Research Article

The Effects of Defence Expenditures on Economic Growth: A Case Study on Türkiye

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Abstract: This study examines the effects of defence expenditures (DE) on economic growth (EG) between 1990 and 2023. In models where the effects of defence expenditures on economic growth are investigated, the determinants of economic growth are frequently used as control variables. For this reason, the World Uncertainty Index (WUI) is included in the model used in the study. Thus, the study contributes to the literature. On the other hand, the developments in the defence industry in Türkiye in recent years are remarkable. Therefore, the economic and political effects of DE encouraged the preparation of this study. In this study, the AARDL method is used to determine the cointegrated relationship between variables, and then the error correction model is used to obtain long-run findings. According to the findings, fixed capital investments positively affect EG in both the short and long run. While foreign trade deficits affect EG positively in the long run, they affect it negatively in the short run. While the world uncertainty index has a negative effect on EG in the long run, there is no relationship between the variables in the short run. Finally, it is concluded that DE has a positive effect on EG in both the short and long run.

Keywords: Defence Expenditures, Economic Growth, Economic Policies, Time Series Analysis
Jel Codes: H50, O47, P00, C32

Savunma Harcamalarının Ekonomik Büyüme Üzerindeki Etkileri: Türkiye Örneği

Öz: Bu çalışmada 1990-2023 yılları arası savunma harcamalarının (SH) ekonomik büyüme (EB) üzerine etkileri incelemektedir. SH'nin EB üzerine etkileri araştırıldığı modellerde EB'nin belirleyicileri kontrol değişken olarak sıklıkla kullanılmaktadır. Bu nedenle çalışmada kullanılan modele Dünya Belirsizlik Endeksi (WUI) dahil edilmiştir. Böylece çalışma literatüre katkı sağlamaktadır. Öte yandan, Türkiye'de son yıllarda savunma sanayinde yaşanan gelişmeler dikkat çekicidir. Dolayısıyla savunma harcamalarının ekonomik ve politik etkileri bu çalışmanın hazırlanmasını teşvik etmiştir. Bu çalışmada, değişkenler arasındaki eşbütünleşik ilişkiyi belirlemek için AARDL yöntemi ve devamında uzun dönemli bulguları elde etmek için hata düzeltme modeli kullanılmıştır. Elde edilen bulgulara göre, sabit sermaye yatırımları hem kısa hem de uzun dönemde EB'yi pozitif yönde etkilemektedir. Dış ticaret açıkları EB'yi uzun dönemde olumlu etkilerken, kısa dönemde olumsuz etkilemektedir. Dünya belirsizlik endeksi uzun dönemde EB üzerinde negatif bir etkiye sahipken, kısa dönemde değişkenler arasında herhangi bir ilişki bulunmamaktadır. Son olarak, SH'nin hem kısa hem de uzun dönemde EB üzerinde pozitif bir etkiye sahip olduğu sonucuna varılmıştır.

Anahtar Kelimeler: Savunma Harcamaları, Ekonomik Büyüme, Ekonomi Politikaları, Zaman Serisi Analizi
Jel Kodları: H50, O47, P00, C32

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1. Introduction

The economic literature, in which growth models for the growth and development process of countries and the factors affecting these models are discussed, started with the Mercantilist view in the 15th century. This view was followed by the Physiocrats who dominated until the end of the 18th century. The Physiocrats, who explained the source of growth with the natural order, were followed by the Classics. The Classical view, which associated the phenomenon of growth with the division of labour, the unit of capital, population and specialisation, was replaced by the Keynesian view, an approach that advocated state interventionism, with the 'Great Depression'. The Keynesian growth model was followed by the Neo-classical growth model. In the neo-classical growth model, technological development was considered exogenous and defined as an important factor in economic growth (Özdemir & İmamoğlu, 2021, pp. 2016-2017). In the following periods, R&D expenditures have taken an important place in economic growth models such as technological development. In the endogenous growth model, which is based on the criticism of the neoclassical model, it is stated that economic growth can be achieved by the country's own internal dynamics. When these dynamics are analysed, it is seen that human capital, knowledge, education, health services as well as R&D and innovation have an important place (Kibritçioğlu, 1998, p. 217). Therefore, it is seen that the views on the growth processes of countries have been discussed with different economic ideas from the 15th century to the present day.

From past to present, countries have followed policies to protect themselves against threats from other countries while planning to meet their domestic needs. For this reason, a significant share of national budgets is allocated to DE (Korkmaz, 2015, p. 273). DE is an important expenditure item in the budgets of countries. Therefore, the effects of DE on economies are an important topic of discussion in the academic literature (Sağdıç et al., 2019, p.104). In fact, DE is a significant burden on the public budget and the share allocated to DE from the state budget excludes public investments in different sectors (Selvanathan & Selvanathan, 2014, p. 69). On the other hand, the high value added generated by the development of DE may lead to positive externalities on different sectors over time and thus have positive effects on EG. Therefore, developments in the defence industry become an important factor in the development of countries over time (Engin & Uğur, 2024, p. 732).

