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The Impact of Defense Expenditures on Macroeconomic Indicators in Turkey: 2000-2020 Period[*]

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Abstract: The relationship between macroeconomic indicators and defense expenditures has been extensively studied especially in developed countries. The goal of this study is to analyze the relationship between defense expenditures and some important macroeconomic indicators in Turkey for the period of 2000-2020. Unlike many other studies which utilizes only the SIPRI (Stockholm International Peace Research Institute) data, two data sets, SIPRI and the data prepared from Turkish budget data, were used in this study. For this period, the relationship between defense expenditures and macroeconomic indicators in Turkey was tested with Granger Causality Analysis with both data sets. According to the results of the analysis, a bidirectional relationship was found between defense expenditures (SIPRI) and economic growth in Turkey, while a unidirectional relationship was found between defense expenditures obtained from budget figures and economic growth. A unidirectional relationship was found between budget defense expenditures and gross domestic savings, and no relationship was found between defense expenditures and unemployment and foreign trade balance figures. The results are discussed with policy recommendations.

Key Words: Defense Expenditures, Macroeconomic Indicators, Economic Growth, Causality

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Türkiye'de 2000-2020 Döneminde Savunma Harcamalarının Makroekonomik Göstergeler Üzerine Etkisi*

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Öz: Makroekonomik göstergeler ile savunma harcamaları arasındaki ilişki özellikle gelişmiş ülkelerde oldukça çok araştırılan bir konudur. Bu çalışmanın amacı Türkiye'de savunma harcamaları ile önemli makroekonomik göstergeler arasındaki ilişkiyi 2000-2020 dönemi için analiz etmektir. Alandaki çalışmalarda yoğunlukla SIPRI (Stockholm Uluslararası Barış Araştırmaları Enstitüsü) verilerinin kullanıldığı görülmekte olup bu çalışmada diğer çalışmalardan farklı olarak iki ayrı veri seti kullanılmıştır. Bu dönem için savunma harcamaları ve makroekonomik göstergeler ilişkisi hem uluslararası verilerden hazırlanan SIPRI veri seti hem de bütçe verilerinden hazırlanan veri seti olmak üzere iki ayrı veri setiyle Granger Nedensellik Analizi ile test edilmiştir. Analiz sonuçlarına göre, Türkiye'de savunma harcamaları (SIPRI) ile ekonomik büyüme arasında çift yönlü bir ilişkinin varlığı tespit edilirken, bütçe rakamlarından elde edilen savunma harcamaları verileri ile ekonomik büyüme arasında ise tek yönlü bir ilişki tespit edilmiştir. Bütçe savunma harcamaları ile gayri safi yurt içi tasarruflar arasında tek yönlü bir ilişki bulunmuş, savunma harcamaları ile işsizlik ve dış ticaret dengesi rakamları arasında ise bir ilişki tespit edilememiştir. Sonuçlar politika önerileri ile tartışılmıştır.

Anahtar Kelimeler: Savunma Harcamaları, Makroekonomik Göstergeler, Büyüme, Nedensellik

Introduction

Defense started with the beginning of humanity and took its place as one of the most fundamental rights with the formation of states. States have made great efforts to build the future of their countries and to leave a more livable, socially developed and safe homeland to the next generations. Since sovereignty is in question, the need for defense is inevitable for all states. However, it has always been an important discussion topic how much share the states will allocate for defense expenditures while planning their limited budgets. In order to both ensure the security of the country and earn the title of an investable country, an optimal budget should be allocated for defense needs. While determining this optimal level, the effect of defense expenditures on economic growth and some macroeconomic indicators related the economic growth should not be ignored.

Academic studies on the subject have different results on the impact of defense spending on the economy using different indicators like economic growth, employment and budget deficit. According to the results, this effect on the economy may vary from country to country, depending on the level of development, period-to-period, and based on geography as well as conflict environment. (Zhong, 2016, p.32).

Defense has always been very important for Turkey due to its geographic location of the country, a bridge role between Europe and Asia, and the proximity to the conflict region and natural energy resources, and ongoing conflict and tensions with terrorist organizations and neighboring countries. Turkey uses a significant portion of its GDP for defense purposes to compete with all these threats, to obtain rights from energy corridors around the country, and in order to make the country attractive for investors. In addition, having the region's largest and technically rapidly developing army cause to increase in this budget (www.sipri.com.tr, 2018).

In this study, the relationship between defense expenditures and important macroeconomic indicators in Turkey is examined using Granger Causality Test based on two different datasets between 2000 and 2020. In the following part first defense expenditures in Turkey and around the world have been presented. Then the related literature reviewed. After data and model are covered, econometric results have been discussed with policy implications.

