçler (2017), unemployment and DE have a reverse causal relationship. Topal (2018) found no causality between unemployment and DE in Türkiye. Erdugan and Özçelik (2020) stated that DE negatively affects employment. According to Ceyhan and Köstekçi (2021), a rise in DE eventually results in higher unemployment. A one-way causal

relationship between DE and unemployment in Türkiye was discovered by Özen Atabey and Karakuş (2023).

The literature has mostly concentrated on the connection between DE and macroeconomic factors, as can be seen from the studies on Türkiye. There is disagreement over the direction of the reciprocal relationship that has been found between DE and EG or GDP variables. Throughout the literature, a correlation between inflation and DE has been found. Furthermore, though to a lesser degree, the connection between DE and geopolitical risk has also been assessed. Among the common results of a few studies in the literature is that DE increases when geopolitical risks rise, and geopolitical risks decrease when DE increases. However, it has been noted that the literature has failed to identify a connection between DE and political stability. The gap in the literature is filled by this study.

2. Data and Methodology

Secondary data sets (macroeconomic indicators) for the period 1988-2022 are sourced from the World Development Indicators (WDI). (World Bank, 2023). Among the gr index data were sourced from the https://www.matteoiacoviello.com/gpr.htm (Caldara and Iacoviello 2022), while political stability index data were obtained from the "International Country Risk Guide" (ICRG) prepared by the Political Risk Services (PRS) Group (PRS Group, 2022). For elasticity interpretations, the variables are logarithmically transformed. The reason for including defense expenditures, Gross Domestic Product and Balance of trade data in local currencies in the analysis is to exclude the effects that may arise from the exchange rate effect as stated in Efe and Aydın (2024).

Table 1: *Descriptive Variables*

Variables	Abbreviations	Source
Military expenditure	lnmil	Local Currency Calendary Years
Gross domestic product	lngdp	GDP (constant LCU)
Inflation	lninf	Inflation, consumer prices (annual %)
Employment	lnemp	Employment to population ratio, 15+, total (%) (national estimate)
Balance of Trade	lndtd	Exports of goods and services (constant LCU)-Imports of goods and services (constant LCU)
Geopolitical Risk Index	lngpr	Recent GPR (Index: 1985:2019=100)
Political Stability Index	lnpsi	The PRS Group (The ICRG Methodology)

When the specification tests show that there is no autocorrelation, there is no problem of changing variance, The series follow a normal distribution, and there are no errors in model fitting, the prerequisites for starting the analysis are met.

According to Pesaran, Shin and Smith (2001), different econometric analyses are utilized in determining economic relationships, and in particular, different Co-integration analyses like Engle & Granger (1987), Johansen (1988) and Johansen and Juselius (1990). This method allows us to investigate how variables interact with each other over both extended and shorter time periods. Within the scope of this research, the lagged autoregressive frontier test (ARDL) is preferred founded on the characteristics of the indicators used. Although classical co-integration Tests demand the variables to be stationary at the same order., the ARDL method does not require this condition, This means that even if the series are stationary at I(0) or I(1), it is still possible to examine whether a cointegration nexus exists between indicators (Sharifi-Renani, 2007, p. 3). But according to Pesaran et al. (2001, p. 290), the independent variables should be stationary at I(0) and/or I(1), and the dependent variable should be stationary at I(1). Another benefit of the ARDL model is that it can be used in small sample studies and yields more

accurate and efficient results than co-integration tests developed by Johansen (1988, 1995) and Engle and Granger (1987) (Narayan and Smyth, 2005, p. 103).

The goal of the ARDL method is to ascertain the variables' long-term relationship. Equation 1 defines the long-term relationship in this situation, if Y stands for the dependent variable and Z for the independent variables.

$$Yt = \phi + \beta Zt + \varepsilon t \quad (1)$$

Using a bounds test approach, Pesaran et al. (2001) devised a way to estimate the long-run relationship represented in Equation 1. This approach, known as the ARDL test, is predicated on using an unconstrained error correction model to estimate the long-term relationship between variables. Stated differently, the long-run coefficients are obtained by first estimating the unconstrained error correction model and then converting it into a constrained error correction model. Equation 2 shows a linear ARDL model with distributed lags.

$$\Delta Y_t = \mu + \rho_Y Y_{t-1} + \rho_X Z_{t-1} + \sum_{i=1}^{p-1} a_i \Delta Y_{t-i} + \sum_{i=0}^{q-i} \beta_i \Delta Z_{t-1} + \varepsilon_t \quad (2)$$

The problem of the number of data and loss of information arises due to differencing. Toda and Yamamoto (1995) created the test of causality, which eliminates this problem and enables testing without the need for cointegration. Considering the variables that do not have cointegration relationship with defense expenditures, the compatibility of the results with each other is tested by looking at the causality nexus between defense spending and variables. Base vector autoregression (maximum degree of cointegration + level variables) model used in the CGE analysis can be shown as follows Equation 3 and 4.