Today, political developments on a global and regional scale push countries to increase their military defence capabilities. For this reason, the effects of the developments in the defence industry, where high technology-oriented high value-added products are produced, on different sectors and thus on the national economy is an important issue that is highly curious in the literature. In addition, Türkiye's recent investments in the defence industry have attracted attention. According to Dr. Haluk Görgün, President of the Turkish Defence Industry Agency, *"the defence industry's exports exceeded 7 billion USD in 2023, and it is planned to exceed 10 billion USD within 2 years*[1]*".* **In the light of these developments in Türkiye's defence industry, the importance of this study, which has been prepared taking into account the topicality of the subject, is emphasised. On the other hand, the fact that this study investigates the issue with the help of recent empirical approaches reveals the unique value of the study.** In this context, the following sections of the study are planned as follows. The second section explains the theoretical framework of the relationship between DE and EG. The third section presents the literature review on the subject. The fourth section presents the model, hypotheses, methodology and findings of the study. Finally, the fifth section presents the conclusion and evaluation.

[1] https://www.eurasiantimes.com/from-importer-to-innovator-phenomena/
https://www.savunmasanayist.com/turkiyenin-2024-yili-savunma-butcesi-rekor-artisa-gebe/

2. Theoretical Framework

The first study investigating the effects of DE on EG was conducted by Benoit (1973). In subsequent studies, the effects of DE on EG were analysed with two different approaches: The Military Keynesian approach and the Neoclassical approach (Dunne et al., 2001, p. 7). In the Military Keynesian approach, it is argued that DE has positive effects on EG (Alptekin, 2012, p. 206). According to this view, advanced technologies developed in the defence industry together with the modernisation of existing production techniques create positive externalities in the real sector production process. Therefore, it is suggested that DE has a positive impact on the private sector production process (Eshay, 1983, as cited in Alptekin, 2012, p.206). In the Neoclassical view, DE is considered within the scope of negative externalities. In this view, it is argued that scarce resources are spent according to the needs of the defence industry and this situation negatively affects productive investments and capital accumulation. For this reason, it is thought that DE has negative effects on EG (Saygılı, 2022, p. 163).

In addition to the Military Keynesian and Neoclassical approaches, the literature investigates the relationship between DE and EG through four different hypotheses, namely the growth hypothesis, the inhibitory hypothesis, the feedback hypothesis, and finally the neutrality hypothesis. The growth hypothesis suggests that developments in DE have positive effects on EG. The inhibitory hypothesis posits a unidirectional and negative relationship between DE to EG. The feedback hypothesis suggests a bidirectional causal relationship between DE and EG. Finally, according to the neutrality hypothesis, there is no causal relationship between DE and EG (Biswas & Ram, 1986, p. 362; Kollias et al., 2004, p. 299; Destek, 2016, p. 210; Yıldırım, 2024, p.138).

In today's world, countries allocate a significant percentage of their GDP to DE in response to recent regional and global political instability. Figure 1 below lists the thirteen countries with the highest defence expenditures in the world, the European Union, and the total worldwide DE as of 2022. Accordingly, the data for 2022 reveals that a budget of 2.207 trillion dollars[2] was allocated for DE worldwide. Looking at country-specific DE data for 2022, the US ranks first with $876.9 billion, followed by China ($291.9 billion), Russia ($86.3 billion), India ($81.3 billion), Saudi Arabia ($75 billion), the United Kingdom ($68.4 billion), Germany ($55.7 billion), France ($53.6 billion), Korea ($46.3 billion), Japan ($45.9 billion), Ukraine ($43.9 billion), Italy ($33.4 billion), Australia ($32.2 billion), Canada ($26.8 billion), Israel ($23.4 billion), and finally Türkiye with $10.6 billion (World Bank, 2024).

