The Relationship Between Defense Expenditures and Economic Performance in Selected Countries

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Abstract

There is no consensus on the impact on growth of military expenditures, which are included under the state expenditures planned by policy decision-makers, since they have different characteristics from the rest of the state expenditures. Military expenditures made in order to provide support for issues such as protecting the welfare of society, protecting the country's borders, defending against attacks from outside, protecting energy fields in order for economic growth to take place are being increased by countries day by day. Considering that dec jul is directly proportional to growth, countries are spending on production and R & D by providing the necessary infrastructure for the defense industry. Countries that have achieved a rapid technological acceleration from an industrial point of view ensure the security of their own nation, which is one of the social state requirements, protect their borders, and minimize their costs and external dependence. Countries can follow independent policies in case of possible threats with technological advances. This study aims to examine the worldwide history of the defense dec and the relationship between military expenditures for the defense industry and economic performance in selected countries by conducting a panel data analysis. In the analysis, Turkey, Azerbaijan and Pakistan, which are in close social, cultural and economic relations, were included in the analysis and the period 1992-2019, when there were no difficulties in providing data, was considered. The growth rates in real gross domestic product per capita as an indicator of economic performance, while using military spending as an indicator of the share of military expenditure in gross domestic product was used. As a result of the analysis, it was concluded that an increase in military spending has a negative impact on economic growth. It can be said that military expenditures have a negative impact on growth in the relevant countries due to the fact that they are carried out instead of efficient investment expenditures.

Keywords: Military Expenditures, Economic Performance, Granger Causality Test, Panel Data

Introduction

From the past to the present, many discoveries have been made in the history of humanity, both for their own defense and to hold power. This power, which was first obtained for individual defense, has evolved as a defense for the protection of communities after the transition to settled life. These communities have revealed experts or classes in the field. The defense class, which is among these classes, can be expressed as a special unit with duties such as eliminating the threats that may arise and ensuring the security of the people in the society (Durgun and Timur, 2017: 126). The protection of societies or the desire to be ahead of other states can make states even stronger with the expenditures made on this unit. Goods and services produced for use in the military field can be examined under two headings. The first is the expenses for the food, clothing and living quarters of the persons hired to defend themselves. The second is the equipment and weapons that will be used against threats and for the security of the society. Countries may experience difficulties in the procurement process as there is a limited market for the sellers of these goods (arms and equipment). These necessary goods cannot be supplied or can be met with high costs. Societies can produce by investing in these goods and services, which are difficult to supply or have high costs. This industry is a sector that requires high R&D, capital and risk. Produced goods can sometimes remain in the stocks of countries without being used at all. For this reason, limited production is made. Production

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in the military field in the world is made by developed countries. It also aims to be among the countries that aim to take its place in this field in Turkey, Azerbaijan and Pakistan (Saraçöz, 2018: 10). This study aims to examine the worldwide history of military expenditures and the relationship between expenditures for the defense industry and economic performance in selected countries by using panel data analysis. As an economic performance indicator, real gross domestic product figures, which are widely used in the literature, and military expenditure figures for the years between 1980-2020 as a defense industry indicator are taken as basis.

Definition of Military Expenditures

It can be defined as the expenditures made to military and civilian persons who will serve to ensure the security of society, in order to sustain activities such as equipment, vehicles, equipment, and shelter. In addition to these, there are also institutions that can support military units or prevent threats that may occur outside the military field. Expenditures made on police, militia and customs officers, expenditures on civil defense, expenditures on foreign military organizations, expenditures on organizations producing weapons, expenditures on research and development that will provide development in the military field are among these expenditure items (Tügen, 1988: 48).).

There is no general definition of military expenditures in the global sense. Countries can include different expenditures in their military expenditure titles. These differences cause military expenditures to be calculated differently. While Germany calculated military expenditures as 49,602 million marks in 1993, NATO calculated this amount as 63,854 million marks. Again, while China was calculating 7.3 billion dollars in 1993, when the military support is taken into account, the amount rises to 34 billion dollars (Brozska, 1995: 51). In Table 1 shown below, the titles of three different organizations included in the military field are shown. In this table, it is seen that these titles may differ by international organizations.