$$Y\text{t} = \alpha 0 + \sum_{i=1}^{k+dmax} \alpha 1(\text{i+d}) Y\text{t-(i+d)} + \sum_{i=1}^{k+dmax} \alpha 2(\text{i+d})\, X\text{t-(i+d)} + \varepsilon 1\text{t} \quad (3)$$

$$X\text{t} = \beta 0 + \sum_{i=1}^{k+dmax} \beta 1(\text{i+d}) Y\text{t-(i+d)} + \sum_{i=1}^{k+dmax} \beta 2(\text{i+d})\, X\text{t-(i+d)} + \varepsilon 2\text{t} \quad (4)$$

It is not possible to determine the causality between whether a cointegration relationship exists and the analyzed indicators (Yaylalı and Lebe 2011, p. 37). The TY analysis, on the other hand, enables estimation by applying the WALD test transformed by adding lags up to VAR (dmax+k) (Akkaş and Sayılgan 2015, p. 575).

3. Empirical Results

According to the Phillips-Perron (1988) PP and test, it is concluded that the variables do not contain unit roots at I(0) or I(1) levels.

Table 2: Unit Root Test

Variables	PP(Intercept)
lnmil	-4.74**
lnmil 1st diffference	-1.54
lninf	-1.14
lninf 1st diffference	-3.09**
lnemp	-2.15
lnemp 1st diffference	-4.79**
lngdp	1.57
lngdp 1st diffference	-7.30**
lndtd	-3.98**
lndtd 1st diffference	-8.44**
lngpr	-2.92
lngpr 1st diffference	-11.23**
lnpsi	-2.10
lnpsi 1st diffference	-4.39**

Note: *In the Philips Perron test, Bartlett Kernell is used as the estimation method and Newey-West is used as the bandwidth. **: significance at the 5% level.*

Due to the small number of data (34) for ARDL analysis, appropriate models were determined by taking 2 lags as the longest possible lag time. ARDL(1, 1) model with lnmil as independent variable, ARDL(1, 1) model with lninf as dependent variable, ARDL(1, 0) model with lngdp as dependent variable, ARDL(1, 1, 0) model with lndtd as dependent variable, ARDL(1, 2) model with lnemp as dependent variable, ARDL(1, 0) model with lngpr as dependent indicator and ARDL(1, 0) model with lnpsi as dependent indicator show the appropriate lag lengths.

3.1. ARDL Bounds Test

3.1.1. Inflation-Defense Expenditures

Table 3: Diagnostic Tests

Tests	T-stat	P-Value	Decision
BG-LM	0.859	0.434	There is no autocorrelation problem.
BPG	1.142	0.348	There is no heteroscedasticity
Ramsey Reset Test	1.395	0.173	There is no Model Building error.
Jarque-Bera	50.434	0.000	Residuals in the series follow a non-normal distribution.

The 5% significance level indicates that the series are consistent. Since the residuals in the series are abnormally distributed, the determination of the nexus between inflation and defense expenditures cannot be continued.

3.1.2. GDP- Defense Expenditures

Table 4: Diagnostic Tests

Tests	T-stat	P-Value	Decision
BG-LM	0.216	0.806	There is no autocorrelation problem.
BPG	0.731	0.489	There is no heteroscedasticity
Ramsey Reset Test	0.606	0.548	There is no Model Building error.
Jarque-Bera	4.414	0.110	The residuals in the series do not follow a non-normal distribution.

To find out whether there is structural breaks in the indicators, Brown, Durbin and Evans (1975) CUSUM and CUSUMSQ tests (graphs constructed by using the squares of the residuals with returns) were applied. The series are found to be consistent at 5% significance level.

Graph 1: Cusum ve CusumQ Tests

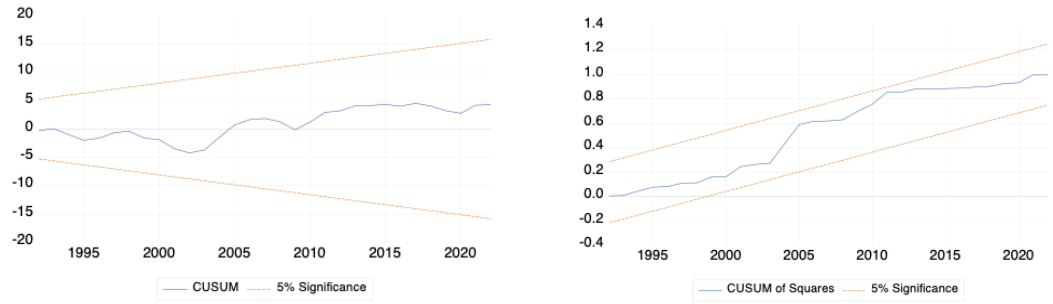


Table 5 shows that, at the 5% significance level, cointegration between the series is approved in the long run because 11.145>4.53.