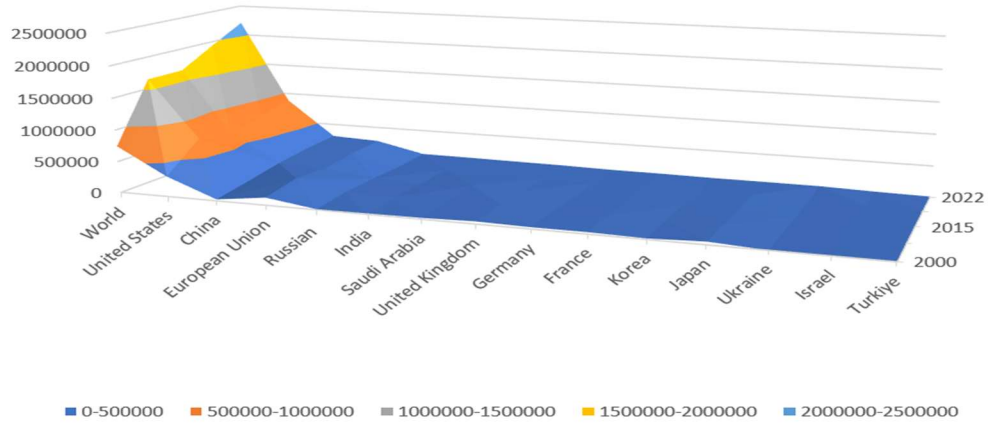
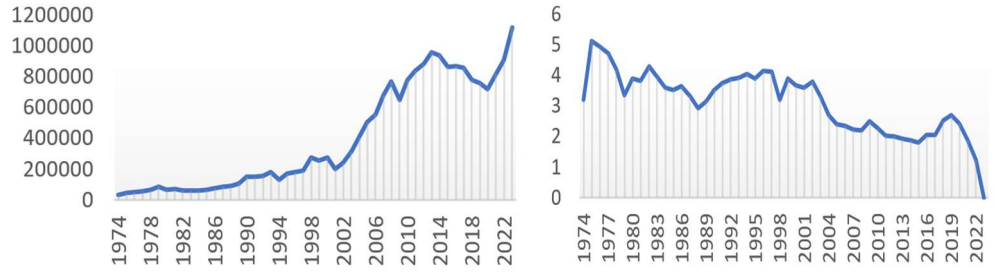


Figure 1. Military Expenditures of Selected Countries (2022) (1.000.000 current USD) (**Source:** Prepared by the author based on the World Bank database.)

[2] US Dollar.

Türkiye's DE amounted to $1.1 billion in 1974 and accounted for 3.19% of national income. While the highest share of DE in national income in Türkiye was in 1975 at 5.11%, this share has been decreasing since 1996. In fact, after 2000, while the dollar amount of DE increased, its share of national income actually decreased. For example, DE was $9.9 billion in 2000 but $17.6 billion in 2010, yet DE's share of national income in 2000 was 3.66% but only 2.27% in 2010. The budget allocated to DE and its share in national income decreased significantly, especially by 2020. In fact, while the budget allocated to DE in 2020 was $17.4 billion, the allocations in 2021 and 2022 were $15.5 and $10.6 billion, respectively while DE's share of national income was 2.43%, 1.89%, and 1.23%, respectively. Looking at the budget allocated to DE in recent years, there has been a significant increase compared to previous years. In 2023, the DE budget was approximately $16 billion, and, by 2024, it had increased 250% to $40.5 billion. In 2025, Türkiye is expected to allocate approximately $47 billion[3] for DE.



Türkiye Defence Expenditure (1.000.000 current USD)

Ratio of Defence Expenditures to GDP

Graph 1. Türkiye's defence expenditures and share of national income (**Source**: Prepared by the author based on the World Bank database.)

3. Literature Research

The relationship between DE and EG has been the subject of many studies in the scholarly literature. However, it is noteworthy that there is no consensus in these studies, as some indicate that DE positively affects EG while others find that it negatively affects EG, and yet others suggest there is no relationship between the two variables. Considering the lack of consensus in the literature, this study is intended to make a significant contribution to the current debate. In this context, the reviewed literature is presented by taking into account the studies that have obtained results that DE positively affects EG, negatively affects EG, there is causality and finally there is no relationship between the variables.

Many studies find that DE has a positive effect on EG. For example, Yıldırım et al. (2005) investigated the effects of DE on EG for the Middle East and Türkiye between 1989-1999 using panel data analysis. They determined that DE had positive effects on EG. Polat (2020) investigated the relationship between DE and EG for the fifteen countries with the highest defence expenditures in the world between 1992-2017 using panel data analysis. He determined that a 1% increase in DE increased EG by 1.05% on average, in the long term, while this rate is slightly lower in the short term. He also found that a 1% increase in EG increased DE by 0.89%. Ceyhan & Köstekçi (2021) investigated the relationship between DE and EG between 1988-2019 for Türkiye using cointegration tests, concluding that DE had a long-term positive effect on EG. Ajala & Laniran (2021) investigated the issue in Nigeria between 1981-2017 with the ARDL method and also determined that DE

[3] https://www.savunmasanayist.com/turkiyenin-2025-yili-savunma-butcesi-aciklandi-tarihi-rekor/

had positive effects on EG. Çiçek et al. (2024) investigated the issue using a panel regression method for five G20 countries between 2000-2021 and found a positive relationship between DE and EG. Similar results were obtained by Destek (2016) for Canada, Çetinkaya et al. (2017) for Türkiye (over the long term), Ajmair (2018) for Pakistan, Torun et al. (2021) for NATO countries, Özcan (2021) for developing countries in the G20, Yurttançıkmaz et al. (2012) for Iran, Çınar & Ünsan (2021) for Middle Eastern countries (over the long term), Naımoğlu & Özbek (2022) for Türkiye, Oğul (2022) for the countries with the highest defence expenditures, Koçak (2023) for the USA, Russia, Israel, and Saudi Arabia, and Çakır & Dereli (2024) for MIST countries.