Table 1. Expenses Considered Included in Defense Expenditures by International Organizations

Military Spending Heads	NATO	*IMF*	UN
Payments to Military Forces			
Payments to officers and military personnel	+	+	+
Payments to civilians working in or related to the armed forces	+	+	+
Cost of privileges provided to working personnel and their families	+	+	+
Pension	+	−	+
Payments to military installations	+	+	-
Weapons spending	+	+	+
Infrastructure and superstructure investments	+	+	+
Maintenance and repair expenses	+	+	+
Military research and development expenses	+	+	+
Other needs	+	+	+
Military/Defense/Strategic Expenditures			
Stocking of strategic goods	$+x$	−	-
Incentives for weapons production	$+x$	+	-
Military aid to other countries	+	+	+
Contributions to international agreements	+	+	-

Civil defense	-	+	+
Expenditures on Former Military Forces/Activities			
Support for veterans	-	—	-
War debts	-	—	-
Expenditures on Other Powers			
Gendarme	$+a$	$+^a$	$+a$
customs custody	$+a$	$+^a$	$+a$
Police	$+a$	—	-
Spending on Other Accounts			
Assistance/Disaster recovery	+	—	-
United Nations Peacekeeping	+	+	-
Obligations for Future Expenditures			
Credit support	+	+	-

Source: Brzoska, 1995: 48-49, cited by Giray, 2004: 184-185

+: Included in Military Expenditures. -: Not included in Military Expenditures.

$+^x$: Included in defense expenditures if managed and financed by the defense organization.

$+^a$: Included in defense expenditures when trained, equipped and available for military activities.

Characteristics of Military Expenditures

Expenditures made in the military field are described as fully public and bear all their characteristics. Since the expenditures are not specific to individuals, everyone can benefit from within the borders of the country. In this way, no one in the society is deprived of this service. Individuals in the country do not have to compete with each other while consuming this service.

Industries producing in the military field are non-profit. For this reason, high performance and quality products are produced. Every stage of the goods in production is controlled by the state. Confidentiality is very important to prevent espionage in military technology (Karaköse, 2015:53-54).

State of International Defense Expenditures

A number of data are available for states to protect themselves and ensure their continuity in the face of regional, national and global threats. These data can be considered in two parts as fixed and variable. Fixed data; geography, history, population and culture. Variable data is; economic, technological and military capacity. All these data define international power. In other words, the strategic superiority of states in the international arena emerges through the correct management of these data with strategic mindset, planning and political will (Davutoğlu, 2003: 17).

Fixed data has a long-term and hard to change or unchangeable structure, while variable data is open to short and medium-term changes. The historical heritage of the states has a significant impact on the borders of the areas they are responsible and related to (Davutoğlu, 2003).

Another important function in determining the defense power is geography. The conditions created by geography have a positive or negative effect on the defense needs of countries. In the same period, there is no significant change in the economic welfare levels of the countries in the region. Undoubtedly, population is also an element that emerges with geography. As well as geographical location, population structure is also highly effective on the defense capacities and needs of countries. Beyond the geographic and population data, the main

determinant on the defense function is the economic and technological developments. Maintaining a balance between economic and security priorities, neglecting economic development and being dependent on imports for security cause significant cracks in the power parameters of states. "The countries that work most efficiently in this regard are the countries that consider the defense sector as an economic field in itself and plan this sector in a way that will both meet their own defense needs and generate economic returns with the weapons and defense systems they produce" (Davutoğlu, 2003: 39).