Defense Expenditures around the World

Defense is a pure public good and every country whether they are in war or in peace, have a certain amount of defense expenditures. Nevertheless, this level of expenditures changes depending on many factors like conflict environment, terrorist acts, level of development, armament race, time period, scarce natural resources, and geography. Defense is the primary duty of governments and the entire burden of defense spending is covered by the state budget (Yıldız, 2018, p.18).

Although the existence of defense spending dates back to ancient times, the impact of these expenditures on the economy started to attract the interest of researchers especially after Great Economic Depression and Second World War. Especially, economic turndown after the oil crisis and increased armament with respectively Cold War, Arab-Israel war and Gulf Crisis caused to countries to sharply increase the rate of their defense budget.

Defense structure of the countries change due to geostrategic positions, relations with the neighboring countries, proximity to the regional threats, underground and above wealth, proximity to international trade routes, political regimes, the ethnic structure, and educational level of people (www.sipri.com.tr, 2018). Although all kinds of expenditures which were spent for ensuring the national security of the country such as the supply of military equipment, construction, maintenance, repair of the military facilities, personnel salaries, and civil defense are considered as defense expenditures. In the literature there is no consensus on the definition of defense expenditures. Organizations such as North Atlantic Treaty Organization (NATO), International Monetary Fund (IMF), United Nations (UN), and Stockholm International Peace Research Institute (SIPRI) have defined military/defense expenditures differently (www.sipri.com.tr, 2018).

NATO accepted all payments for the armed forces (including employee and retired military personnel salaries) as its main defense expenditure item. The land, naval and air forces of the countries, as well as their Special Forces and logistic commands, are considered as the constituent elements of the armed forces. Incentives for the defense industry and contribution payments made within the scope of international agreements and military aid to other member countries are also determined as other main criteria. Unlike other organizations, NATO includes the expenditures made by the countries for the police as an item of defense expenditure for these reasons;

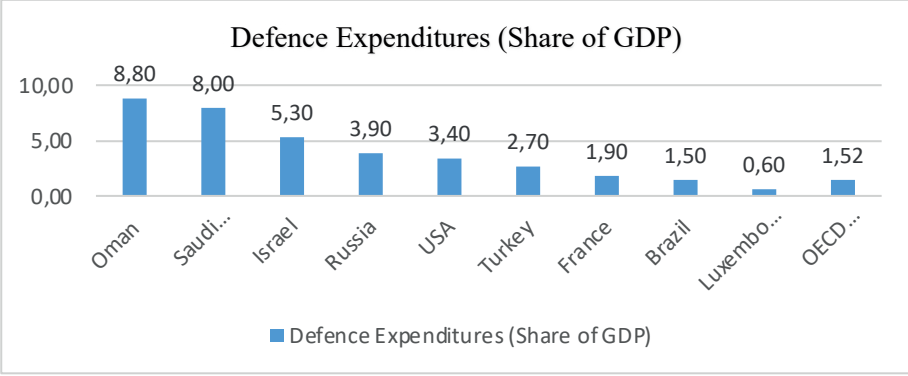
a. the gendarmerie, coast guard, and police elements are actively used within the scope of the counter-terrorism operation both inside and outside the countries,
b. they take part in many local and international operations, with the special operations units they have,
c. gendarmerie and police elements are still on duty at many bases and checkpoints in different countries,
d. police and gendarmerie elements actively participate in peacekeeping operations with the UN and NATO,
e. the armed forces, gendarmerie, coast guard, and police elements carry out joint operations within the scope of the fight against terrorism within the countries.
f. as an element of the defense policies of the countries, they engage in activities to combat criminal organizations, smuggling, and immigration (NATO, 2017, p.5).

In addition, NATO and UN considered all expenditures made by countries within the scope of peacekeeping operations as defense expenditures. Apart from

NATO, the UN and IMF make different definitions of what defense spending might be. While NATO accepted the incentives for the defense industry as defense expenditure, the UN and IMF do not consider these expenditures under the title of defense expenditure. As a result, there is still no clear consensus between countries and international organizations on what items defense spending will consist of (www.sipri.com.tr, 2019).

Apart from the armed forces, the use of gendarmerie, coast guard, and police for defense purposes, military investments and projects made with state-private sector cooperation, roles taken in international organizations, war debts, the support given to peacekeeping operations in different parts of the world, military intelligence budgets, secret projects, and grants made for military purposes to other countries may change the definition of 'defense expenditure' from country to country.