Some studies conclude that DE has a negative impact on EG. Dunne et al. (2001) investigated the relationship between DE and EG for Türkiye and Greece using the Granger causality test. While the effects of DE on EG were positive in Greece, they were negative in Türkiye. Kanca & Yamak (2020) investigated the relationship between DE and EG for the Turkish economy between 1980-2017 using ARDL and Toda-Yamamoto methods. They found that DE had a negative long-term effect on EG and that there was a bidirectional causality relationship between both variables. Saeed (2023) investigated the relationship between DE and EG for 133 countries between 1960 and 2012 using panel methods. He concluded that a 1% increase in military expenditures decreased economic growth by 1.1%. Engin & Uğur (2024) investigated the relationship between DE and EG for N11 countries between 2003-2022 with panel data analysis. They found that a 1% increase in DE reduced economic growth by 0.08%. Similar results were obtained by Alptekin (2012) for OECD countries, Hou & Chen (2013) for thirty-five developing countries, Topal (2018) for Türkiye, Akcan (2019) for Türkiye, Asıloğulları & Ceyhan (2019) for thirty-five OECD countries, Çetin & Güzel (2019) for MENA countries, Kanca & Yamak (2020) for Türkiye, Becker & Dunne (2023) for thirty-four countries, Koçak (2023) for twelve countries, and Çınar & Ünsal (2021) for Middle Eastern countries over the long term.

Other studies investigate the causal relationship between DE and EG. For example, Karagöl & Palaz (2004) investigated the relationship between DE and EG in Türkiye between 1955-2000 using the Johansen cointegration test and the Granger causality test. They found that there was an equilibrium relationship between DE and EG over the long term. They also concluded that there was a unidirectional causality relationship from DE to EG in the short term. Similar findings were found by Çevik & Bektaş (2019), Pan (2015), Gültekin Tarla & Boyrazlı (2023), Turan et al. (2018), and Has & Çınar (2022). Selvanathan & Selvanathan (2014) investigated the relationship between DE and EG in Sri Lanka for the period 1975-2013 using the Granger causality test and found that there was a unidirectional causal relationship from DE to EG. Sağdıç et al. (2019) used panel methods to investigate the effects of DE on EG for twenty-one European Union countries between 2005-2017 concluding that DE had a positive effect on EG and that there was a bidirectional causal relationship between both variables. Similar results were obtained by Destek (2016) for the USA, Korkmaz & Bilgin (2017) for Türkiye, Kılıç et al. (2018) for G-8 countries, Turan et al. (2018) for low-income countries, Artekin et al. (2019) for G7 countries, Lobont et al. (2019) for Romania, Yantur & Gürson (2019) for the USA, France, and Japan, Kanca & Yamak (2020) for Türkiye, and Özşahin & Şahin (2023) for Türkiye.

Finally, there are some studies that find no demonstrable relationship between DE and EG. For example, Durgun & Timur (2017) found no relationship between DE and EG for the Turkish economy between 1970-2015 using the Granger causality test. Similar results were found by Pan (2015) for Jordan, Oman, and Saudi Arabia, Çetinkaya et al. (2017) for Türkiye over the short term, Korkmaz & Bilgin (2017) for the US, Ayla (2020) for Türkiye, Özer (2020) for Türkiye, and Özcan (2021) for developed countries in the G20.

Based on this summary of the literature on the relationship between DE and EG, it is clear that this topic has been heavily investigated for many countries using many different methods. However, it is also clear that there is no consensus in these studies, even when the same countries are the subject of multiple studies.

4. Research Method

This study investigates the effects of DE on EG in the Turkish economy for the period 1990-2023. The WUI data used in the study has been calculated since 1990. Military expenditure data has been calculated up to 2023. Therefore, the study covers the period between 1990 and 2023. The data of the study are obtained from the World Bank database and Economic Policy Uncertainty (EPU). EG, DE and fixed capital formation data are in US dollars and are logarithmically transformed and included in the study. Trade openness data are obtained by the ratio of the sum of exports and imports to GDP data. Finally, the EPU index developed[4] by Hites Ahir (International Monetary Fund), Nicholas Bloom (Stanford University) and Davide Furceri (International Monetary Fund) was used. The variables used in the study are presented in Table 1.