When we look at the distribution of the top 100 companies in the defense sector in terms of economic size in 2017 by countries and regions, it is observed that approximately 60% of them are located in America and Western European countries. It is observed that these countries are in the position of defense exporter as mentioned. These countries are also among the countries that allocate the largest shares from their budgets to the defense industry. However, the sector has a positive impact on the budget, as they convert a certain part of their investment into economic input through exports. In other words, if the shares allocated to defense from the budget increase in countries with high economic capacity, this has a positive effect on their power parameters. Turkey, within the framework of its geopolitical borders and population characteristics, economic potentials and the threats in return for these, has to become externally independent in the defense industry and to get out of the importing countries in this field and quickly rise to the level of exporting countries. This fact is more clearly understood when the historical heritage, geographical location and rapidly growing population structure that Turkey is faced with within the framework of the power factors that determine the strategic positions of the countries. In the periods when the export-oriented development strategy was adopted after the 1980s, the export potential of the defense sector was not sufficiently evaluated and the technological breakthrough in the sector could not be realized to the desired extent (Davutoğlu, 2003: 41).

Contrary to other sectors, the lack of freedom of production and export in the defense industry, and the fact that production and export decisions are made in the private sector on a state scale rather than on a firm basis bring some requirements in practice. The fact that the export potential of the sector has not been adequately evaluated and the technological breakthrough has not been realized to the desired extent is directly related to these restrictions. "The export process can be defined as the process from the emergence of a product as an idea in the defense industry, the maturation of the idea, its development and production, to the stage of promotion/marketing, financial support and export of this product in both domestic and foreign markets" (SSM Export Strategy Document 2010).

With the establishment of the Undersecretariat for Defense Industries (SSM), in our Defense Industry, where sectoral internal discipline is ensured, the Law No. 5201 on the "Inspection of Industrial Organizations Producing Warfare Tools and Equipment, Weapons Ammunition and Explosives" and No. 5202 "With the entry into force of the Defense Industry Security Law, the necessary legal proceedings have been completed. Within the scope of Law No. 5201, there is an obligation to publish a list subject to control in the defense industry sector in the official gazette every year.

Within the scope of this law, the duties of the Ministry of National Defense are; production, import and export permits and end-user document approval. In the defense industry, export permit procedures begin with the submission of export applications by the companies to the Ministry, and after the document review phase is completed by the Ministry, the approval decision is taken by submitting it to the opinion of the General Staff and the Ministry of Foreign Affairs. In addition, "in order to prevent the uncontrolled spread of weapons-related technologies in the international arena; The export control regimes established on a voluntary basis to inform each other of the weapons and technologies they export are called "Weapon Export Control Regimes". The purpose of these regimes; to define weapons-related technologies, to determine technological limits, to keep arms traders under control within the framework of legislation, and to prevent uncontrolled spread by sharing information on arms trade.

International security agreements are signed within the framework of the "Defense Industry Security Law" numbered 5202. With these agreements, it is aimed to ensure the safe conduct of bilateral relations with the countries with which cooperation in the field of defense industry is carried out and to determine the main lines of

issues related to the security of international projects to be carried out by organizations/companies bilaterally with various countries.

Literature Review

When the literature is reviewed, it is noteworthy that there are many empirical and descriptive studies examining the relationship between defense expenditures and growth. The method and sample group used in the studies differed according to the countries. Benoit (1978) examined 44 less developed countries in his study using annual time series data between 1950 and 1965. Gross national product, investment rates, defense expenditures and foreign aid were used as variables. In the study, a direct relationship was found between per capita income and defense expenditures. Dunne et al. (2001) analyzed the data of 1960-1996 using the Granger causality test in their study for Turkey and Greece. In the study, in which real gross domestic product and military expenditures were used as variables, the causality relationship was positive for Greece and negative for Turkey. In the study carried out by Karagöl and Palaz (2004), the relationship between defense expenditures and growth was examined in terms of Turkey with the help of data covering the years 1955-2000. In the short term, a relationship has been determined between defense expenditures and economic growth. Yıldırım et al. (2005) examined the effects of military expenditures on economic growth in terms of Middle Eastern countries and Turkey. The study was modeled using the panel section technique, through data covering the years 1989-1999. According to the result obtained from the study, a positive relationship was determined between the variables. In the study conducted by Duyar and Koçoğlu (2014), the relationship between defense expenditures and growth was examined. The variables used in the study; Using real gross domestic product, military expenditures, gross capital formation and labor force variables, six sub-Saharan countries were analyzed with the help of data covering the years 1990-2012. In the study, the model was established using the panel GLS technique. In the study, it has been determined that military expenditures have a positive effect on economic growth. In his study, Support (2016) established a relationship between economic growth and military expenditures through panel data analysis, using annual data for the years 1998-2014 for fourteen NATO countries. In the study, a bidirectional causality relationship was found between military expenditures and growth.