Table 5: ARDL Bounds Test

k	F-stat	I(0)	I(1)
1	11.145	3.223***	3.757***
		3.957**	4.53**
		5.763*	6.48*

According to the long-run coefficients in Table 6, the GDP rises by 0.428% for every 1% boost in defense spending. However, it is not statistically significant. Nevertheless, it is not statistically significant. LNGDP= -0.4282*LNMIL +25.273

Table 6: Long-Run Coefficients

Variables	Coefficient	Std-error	T-stat	P-value
lnmil	0.428	1.919	0.223	0.824
c	25.273	11.6	2.178	0.037

To detect short-run relationships, one-period lags of the residuals should be added to the model and the error correction coefficient should be examined. According to Table 7, the probability value of CointEq(-1)* is significant and negative. If a deviation from equilibrium occurs in the short-term, it will reach the long-term equilibrium after 166.66 years.

Table 7: Error Correction Model and Short-Run Coefficient

Variables	Coefficient	T-stat	P-value
CointEq(-1)*	-0.006	-5.966	0.000

Because of the results, it is determined that defense spending and GDP in Türkiye are cointegrated.

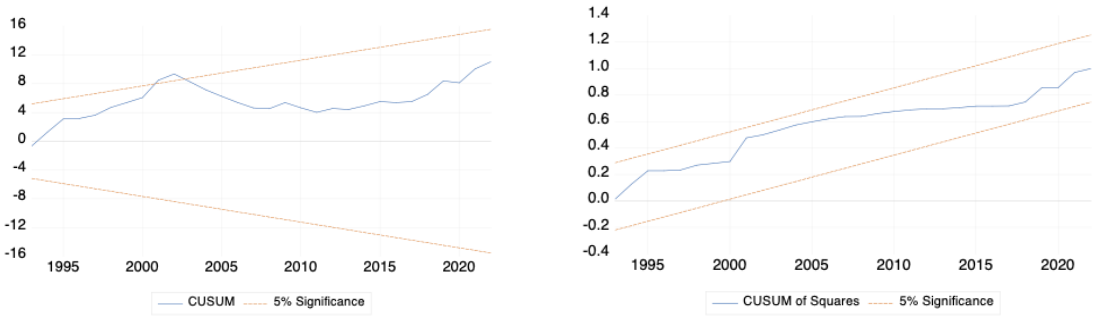
3.1.3. Balance of Trade-Defense Expenditures

Table 8: Diagnostic Tests

Tests	T-stat	P-Value	Decision
BG-LM	1.204	0.315	There is no autocorrelation problem.
BPG	0.955	0.446	There is no heteroscedasticity
Ramsey Reset Test	0.143	0.886	There is no Model Building error.
Jarque-Bera	1.893	0.388	The residuals in the series do not follow a non-normal distribution.

To investigate the presence of structural breaks in the indicators, the CUSUM and CUSUMSQ tests (graphs created by using the squares of the reversible residuals) constructed by Brown et al. (1975) were applied. At the 5% significance level, the series was found to offer consistency in the CUSUMQ test. Due to the 2001-2002 structural breaks seen in the CUSUM test, the analysis was continued by adding a dummy variable.

Graph 2: Cusum ve CusumQ Tests



According to Table 9, since 7.363>4.335 at 5% significance level, the long-term cointegration between the series is acknowledged.

Table 9: ARDL Bounds Test

k	F-stat	I(0)	I(1)
2	7.363	3.478**	4.335**

When looking at the long-term coefficients in Table 10, it is seen that a 1% increase in defense expenditures causes a 0.033% increase in the balance of trade. The 5% level of statistical significance is reached. LNDTD = 0.0337*LNMIL – 0.1919dummy + 0.9103

Table 10: Long-Run Coefficients

Variables	Coefficient	Std-error	T-stat	P-value
lnmil	0.033	0.015	2.234	0.033
Dummy	0.191	0.107	1.793	0.083
c	-0.910	0.385	-2.364	0.025

Short-term relationships must be identified by checking the error correction coefficient and adding one-term lags of the residuals to the model. Table 11 indicates that CointEq(-1)** has a significant negative probability value. After 1.31 years, if there is a short-term deviation from the balance, it will return to the long-term balance. A 1% short-term increase in defense spending raises the trade balance by 0.267 at the 1% significance level.

Table 11: Error Correction Model and Short-Run Coefficients

Variables	Coefficient	T-stat	P-value
dlnmil	0.267	4.165	0.000
CointEq(-1)*	0.762	-5.701	0.000

The results showed a statistically significant correlation between defense spending and Türkiye's trade balance over both the short and long term.