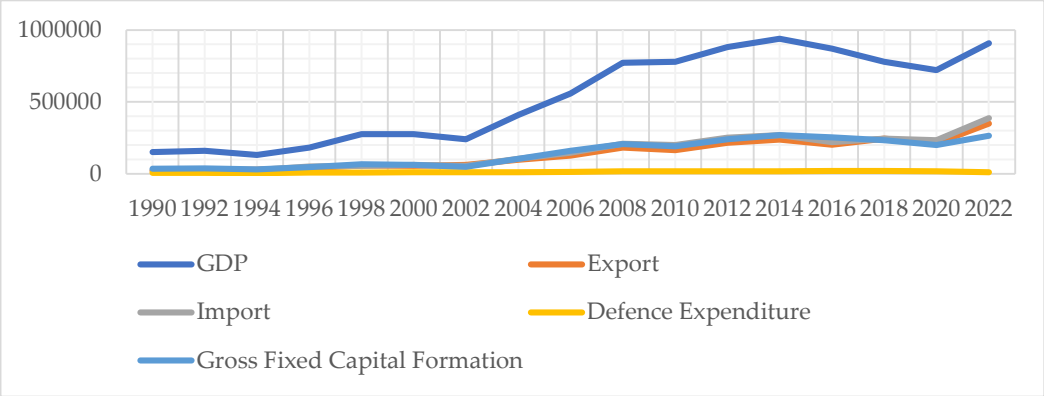


Figure 2. Data on Turkish Economy (1.000.000 US dollars)

The EIU index, one of the data used in the study, is calculated for 143 countries using the frequency of 'uncertainty' in the Economist Intelligence Unit (EIU) country reports. The EIU reports cover major political and economic developments in each country, together with analyses and forecasts of political, policy and economic conditions[5]. To make the WUI comparable across countries, the raw numbers are scaled by the total number of words in each report. In this study, the WUI for developing countries is used.

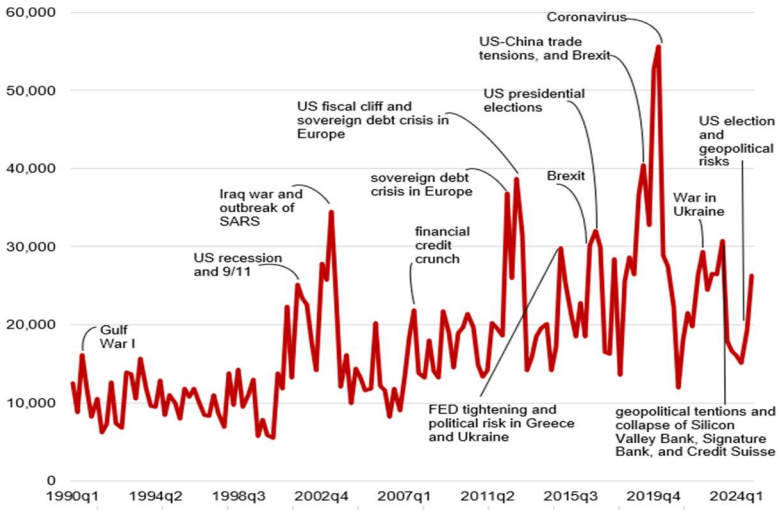


Figure 3. World Uncertainty Index (**Source**: Ahir, H, Bloom, N. & Furceri, D. (2022). World Uncertainty Index. NBER Working Paper.)

[4,5] https://www.policyuncertainty.com/wui_quarterly.html

Table 1. Variable Definitions

Variables	Symbols	Definitions	References
GDP	lngdp	Annual GDP (current US$)	World Bank
Trade Openness	trade	Ratio of total exported and imported goods and services to GDP (current US$)	World Bank
Defence Expenditure	lndfns	Military Expenditures (current US$)	World Bank
Gross Fixed Capital Formation	lngfcf	Gross Fixed Capital Formation (current US$)	World Bank
World Uncertainty Index	lnWUI	World Uncertainty Index	EPU[6]

The model used in this study is derived from Desli & Gkoulgkoutsika (2021). Desli & Gkoulgkoutsika (2021) examined economic growth and defence expenditures in their study. However, they used a control variable to take into account other factors that may affect the economic growth process. In this study, the WUI was added to the model used by Desli & Gkoulgkoutsika (2021) and the model to be used for estimation in the study was obtained. Equation (1) presents the study's model:

$$lngdp_t = \beta_0 + \beta_1 lndfns_t + \beta_2 lngfcf_t + \beta_3 trade_t + \beta_4 lnWUI_t + \mu_t \quad \text{.....(1)}$$

The null hypothesis (H_0) of the study within the scope of equation (1) is as follows:

H_0: DE does not positively affect GDP,

H_a: DE has a positive effect on GDP.