Data Set and Econometric Model

In the study, Turkey, Azerbaijan and Pakistan, which have similar cultures, were examined within the framework of panel data analysis. Since the data between 1992-2019 is uninterrupted, the time interval between these years was preferred. As the dependent variable, real gross domestic product (GDP) as an indicator of economic performance; the independent variable is military expenditure (ASH) variables. These variables used in the analysis were obtained from the World Bank Development Indicators Database. The econometric model used in the analysis is shown in equation (1) below.

$$\ln GSYIH_{it} = a_i + \partial_{it} + \beta_1 lnASH_{it} + \varepsilon_{it} \qquad (1)$$

Each of the countries used in the i analysis in the model; t stands for time periods. α and ∂ indicate the probability of country-specific fixed effects and deterministic trends, respectively. The ε parameter also represents estimated residuals representing long-term deviations.

Econometric Methods and Findings

In order to achieve healthier results in panel data analysis, it is necessary to investigate the cross-sectional dependence between the variables. Pesaran (2004) emphasizes that there may be correlations between cross-sections in panel models where the cross-section size (N) is small and the time dimension (T) is large. Since N=11 T=20 or N<T in the study, cross-sectional dependence and homogeneity should be checked. If the cross-section dependency is not taken into account, misleading and inconsistent results can be obtained (Chudik & Pesaran, 2013).

Table 2. Cross Section Dependency Test Results

Test Name	Test Value	Probability Value / Critical Value
Pesaran CD$_{LM}$	28.199	p=0.0000
Friedman R	50.543	p=0.0000
Frees Q	0.2760	Frees Q Dağılımına göre kritik değerler $\alpha = 0.10 :$ 0.1294 $\alpha = 0.05 :$ 0.1695 $\alpha = 0.01 :$ 0.2468
Breusch Pagan LM	190.595	p=0.0000

When the cross-section dependency test results in Table 2 are examined, the null hypothesis is not accepted. In other words, dependence between units was determined according to the results of Pesaran CDLM, Friedman R, Frees Q and Breusch Pagan LM tests. In this case, it is recommended to use the Pesaran Panel Unit Root Test as it allows heterogeneous autoregressive coefficients (Apergis and Payne, 2010: 546). The results of the Pesaran Panel Unit Root Test, which is the second generation unit root test, are given in Table 3.

Table 3. Pesaran Panel Unit Root Test Results

		Variables	PP		*Variables*	PP
Level	*Fixed*	GSYIH	28.8957 (0.0001)	*First Differences*	GSYIH	51.3447 (0.000)
		ASH	11.8965 (0.0643)		ASH	62.6708 (0.000)
	Fixed +Trend	GSYIH	20.2512 (0.0025)		GSYIH	284.732 (0.000)
		ASH	7.91778 (0.0000)		ASH	112.064 (0.000)

The values shown in parentheses below the t-bar values represent the probability value.

According to the pesaran unit root test results, while the GDP and ASH variables are not stationary at the level level, when the first degree differences of the variables are taken, it is seen that they become statistically significant at the 5% significance level and become stationary. Therefore, econometric analysis will be continued by taking the first differences of these variables.

Although there are permanent shocks affecting the system in econometric analyzes, testing whether there is a long-term relationship between the variables will increase the power of the test. For this purpose, Pedroni Cointegration test will be performed (Tatoğlu, 2012: 240). Pedroni has suggested several tests that allow heterogeneity in cointegration analysis (Asteriou and Hall, 2007: 373). This test allows for heterogeneity in the cointegration vector. This test not only allows the dynamic and fixed effects to be different between the sections of the panel, but also allows the cointegrating vector to be different between the sections under the alternative hypothesis (Guvenek and Alptekin, 2010:181). Table 4 shows the results of the Pedroni cointegration test.