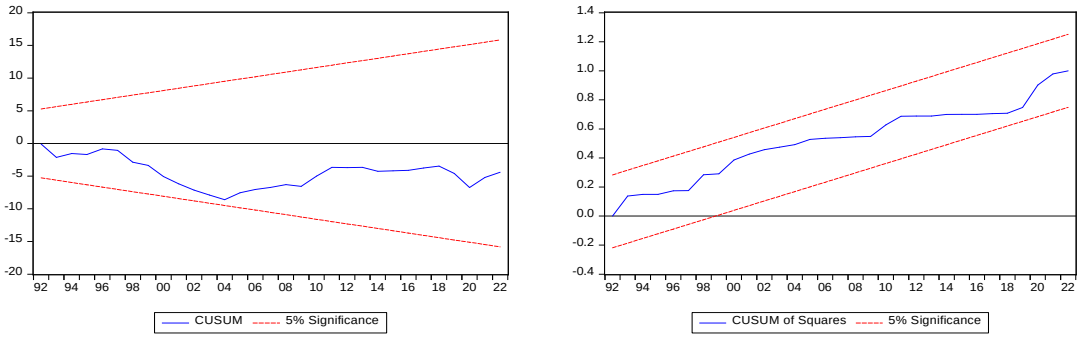
3.1.4. Employment- Defense Expenditures

Table 12: Diagnostic Tests

Tests	T-stat	P-Value	Decision
BG-LM	0.096	0.908	There is no autocorrelation problem.
BPG	0.724	0.582	There is no heteroscedasticity
Ramsey Reset Test	1.108	0.277	There is no Model Building error.
Jarque-Bera	0.466	0.792	The residuals in the series do not follow a non-normal distribution.

The CUSUM and CUSUMSQ tests (graphs created by utilizing the squares of the residuals with returns) were used by Brown et al. (1975) to examine the existence of structural breaks in the variables. The series are found to be consistent at 5% significance level.

Graph 3: Cusum ve CusumQ Tests



Given that Table 13's 5% significance level is 1.833<4.53, it is generally accepted that there is no long-term cointegration between the series.

Table 13: ARDL Bounds Test

k	F-stat	I(0)	I(1)
1	1.833	3.223***	3.757***
		3.957**	4.53**
		5.763*	6.48*

The results showed that there was no correlation between employment in Türkiye and defense spending.

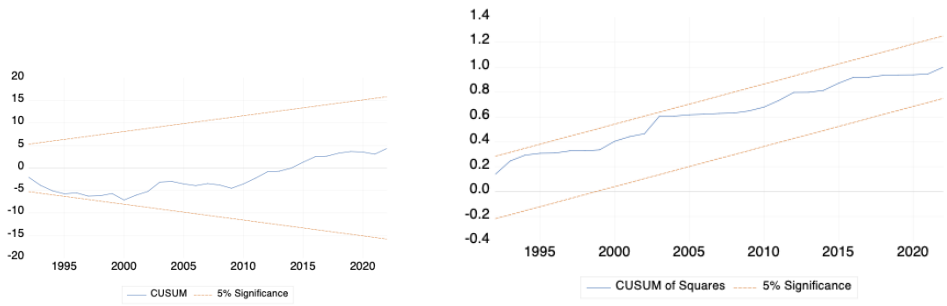
3.1.5. Geopolitical Risk Index- Defense Expenditures

Table 14: Diagnostic Tests

Tests	T-stat	P-Value	Decision
BG-LM	0.14	0.869	There is no autocorrelation problem.
BPG	2.832	0.074	There is no heteroscedasticity
Ramsey Reset Test	2.067	0.057	There is no Model Building error.
Jarque-Bera	0.091	0.955	The residuals in the series do not follow a non-normal distribution.

The CUSUM and CUSUMSQ tests (graphs made using the squares of the reversible residuals) developed by Brown et al. (1975) were used to examine whether there were structural breaks in the variables. It was determined that the series provided consistency at the 5% significance level.

Graph 4: Cusum ve CusumQ Tests



Long-term cointegration between the series is acknowledged based on Table 15's result of 6.18>6.17 at the 5% significance level.

Table 15: ARDL Bounds Test

k	F-stat	I(0)	I(1)
1	6.18	5.29**	6.175**

A 1% increase in defense spending results in a 0.103% drop in the geopolitical risk index, according to the long-term coefficients. At the 10% level, it is statistically significant. LNGPR = 0.1030*LNMIL

Table 16: Long-Run Coefficients

Variables	Coefficient	Std-error	T-stat	P-value
lnmil	-0.103	0.054	1.894	0.067

Short-term relationships must be identified by checking the error correction coefficient and adding one-term lags of the residuals to the model. Table 17 indicates that CointEq(-1)** has a significant negative probability value. If there is a deviation from the balance in the short run, it will reach the long run balance after 1.71 years. No short-run relationship was detected between the variables.

Table 17: Error Correction Model and Short-Run Coefficients

Variables	Coefficient	T-stat	P-value
CointEq(-1)*	-0.582	-3.464	0.001

The results showed a statistically significant long-term correlation between Türkiye's defense spending and its geopolitical risk index.

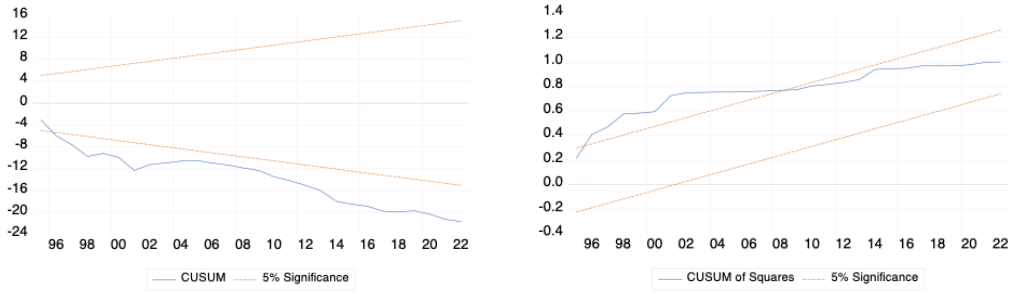
3.1.6. Political Stability Index- Defense Expenditures

Table 18: Diagnostic Tests

Tests	T-stat	P-Value	Decision
BG-LM	3.360	0.0504	There is no autocorrelation problem.
BPG	7.798	0.000	There is heteroscedasticity
Ramsey Reset Test	1.538	0.135	There is no Model Building error.
Jarque-Bera	5.514	0.053	The residuals in the series do not follow a non-normal distribution.