The constraints used in the study are as follows:

H_0: $\beta_1 = \beta_2 = \beta_3 = \beta_4 = 0$

H_a: $\beta_1 \neq \beta_2 \neq \beta_3 \neq \beta_4 \neq 0$

To test the hypotheses investigated in the study's model, variables' stationarity levels must be determined. The study employed ADF and PP unit root tests for this purpose. In the rest of the study, AARDL method was used to investigate the cointegrated relationship between the variables. The ARDL method created by Pesaran et al. (2001) is based on the idea that the independent variables can be stationary at both the I(0) and I(1) levels as long as the dependent variable is also fixed at the I(1) level. However, in 2018, McNown et al. (2018) introduced the bootstrap ARDL (BARDL) method to the literature, and then Sam et al. (2019) developed the AARDL method by taking into account the BARDL approach (Mert & Çağlar, 2023, pp. 350-351). The most important innovation compared to the AARDL model is that it brings flexibility to the condition that the dependent variable in the ARDL model is stationary at I(1) level. Thus, the cointegration test is also used when the dependent variable is stationary at I(0) and I(1) levels along with the independent variables in the AARDL model (Sam et al., 2019, p. 137):

[6] https://www.policyuncertainty.com/

$$\begin{aligned}\Delta \ln gdp_t = \ & \theta_0 + \sum_{i=1}^{k} \theta_{1i}\, \Delta \ln gdp_{t-1} \\ & + \sum_{i=1}^{l} \theta_{2i}\, \Delta \ln dfns_{t-1} + \sum_{i=1}^{m} \theta_{3i}\, \Delta \ln gfcf_{t-1} + \sum_{i=1}^{n} \theta_{4i}\, \Delta \ln trade_{t-1} \\ & + \sum_{i=1}^{r} \theta_{5i}\, \Delta WUI + \beta_1 \ln gdp_{t-1} + \beta_2 \ln dfns_{t-1} + \beta_3 \ln gfcf_{t-1} + \beta_4 \ln trade_{t-1} \\ & + \beta_5 WUI_{t-1} + \mu_t \ldots\ldots (2)\end{aligned}$$

In Equation (2), θ_0 is the constant term, $\theta_{1,\ldots,5}$ is the short-run coefficients, $\beta_{1,\ldots5}$ is the long-run coefficients, μ is the error term, k, l, m, n, and r are the lag lengths. The constraints of the AARDL model in equation (2) are as follows:

$F_{overall}$:$H_0: \beta_1 = \beta_2 = \beta_3 = \beta_4 = \beta_5 = 0$

t_{DV} :$H_0: \beta_1 = 0$

F_{IDV} :$H_0: \beta_2 = \beta_3 = \beta_4 = \beta_5 = 0$

$F_{overall}$ test is used for the whole model, t_{DV} test is used only for the dependent variable and finally F_{IDV} test is used to test all independent variables. The critical values obtained from these tests are tested against the critical values in the table obtained by Narayan (2005), Pesaran et al. (2001) and Sam et al. If the calculated test statistic value is greater than the table critical value, it is concluded that there is a cointegrated relationship for equation (2) (Sam et al., 2019, p.137).

5. Findings

Before investigating the unit root processes of the series used in the study, descriptive statistics are presented. In this context, lngdp is the highest value series, and the trade series is the lowest. On the other hand, the averages of the lngdp, lngfcf, lndfns, trade, and lnWUI series are 26.807, 25.438, 23.177, 0.497, and 9.728, respectively. It has also been determined that the series with the smallest standard deviation is trade, while the series with the largest standard deviation is lngfcf. When looking at the skewness values of the series, it is observed that the lngdp, lngfcf, and lndfns series have negative values and are left-skewed. The Trade and lnWUI series, on the other hand, have positive values and are right-skewed. Upon examining the kurtosis values of the series, it becomes clear that each series exhibits positive values, indicating a leptokurtic structure. Finally, the normal distribution of the series was investigated using the Jarque-Bera test. The result of this test concludes that the series follows a normal distribution.

Table 2. Descriptive Statistics

	lngdp	lngfcf	lndfns	Trade	lnWUI
Mean	26.807	25.438	23.177	0.497	9.728
Median	26.122	25.742	23.252	0.487	9.708
Maximum	27.742	26.598	23.740	0.811	10.422
Minimum	25.595	24.187	22.389	0.304	9.186
Std. Dev.	0.717	0.817	0.429	0.111	0.313
Skewness	-0.355	-0.263	-0.434	0.544	0.379
Kurtosis	1.478	1.391	1.796	3.739	2.376
Jarque-Bera	3.997	4.057	3.118	2.455	1.367
Probability	0.135	0.131	0.210	0.293	0.504
Observations	34	34	34	34	34

The rest of the study shows the results from the ADF and PP unit root tests, which were used to see if the variables have unit roots. Based on the results of the ADF and PP unit root tests, it is clear that all variables have a unit-rooted process at the level value.