Table 4: Pedroni Cointegration Test Results

	Statistic	Prob.	Weighted	
			Statistic	Prob.
Panel v-Statistic	0.270047	0.3936	0.335136	0.3688
Panel rho-Statistic	-0.973632	0.1651	-4.610813	0.0000
Panel PP-Statistic	-2.351438	0.0094	-5.014875	0.0000
Panel ADF-Statistic	-1.577467	0.0573	-2.598480	0.0047
Group rho-Statistic	-3.003734	0.0013		
Group PP-Statistic	-4.335826	0.0000		
Group ADF-Statistic	-2.511949	0.0060		

According to the results of the cointegration test, it is observed that there is cointegration since most of the p values are greater than 0.05. According to the Pedroni cointegration test, in which we investigated the long-term relationship between Military Expenditures (lnASH) and economic growth, the H_0 hypothesis (there is no cointegration between the series) was rejected. It can be stated that there is a significant relationship between military expenditures and economic growth in the long run. In this context, there is a long-term movement between Military Expenditures (lnASH) and economic growth in selected countries, and the analyzes show that there is a long-term relationship between the variables.

According to the results of the Pedroni cointegration test, there is at least one cointegrating relationship and the variables move together in the long run. According to the double Granger causality test, while there is no causality from military expenditures to income, there is a causality from income to military expenditures. Granger Causality Test results are given in Table 5. When the P values are examined, it is observed that there is a causality from GDP to ASH because it is less than 0.05.

Table 5. Granger Causality Test Results

Null Hypothesis:	F-Statistic	Prob.
ASH does not Granger Cause GSYIH	1.47831	0.2348
GSYIH does not Granger Cause ASH	3.75780	0.0280

Conclusion

Defense expenditures, unlike other expenditures, can be called indispensable expenditures for countries. Today, all countries have expenses related to defense expenditures in their budgets. In this study, which was prepared to test different theories in the literature, an experimental study was conducted with the help of time series of GDP per capita and Military Expenditures of Turkey, Azerbaijan and Pakistan covering the years 1992-2019. ADF and PP unit root tests were applied to determine the stationarity of defense expenditures and economic growth series. It was determined that the series were stationary at the first difference, and thus, the relationship between the series could be examined. Then, VAR analysis was applied to determine the lag length and the appropriate lag length was determined. In order to determine the stability of the VAR analysis, the stationarity graphs of the model were examined and as a result, it was determined that the model was dynamically stationary and stable. As a result, a definite causality has been determined between defense expenditures and economic growth for the examined period in the economies of Turkey, Azerbaijan and Pakistan. When the results of the Granger Causality Test are examined, it is observed that there is a causality from GDP to ASH, since p values are less than 0.05 when examined, a causality from ASH to GDP could not be determined.

References

Apergis, N., & Payne, J. E. (2010). Renewable energy consumption and growth in Eurasia. *Energy Economics*, 32(6).

Atlı, Y., A Practical R&D. (2000). *Project selection methodology for the turkish armed forces*, Unpublished Master's Thesis, Yeditepe University, Institute of Science, Istanbul.

Asteriou, D., & Hall, S. G. (2007). Applied econometrics: A modern approach, revised edition. Hampshire: *Palgrave Macmillan*, 46(2), 117-155.

Bilgili, F., & Uğurlu, E. (2007). Interaction between growth, foreign direct investments and domestic investments, *Erciyes University Journal of Social Sciences Institute*, 23 (2), 127-152.

Brzoska, M. (1995). *World military expenditures, handbook of defense economics I*, (Ed: Keith Hartley and Todd Sandler), Amsterdam: Elsevier Science B.V., 45-67.

Chudik, A., & Pesaran, M. H. (2013). *Large panel data models with cross-sectional dependence: A survey*. Cafe Research Paper, (13.15).

Davutoğlu, A., Strategic Depth; *Turkey's international position*, Küre Publications Istanbul, 2003.