There is heteroscedasticity The CUSUM and CUSUMSQ tests, which are graphs made using the squares of the returned residuals and were developed by Brown et al. (1975), were used to examine whether there were structural breaks in the variables. It was determined that the series did not provide consistency at the 5% significance level.

Graph 5: Cusum ve CusumQ Tests



3.2. Toda Yamamoto Causality Test

For each equation where the independent variables and defense expenditures are considered, the appropriate lag length (2) is taken. Since K(2)+dmax(1)=3, the Toda Yamamoto **(**TY) equation with 3 lags should be applied.

Table 19: Optimal Lag Length

Lag Length	LR	FPE	AIC	SC	HQ
Inflation-Mil					
0	NA	4.066872	7.078591	7.169289	7.109108
1	247.4188	0.001359	-0.926278	-0.654186*	-0.834727
2	10.50162*	0.001195*	-1.058912*	-0.605424	-0.906327*
GDP-Mil					
0	NA	0.312660	4.513079	4.603776	4.543596
1	270.5371	4.83e-05	-4.262399	-3.990306	-4.170848
2	25.71977*	2.47e-05*	-4.938538*	-4.485051*	-4.785953*
Balance of Trade-Mil					
0	NA	0.100631	3.379421	3.470119	3.409938
1	186.8942	0.000253	-2.607962	-2.335870	-2.516412
2	23.76808*	0.000138*	-3.214398*	-2.760911*	-3.061814*
Employment-Mil					
0	NA	0.020323	1.779692	1.870390	1.810209
1	226.7870	1.35e-05	-5.537451	-5.265359	-5.445900
2	16.20907*	9.68e-06*	-5.873922*	-5.420435*	-5.721338*
Gpr-Mil					
0	NA	2.205837	6.466824	6.557521	6.497341
1	182.8456	0.006343	0.614394	0.886486	0.705945
2	22.74484*	0.003601*	0.044503*	0.497990*	0.197087*
Psi-Mil					
0	NA	0.084541	3.205198	3.295895	3.235714
1	208.5029	0.000103	-3.502474	-3.230382	-3.410923
2	26.78158*	5.08e-05*	-4.216535*	-3.763047*	-4.063950*

Note: *The abbreviation Miles refers to Defense Expenditures. Gpr refers to Geopolitical Risk Index. Psi refers to Political Stability Index * indicates the appropriate lag length.*

The wald test will be used to examine the relationship between defense expenditures and variables by examining the coefficients of the independent variable defense expenditure (Coef(4), Coef(5), and Coef(6)). The probability value (coefficient) was determined by finding the right-tailed probability of the chi-square distribution (k degree of freedom table) (Chi-square probability value; degree of freedom (k)).

coef(4)=coef(5)=coef(6)=0

Table 20: Wald Test

Equations	P-value	H0 Hypothesis
linf = coef(1)*linf(-1) + coef(2)*linf(-2) + coef(3)*linf(-3) + coef(4)*lmil(-1) + coef(5)*lmil(-2) + coef(6)*lmil(-3) + coef(7)	0.753	No causality from DE to inflation.
lgdp = coef(1)*lgdp(-1) + coef(2)*lgdp(-2) + coef(3)*lgdp(-3) + coef(4)*lmil(-1) + coef(5)*lmil(-2) + coef(6)*lmil(-3) + coef(7)	0.246	No causality from DE to EG
ldtd = coef(1)*ldtd(-1) + coef(2)*ldtd(-2) + coef(3)*ldtd(-3) + coef(4)*lmil(-1) + coef(5)*lmil(-2) + coef(6)*lmil(-3) + coef(7)	0.017	A 5% causality from DE to balance of trade
lemp = coef(1)*lemp(-1) + coef(2)*lemp(-2) + coef(3)*lemp(-3) + coef(4)*lmil(-1) + coef(5)*lmil(-2) + coef(6)*lmil(-3) + coef(7)	0.295	No causality from DE to employment.
lgpr = coef(1)*lgpr(-1) + coef(2)*lgpr(-2) + coef(3)*lgpr(-3) + coef(4)*lmil(-1) + coef(5)*lmil(-2) + coef(6)*lmil(-3) + coef(7)	0.077	A 10% causality from DE to geopolitical risk index.
lpsi = coef(1)*lpsi(-1) + coef(2)*lpsi(-2) + coef(3)*lpsi(-3) + coef(4)*lmil(-1) + coef(5)*lmil(-2) + coef(6)*lmil(-3) + coef(7)	0.020	A 5% causality from DE to political stability index.