However, when the first difference between the variables is taken, it is concluded that they become stationary; in other words, the null hypothesis expressing a unit-rooted process is rejected.

Table 3. ADF and PP Unit Root Test

Variables	ADF Unit Root Test		PP Unit Root Test	
	I(0)	I(1)	I(0)	I(1)
lngdp	-0.836	-5.855***	-0.836	-5.855***
lngfcf	-0.770	-5.843***	-0.772	-5.845***
lndfns	-1.777	-6.435***	-1.811	-6.494***
trade	0.992	-5.946***	-1.396	-6.232***
lnWUI	-1.175	-10.608***	-2.886*	-11.431***

Note: ***, * symbols indicate significance at the 1% and 10% levels, respectively.

After determining that the variables are stationary in the first difference, the AARDL method is used to determine the cointegrated relationship in equation (2). Narayan (2005), Pesaran et al. (2001), and Sam et al. (2019) were used for the $F_{overall}$, $t_{dependent}$ and $F_{independent}$ test statistic values used for the AARDL method cointegration test, and it was found that the calculated test statistics were greater than the table critical values. This result indicates that there is a cointegrated relationship in equation (2). In addition, considering the findings obtained from the results of the diagnostic, CUSUM, and CUSUMQ tests of the study, it is understood that the results of the AARDL model are reliable.

Table 4. AARDL Cointegration Test Results

Model	k	Tests	Test Statistics	Critical Values		
				%1	%5	%10
(1, 2, 3, 3, 1)	4	$F_{overall}$	5.895**	6.36	4.63	3.89
		$t_{dependent}$	-4.313**	5.06	4.01	3.52
		$F_{independent}$	6.874***	6.63	4.67	3.82
Diagnostic Tests			Test Statistics			
Autocorrelation (LM Test)			1.113			
Heteroscedasticity (BPG Test)			1.543			
Normality			0.692			
Ramsey RESET			0.280			
CUSUM			Stabil			
CUSUMQ			Stabil			

Note: ** represents significance at the 5% level.

Table 5 presents the long and short run results obtained from equation (2) using the AARDL method at 5% significance level. According to the long-run results, lngfc, lndfns, trade and lnWUI variables are statistically significant. Moreover, gfc, lndfns and trade variables have positive coefficients while lnWUI variable has a negative coefficient. In other words, the long-run impact of a 1% shock on national income is 0,418%, 0,798%, 0,885 units and -0,246% for lngfcf, lndfns, trade and lnWUI variables, respectively. On the other hand, when the short-run results of the study are analysed, it is observed that lngfcf, lndfns and trade variables are statistically significant. It is found that a 1% increase in the short run affects lngfcf, lndfns and trade variables by 0,559%, 0,255% and -0,285%, respectively. Finally, it is found that lnWUI variable is not statistically significant in the short run.

The findings of the study indicate that defence expenditures have positive effects on economic growth in both the short and long run. This result implies that the growth hypothesis is valid among the hypotheses investigating the relationship between defence expenditures and economic growth. On the other hand, the results obtained confirm that the Military Keynesian approach is valid in this study. Similar findings were obtained by Yıldırım et al. (2005), Polat (2020), Ceyhan & Köstekçi (2021), Ajala & Laniran (2021), Naımoğlu & Özbek (2022), Oğul (2022), Koçak (2023), Çiçek et al. (2024) and Çakır & Dereli (2024).

Table 5. Long and Short Run Estimation Results

Variables	Coefficients	t-statistic Values	Probability Values
Long Run Estimation Results			
lngfcf	0.418	5.439	0.001***
lndfns	0.798	5.617	0.000***
trade	0.885	2.227	0.041**
lnWUI	-0.246	-2.874	0.011**
Short Run Estimation Results			
Δlngfcf	0.559	14.893	0.000***
Δlndfns	0.255	3.875	0.001***
Δtrade	-0.285	-1.879	0.078*
ΔlnWUI	-0.011	-0.395	0.697
ecm(-1)	-0.623	-6.070	0.000***

Note: ***, **, * symbols indicate significance at the 1%, 5%, and 10% levels, respectively.