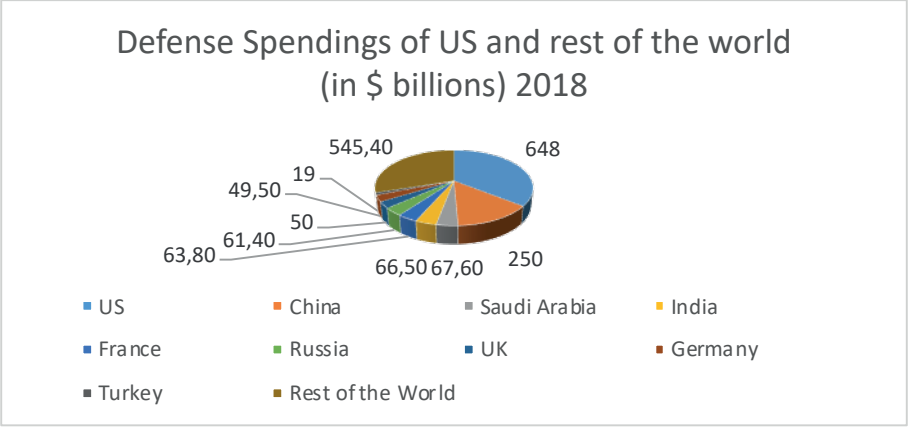
Figure 1. *Defense Expenditures of Selected Countries*



Source: *www.sipri.com.tr, 2019 (Some Selected Countries)*

As can be seen from the above graph showing the countries that allocate the most and the least share of their GDP to defense expenditures, Oman, which struggle with civil war, Saudi Arabia, which try to manage the world oil market with its abundant oil resources, and Israel, which is the main cause of the regional conflict in the Middle East with its aggressive state policies, are the countries with the highest ratio in terms of defense spending and GDP relation (www.sipri.com.tr, 2019).

Figure 2. *Defense Expenditure of US and rest of the world*



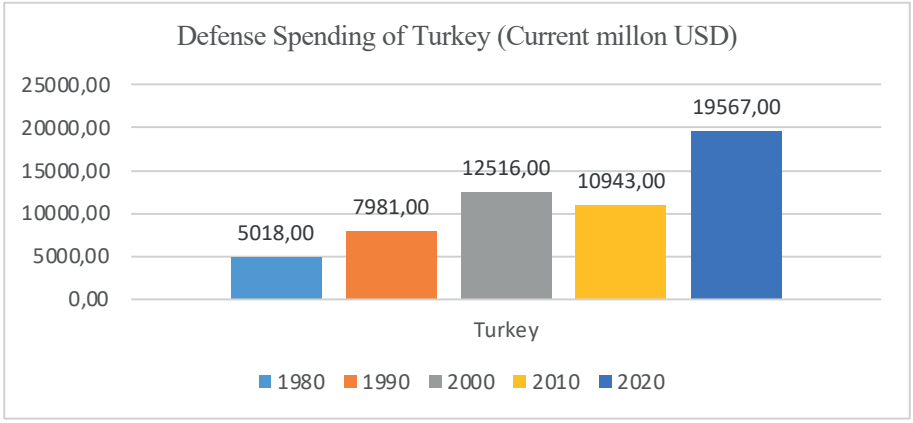
Source: *www.sipri.com.tr, 2019 (Some Selected Countries)*

When compared with the rest of the countries, the US defense expenditures consist of more than 35% of all world defense expenditures. The fact that 7 of the 10 largest defense industry companies in the world have American origin proves this situation. These companies have made many countries dependent on US with their high military/defense technology and this has increased the export potential of the country (www.sipri.com.tr, 2020).

Level of Defense Expenditures in Turkey

Turkey is a bridge between Europe and Asia, and strategically located in conflict-ridden region where there are energy resources, problems of ongoing conflict and tensions with terrorist organizations. As a result defense needs becomes very important for Turkey. Turkey uses significant portion of its GDP for defense purposes to compete with all these threats, to obtain rights from energy corridors around the country, and to make the country attractive for investors. In addition, having the region's largest and technically rapidly developing army cause to increase in defense budget (www.sipri.com.tr, 2018).

Figure 3. *Defense Expenditure of Turkey*



Source: *www.sipri.com.tr, 2020*

National Defense Ministry which consist of land forces, air forces, and naval forces uses approximately 46% of the public defense budget. In addition, The Turkish Gendarmerie uses approximately 19% of the public defense budget, while the Turkish Police Force uses 33%.

The Turkish Police Service budget is considered under the defense budget because of its special operation teams as used to support the army operations. In addition, the duties it took in peacekeeping operations abroad, the duties he carried out within the scope of the fight against terrorism, and the special operations carried out by the special operations units cause the police expenditures to be listed below the defense expenditures. Thus, the Turkish Police Service is the second with its budget after National Defense Ministry. (Central Government Budget Law, 2020).