4. Conclusions

The nexus between defense spending and macroeconomic indicators- geopolitical risk and political stability index in Türkiye was investigated with ARDL bounds and TY causality test. Defense expenditures were examined as independent variables and other indicators as dependent variables.

According to ARDL bounds test, a short and long-term positive causality relationship was determined from defense expenditures to balance of trade and a long-term reverse causality relationship was determined from defense expenditures to gross domestic product. However, the direction could not be determined. No relationship was determined towards inflation, employment, and political stability index.

TY causality test findings, a causality relationship was determined from defense expenditures to foreign trade balance and political stability index at a significance level of 5%, while no causality relationship was determined from defense expenditures to gross domestic product, employment, and inflation. A causality relationship was reached from defense spending to the geopolitical risk index. 10% is a significant value.

Both short- and long-run empirical results support the military Keynesian approach, showing that rising defense spending in Türkiye boosts exports and the trade balance. Increasing R&D activities and implementing policies that encourage investment in higher-density defense industry products will increase positive externalities in the balance of trade. By boosting confidence in the nation's security, political, and economic issues and lowering the likelihood of terrorism, it is possible to draw the long-term conclusion that higher defense spending tends to lower geopolitical risks. This result shows that keeping defense expenditures high is important for Türkiye, which has a relatively high geopolitical risk due to various environmental and internal factors, in terms of reducing this risk. For a country to increase its economic investments and achieve its economic growth targets, security must be ensured in the country based on the

geopolitical risk index relationship. For security prerequisites, defense expenditures should be made in amounts that will bring the geopolitical risk index to the lowest levels. The export of inventions in the defense industry should be encouraged, and positive externalities should be provided to the balance of trade by providing foreign exchange inflow to the country. The inputs (intermediate goods) used in the sector should be obtained as independently as possible from imports, thus preventing a decrease in net exports.

In conclusion, the study examined the impact of defense spending on a few variables unique to Türkiye. The number and quality of variables can be differentiated in subsequent studies, and analyses can be carried out using panel econometric methods among various countries in terms of interaction since it was found that the validity of theories may change in the short and long run. It is hoped that the geopolitical risk index and political stability index variables, which have been examined limitedly in the literature and are closely related to defense expenditures, will also guide researchers to add to their studies. By highlighting the importance of considering all factors at once for research on defense spending in the literature, the findings of this study are expected to bolster recommendations for economic policies in other nations.

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References

Akkaş, M. E., & Sayılgan, G. (2015). Housing prices and mortgage interest rate: Toda-Yamamoto Causality Test. *Journal of Economics Finance and Accounting*, *2*(4), 572-578.

Alesina, A. & Weder, B. (1999). Do Corrupt Governments Receive Less Foreign Aid? doi: 10.3386/w7108

Asongu, S. A., Le Roux, S., & Singh, P. (2021). Fighting terrorism in Africa: Complementarity between inclusive development, military expenditure and political stability. *Journal of Policy Modeling*, *43*(5), 897-922. doi: 1016/j.jpolmod.2020.01.014

Balan, F. (2015). The Nexus between Political Instability, Defence Spending and Economic Growth in the Middle East Countries: Bootstrap Panel Granger Causality Analysis. *Economic Insights-Trends and Challenges: C. IV* (Sayı 4).

Barış, S., & Barış, A. (2024). Do Geopolitical risks affect defense expenditures? An Analysis with panel ARDL approach. *International Journal of Social Inquiry*, *17*(1), 69-85. doi: 10.37093/ijsi.1428209

Bayraktar, S. (2019). Savunma Sanayi ve Savunma Harcamalarının Makroekonomik Etkileri: Türkiye Örneği. [Master's thesis]. Marmara University Institute of Social Sciences.

Benoit, E. (1973). *Defense and economic growth in developing countries*. Lexington Books.

Bilgin, C. (2022). Effects of defense spending changes on economic growth: A Nonlinear cointegration model and asymmetric causality test for Türkiye. *İzmir İktisat Dergisi, 37*(1), 92-109. doi: 10.24988/ije.835979

Brown, R. L., Durbin, J., & Evans, J. M. (1975). Techniques for testing the constancy of regression relationships over time. *Journal of the Royal Statistical Society: Series B (Methodological)*, *37*(2), 149-163. doi: 10.1111/j.2517-6161.1975.tb01532.x

Buzdağlı, Ö., & Özdemir, D. (2021). The Effect of geopolitical risk index on military expenditures. *Süleyman Demirel Üniversitesi Vizyoner Dergisi*, *12*(29), 188-203. doi: 10.21076/vizyoner.761633

Caldara, D., & Iacoviello, M. (2022). Measuring geopolitical risk. *American Economic Review, 112*(4), 1194-1225. doi: 10.1257/aer.20191823

Ceyhan, T., & Köstekçi, A. (2021). The Effect of military expendıtures on economic growth and unemployment: Evidence from Türkiye. *Fırat Üniversitesi Sosyal Bilimler Dergisi, 31*(2), 913-928. doi: 10.18069/firatsbed.898944