Support, M. A. (2016). The relationship between military expenditures and economic growth in NATO countries: Panel data analysis under cross-section dependency. *International Journal of Management Economics & Business*, 12(28), 209.

Dunne, P., Nikolaidou, E., & Vougas, D. (2001). Defense spending and economic growth: A causal analysis for Greece and Turkey. *Defense and Peace Econ*omics, 12(1), 5-26.

Durgun, O., & Timur, C. M. (2017). The relationship between defense expenditure and economic growth: Turkey analyzes. *Dumlupınar University Journal of Social Sciences*, 54, 126-137.

Duyar, M., & Koçoğlu, M. (2014) The effect of military expenditures on economic growth; The case of sub-saharan Africa, *International Journal of Social Studies*, 703-722

Giray, F. (2004). Defense expenditures and economic growth. *Cumhuriyet University Journal of Economics and Administrative Sciences*, 5(1), 181-199.

Güvenek, Burcu; Alptekin, Volkan (2010), The relationship between energy consumption and growth: A panel data analysis on OECD countries, *Journal of Energy, Market and Regulation*, 1, 172-193.

Karagol, E., & Palaz, S. (2004). Does defense expenditure deter economic growth in Turkey? A cointegration analysis. *Defense and Peace Economics*, 15(3), 289-298.

Kaya, E., & ÇEVİK, D. O. (2019). An application on defense industry data with box-jenkins method in time series analysis (Master's thesis, Karamanoğlu Mehmetbey University).

Looney, R. E. (1995). *The economics of third world defense expenditures in: Contemporary studies in economic and financial analysis*, vol. 72, JAI Press, London

Mucuk, M., & Alptekin, V. (2008). The relationship between tax and economic growth in Turkey: VAR analysis (1975-2006). *Journal of Finance*, 155, 159-174.

Nadaroglu, H. (1985). *Public finance theory*. Beta Publishing and Distribution Inc.

Saraçöz, Y. (2018). *The importance of the defense industry and the effects of defense expenditures on the country's economy* (Master's thesis, TOBB ETU Social Sciences Institute).

SSM, "2009 -2016 Defense Industry Sectoral Strategy Document"

Szidarovszky, F., Gershon, M. E., and Duckstein, L. *Techniques for multiobjective decision making in systems management, elsevier science publishers B.V.,* Netherlands, 1986.

Tabucanon, M.T., *Multiple Criteria Decision Making In Industry, ElsevierScience Publishing Company*, Inc., New York, 1988.

Tatoğlu, Ferda (2012), *Advanced panel data analysis*, Beta Basım A.Ş., Istanbul, p. 199-233-240.

Tekeli, Esat, A comparison between America and Russia in the talk of foreign aid, Cumhuriyet, February 7, 1958. *The Last Forms of American Aid*, Cumhuriyet, July 24, 1958.

The World Bank, Online Access: http://data.worldbank.org, Accessed: 04.02.2017.

Topçu, Y. *An integrated decision support model for multi-criteria problem solving*, Unpublished Doctoral Thesis, ITU Institute of Science and Technology, Istanbul, p, 19-25, 2000.

Topcu, M.K. (2010). Effects of defense planning on the economy and defense budgets, *Journal of Defense Sciences*, Vol. 9, No. 1, p.77.

Torun, Erdal. Presentation titled "Defense Industry Security" at the Turkish defense, *Industry Assembly Meeting on September* 30, 2010

Tugen, K. (1988). Developments and economic effects of defense expenditures in the world and in Turkey, *Dokuz Eylül University Journal of FEAS*, 285-302.

Turk, H. K., (2007). *The economic effects of the Turkish defense ındustry and the econometric modeling of the defense expenditure-growth relationship*, Çukurova University Institute of Social Sciences, Department of Economics, Master's Thesis (Unpublished), Adana.

Yıldırım, J., Sezgin, S., and Öcal, N. (2005). Military expenditure and economic growth in middle eastern countries: A dynamic panel data analysis. *Defense and Peace Economics*, 16(4), 283.