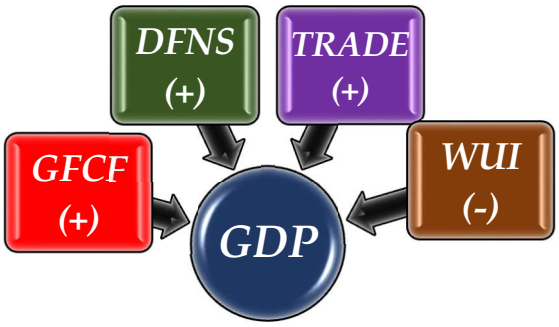


Figure 4. Long Term Results

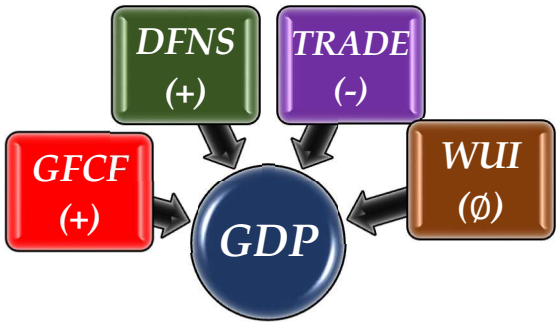
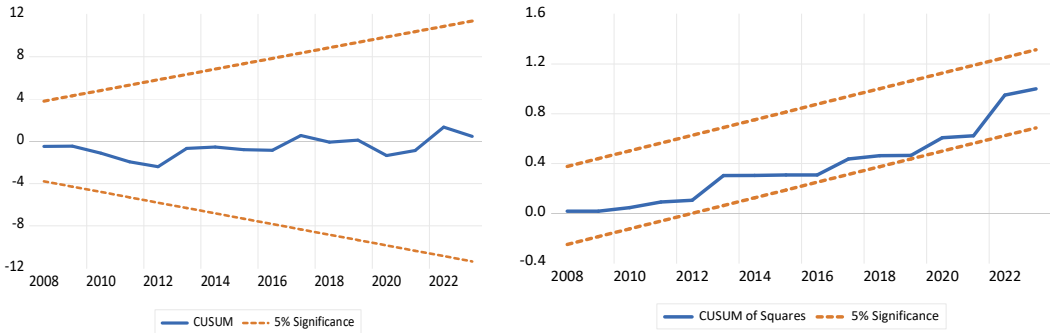


Figure 5. Short Term Results

Finally, it is investigated whether the model used in the study is stable or not. For this purpose, CUSUM and CUSUMQ tests were utilised. As seen in Graph 2, it is concluded that the model used in the study is stable and the results obtained are reliable.



Graph 2. CUSUM and CUSUMQ

6. Conclusion and Discussion

Although the effects of defence expenditures on economic growth have long been discussed in the literature, developments in the Turkish defence industry led to the preparation of this study. In this context, this study investigates the effects of fixed capital investments, trade openness, world uncertainty index and defence expenditures on economic growth. Existing studies have generally focused on the effect of defence expenditures on economic growth together with the explanatory variables of economic growth. In this study, the effects of economic and political events in the world on the Turkish economy are also examined by using the WUI together with defence expenditures as well as fixed capital investments and trade openness variables, which are the explanatory variables of economic growth. In addition, the WUI data for developing countries is used in this study instead of the global WUI data frequently used in the literature. Thus, this study, which examines defence expenditures and economic growth in light of economic and political developments, makes an important contribution to the literature.

The study used ADF and PP unit root tests as well as AARDL methods to investigate the relationship between the series. According to findings obtained within this scope, it was determined that trade openness, fixed capital investments, and defence expenditures positively affected GDP in the long term. In the short term, it was determined that fixed capital investments and defence expenditures positively affected GDP, but trade openness negatively affected GDP. Another finding obtained from the study is the relationship between WUI and GDP. Accordingly, it was determined that there was no statistically significant relationship from WUI to GDP in the short term, while it was concluded that WUI data negatively affected GDP in the long term. Similar findings were reached by Nguyen et al. (2023) and Kang et al. (2019). When these studies were examined, Nguyen et al. (2023) stated that global economic and social events harmed the financial balances of national economies. Kang et al. (2019) found that global uncertainties negatively affected growth.

Finally, policy implications within the scope of the study results are as follows: (i) The positive impact of defence expenditures on economic growth can be explained by the positive externality of defence expenditures on the economy. In this context, policy makers should encourage firms operating in the defence industry to operate in a more competitive environment. (ii) Considering the finding that trade openness has a negative impact on economic growth in the short run, it is important that the companies operating in the defence industry increase their competitiveness with global defence companies. Because in the light of this finding, the negative effects of the trade deficit in the short run can be ameliorated by a defence industry sector that is competitive in global markets. (iii) The study concludes that global economic and political developments have a negative impact on the Turkish economy, especially in the long run. Negative political and economic developments may impact the Turkish economy, particularly the financial sector. Therefore, policy makers should prioritise policies that ensure the depth of financial markets. On the other hand, it may be suggested that those who invest in the financial market should give importance to portfolio diversification, especially considering the impact of global shocks on the Turkish market. (iv) It may be suggested that the issue should be modelled and researched again with the help of different uncertainty indices (such as geopolitical risk index) in the following periods. Especially in developing countries that spend the most on defence within the scope of panel data, investigating the effects of defence expenditures on economic growth in the light of regional and global economic and political developments will contribute to the literature.

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