Değirmenci, T., Ünsal, Y., & Cengiz, Y. (2024). Türkiye'de politik istikrar, ekonomik politika belirsizliği ve ekonomik büyümenin askeri harcamalar üzerindeki etkisi. *Politik Ekonomik Kuram*, 8(2), 370-384. doi: 10.30586/pek.1422314

Demirci, O., & Ayyildiz, F. V. (2023). The Relationship of geopolitical risks and defense expenditures with economic growth: The Example of MIST countries. *Fiscaoeconomia, 7*(3), 1929-1947. doi: 10.25295/fsecon.1277050

Destek, M. A. (2016). Military expenditure and economic growth in BRICS and MIST countries: Evidence from bootstrap panel granger causality analysis. *International Journal of Management Economics and Business, 12*(28), 0-0. doi: 10.17130/ijmeb.20162819853

Durgun, Ö., & Timur, M. C. (2017). The Relationship Between Defense Expenditure and Economic Growth: Türkiye Analyses. *Dumlupınar Üniversitesi Sosyal Bilimler Dergisi, 54*, 126-137.

Efe, E., & Aydın Ü. (2023). The Effect of Macroeconomic Variables and Geopolitical Risk Index on Defence Expenditures. *Eskişehir Osmangazi Üniversitesi Sosyal Bilimler Dergisi* 24(3), 692-707. doi: 10.17494/ogusbd.1317847.

Efe, E., & Aydın, Ü., (2024). The Relationship between political stability and geopolitical risk index with military expenditures: *The Case of BRICS-T countries. In 3. Bilsel International Truva Scientific Researches And Innovation Congress* (pp. 51-64). Çanakkale, Türkiye

Engle, R., & Granger, C. (1987). Co-integration and error correction: Representation, estimation, and testing. *Econometrica, 55*(2), 251-276.

Erbaykal, E. (2007). The Relationship between defence expenditures and economic growth in Türkiye [Master's thesis, Balıkesir University Institute of Social Sciences]. https://hdl.handle.net/20.500.12462/1933

Erdugan, F., & Özçelik, Ö. (2020). Relationship between defense expenditures and employment: Panel data analysis. *Siyaset, Ekonomi ve Yönetim Araştırmaları Dergisi, 8*(2), 152-168.

Esener, S. C., & Ipek, E. (2016). Expanding Effects of Military Expenditures on External Debt in Developing Countries. *Journal of Business Economics and Finance, 4*(4).

Görkem, H., & Işık, S. (2008). The relationship between defence spending and economic growth in Türkiye (1968-2006). 405-424. *Marmara Üniversitesi İktisadi ve İdari Bilimler Dergisi, 25*(2), 405-424.

Gül, E., & Torusdağ, M. (2019). Analysis of the effects of defense expenditures on income distribution and economic development with panel asymmetric causality test: Brics countries and Türkiye Case. *International Journal of Contemporary Economics and Administrative Sciences, 9*(1), 1-24. doi: 10.5281/zenodo.3262188

Huskić, M., Satrovic, E., & Muslija, A. (2020). Revisiting The Military Expenditure–Growth Nexus for The Sample of Mist Countries. In *Selected Topics on Defence Economics and Terrorism*.

İpek, E. (2014). Expanding effects of military expenditures on external debt in developing countries. *Anadolu University Journal of Social Sciences / Anadolu Üniversitesi Sosyal BilimlerDergisi*, *14*(3),113-125.

Johansen, S. (1988). Statistical analysis of cointegration vectors. *Journal of Economic Dynamics and Control*, *12*(2), 231-254. doi: 10.1016/0165-1889(88)90041-3

Johansen, S. (1995). Identifying restrictions of linear equations with applications to simultaneous equations and cointegration. *Journal of Econometrics*, *69*(1), 111-132. https://doi.org/https://doi.org/10.1016/0304-4076(94)01664-L

Johansen, S., & Juselius, K. (1990). Maximum likelihood estimation and inference on cointegration--with applications to the demand for money. *Oxford Bulletin of Economics and Statistics*, *52*(2), 169-210.

Kalyoncu, H., & Yucel, F. (2006). An analytical approach on defense expenditure and economic growth. *Journal of Economic Studies*, *33*(5), 336-343. doi: 10.1108/01443580610706564

Kaya, S. S. (2013). A Causality analysis on the economic effects of defense expenditure in Türkiye (1970-2010). *Trakya Üniversitesi Sosyal Bilimler Dergisi, 15*(2), 17-38.

Khan, K., Su, C. W., & Rizvi, S. K. A. (2022). Guns and blood: A review of geopolitical risk and defence expenditures. *Defence and Peace Economics*, *33*(1), 42-58.

Korkmaz, S. (2015). The Effect of military spending on economic growth and unemployment in Mediterranean countries. *International Journal of Economics and Financial Issues*, *5*(1), 273-280.

McGuire, M. C. (1995). Chapter 2 Defense economics and international security (C. 1, ss. 13-43). Elsevier. doi: 10.1016/S1574-0013(05)80004-3

Murat, Ö. (2020). The Impact on Foreign Trade Balance Balance of Defense Spending in Türkiye and the BRICS countries. [Unpublished doctoral dissertation]. İstanbul Ticaret Üniversitesi.

Naıimoğlu, M., & Özbek, S. (2022). Türkiye'de Savunma Harcamaları ve Ekonomik Büyüme İlişkisinin Yeniden Gözden Geçirilmesi: Fourier Yaklaşımı. *İzmir İktisat Dergisi*, *37*(1), 174-188. doi: 10.24988/ije.909072

Narayan, P. K., & Smyth, R. (2005). The residential demand for electricity in Australia: an application of the bounds testing approach to cointegration. *Energy Policy*, *33*(4), 467-474. doi: 10.1016/j.enpol.2003.08.011

Njamen Kengdo, A. A., Nchofoung, T. N., & Kos A Mougnol, A. (2023). Determinants of military spending in Africa: Do Institutions matter?. *Peace Economics, Peace Science and Public Policy*, *29*(4), 401-440.

Odehnal, J., & Neubauer, J. (2020). Economic, security, and political determinants of military spending in NATO Countries. *Defence and Peace Economics*, *31*(5), 517-531. doi: 10.1080/10242694.2018.1544440

Özen Atabey, A., & Karakuş, M. (2023). Analysis of causal relationships between defense expenditures, unemployment and economic growth: The Case of Türkiye. *Pamukkale Üniversitesi Sosyal Bilimler Enstitüsü Dergisi*, *54*, 39-55. doi:10.30794/pausbed.1130118

Pesaran, M. H., Shin, Y., & Smith, R. J. (2001). Bounds testing approaches to the analysis of level relationships. *Journal of Applied Econometrics*, *16*(3), 289-326. doi: 10.1002/jae.616

Phillips, P. C. B., & Perron, P. (1988). Testing for a unit root in time series regression. *Biometrika, 75*(2), 335-346. doi: 10.1093/biomet/75.2.335

PRS Group. (2022). *The International Country Risk Guide (ICRG) Methodology*. https://www.prsgroup.com/wp-content/uploads/2022/04/ICRG-Method.pdf

Sezgin, S., & Yildirim, J. (2002). The Demand for Turkish defence expenditure. *Defence and Peace Economics, 13*(2), 121-128. doi: 10.1080/10242690210973

Sharifi-Renani, H. (2007). *Demand for money in Iran: An ARDL approach*. https://EconPapers.repec.org/RePEc:pra:mprapa:8224

Sürücü, L., Eminer, F., & Sagbas, M. (2022). The Relationship of defense expenditures and economic growth examples of Türkiye and China (2000-2020). *Güvenlik Stratejileri Dergisi, 18*(41), 171-199. doi: 10.17752/guvenlikstrtj.1026084

Sweidan, O. D. (2023). Geopolitical risk and military expenditures: Evidence from the US economy. *Russian Journal of Economics* 9(2):201-18. doi: 10.32609/j.ruje.9.97733.

Şentürk, S. H. (2020). The Relation of external debt and military expenditures: An Econometric study on selected middle east countries. *Maliye Araştırmaları Dergisi, 6*(3), 93-106.

Song, Y., & Chen, B. (2024). Are the defense policy and military expenditure in China economically or politically driven?. *Journal of Chinese Political Science*, 1-28.

Taçyıldız, M. O., & Çukur, A. (2022). The Impact of Defense Expenditures on Macroeconomic Indicators in Türkiye: 2000-2020 Period. *Journal of Security Studies, 24*(1), 50-74.

Toda, H. Y., & Yamamoto, T. (1995). Statistical inference in vector autoregressions with possibly integrated processes. *Journal of Econometrics, 66*(1-2), 225-250. doi: 10.1016/0304-4076(94)01616-8

Topal, M. H. (2018). The Military expenditure and unemployment relationship in Türkiye:A cointegration analysis under multi-structural breaks and time-varying causality. In *4th International Congress on Political, Economic and Social Studies (ICPESS)* (pp. 139-158).

Üçler, G. (2017). The Effect of defense spending on Unemployment in Türkiye: An Econometric Analysis for the Period of 1980-2014. *Yaşar Üniversitesi E-Dergisi, 12*(46), 161-170.

Yaylalı, M., & Lebe, F. (2011). Beşerî sermaye ile iktisadi büyüme arasındaki ilişkinin ampirik analizi.. *Marmara University Journal of the Faculty of Economic & Administrative Sciences, 30*(1), 23-51.

Yılancı, V., & Özcan, B. (2010). Analyzing the Relationship Between Defense Expenditures and GNP for Türkiye Under Structural Breaks. *Cumhuriyet Üniversitesi İktisadi ve İdari Bilimler Dergisi, 11*(1), 21-33.

Yıldırım, J., & Sezgin, S. (2003). Military expenditure and employment in Türkiye. *Defence and Peace Economics, 14*(2), 129-139. doi: 10.1080/10242690302919

World Bank. (2023). World Development Indicators *DataBank*. World Bank. https://databank.worldbank.org/source/world-development-indicators.