Figure 4. *Employment in Public Defense Institutions*

Source: *Turkish Court of Accounts Audit Report, 2019*

The Turkish Public Defense Sector offers job opportunities to more than one million people. When we add the employment of the Turkish Armed Forces Support Foundation and its affiliates to this, it can be clearly seen that public defense expenditures have a positive effect on unemployment. While 46% of the employees in the Turkish public sector are employed by the Ministry of National Defense, followed by the Turkish Police Department with 32% (Turkish Court of Accounts Audit Report, 2019).

The global security environment has lost its predictability in today's world. In addition, risks and threats have started to emerge with an international and multi-faceted structure. In this sense, Turkey's defense policy built on terrorism, climate change, internal instabilities, weapons of mass destruction, energy security, sea rogue, virtual attacks, environmental problems, radical currents, organized crime, migration, and smuggling (Ministry of Defense Activity Report, 2019).

On the other hand, the Turkish Police Service which was established on April 10 1845, plays an important role in the fight against terrorism in our country. It carries out joint operations with police special operations units, Turkish Armed Forces, Gendarmerie General Command units and intelligence elements. In addition, the Turkish police force is actively used in cross-border operations for the purpose of combating terrorism. They also take part in NATO and UN units within the scope of peacekeeping operations. In addition, since they engage in activities to combat criminal organizations, smuggling, and immigration they have a crucial role as an element of the defense policies of the countries (Turkish Defense Ministry Activity Report, 2019).

Surrounded by regional threats and risk factors on all four sides, Turkey has to allocate a certain amount of budget for defense expenditures. In this sense, while compulsory defense expenditures are made through public defense expenditures, various investment expenditures continue to be made with various foundations and private companies in order for the country to be self-sufficient in the field of the defense industry. The best example of these investments is unmanned aerial vehicles, which have made great progress recently. In addition, the activities of the Turkish Armed Forces Foundation and its subsidiaries, which continue their activities in the public interest, have an important place.

A Foundation Working for Public Benefits: Turkish Armed Forces Strengthening Foundation

Turkey could not use some defense materials, which were imported from allied countries, due to the embargo during the Cyprus problem which began in the 1960s. This situation has revealed the importance of meeting the defense needs with domestic opportunities and has formed the basis of policies for the establishment of a self-sufficient defense industry infrastructure. Thus, some organizations

have been established under the foundation in order to strengthen the Turkish defense industry (www.tskgv.org.tr, 2020).

Table 1. *Turkish Armed Forces Foundation Companies*

Companies affiliated with the Turkish Armed Forces Foundation	
Company	**Detail**
Aselsan	electronics industry
Tusaş	aviation, satellite and space industry
Roketsan	rocket and missile industry
Havelsan	software and information industry
İşbir	generator and alternator industry
Aspilsan	battery industry

Source: *www.tskgv.org.tr, 2020*

Aselsan, Turkey's leading company in the defense industry was established in 1975. The company was established to strengthen the communication infrastructure of the Turkish Army. The vision of the company is fulfilling its main purpose in its establishment and to become a human-sensitive technology company with sustainable growth and competitive power in the global market. Approximately 8,279 qualified personnel are currently working in Aselsan (Aselsan Activity Report, 2019).

Aselsan realized 62% of the sales to the Turkish armed forces. They realized twenty-six of the sales to particular organizations and other corporate customers. In addition, they realized 12 % of the sales as export. On the other hand, new orders are signed as 3 billion 43 million USD as of 2019 (Aselsan.com.tr, 2020).

Roketsan was founded with the goal of procuring the rocket-missile needs of the Turkish Army in 1988. Having a pioneer foundation regarding rocket-missile design and the development of high technology products are the main goals of the company. Roketsan has succeeded in converting the transferred technologies into new products. Using right strategies to realize its establishment purpose, it caused to bring trained labor to our country (Roketsan Activity Report, 2019).

Approximately 55% of the capital of the company, which is not offered to the public, belongs to the Turkish Armed Forces Foundation. In addition, its remaining capital is distributed among the Mechanical Chemistry Institute (15%), Aselsan (15%), Vakıfbank (10%), and Havelsan (5%) (Roketsan Activity Report, 2019).

Turkish Aircraft Industry Corporation was established in the Industry and Technology Ministry to decrease external dependency in Turkey's defense industry in 1973. (Tusaş Activity Report, 2020).

In the evaluation made by the Defense and Aviation Industry Exporters' Association, it has been stated that the export figures have increased by 130 % since the establishment date. It is stated that the export figure exceeded 2 billion dollars in 2018. (Defense and Aviation Industry Exporters Association 2019 Report).

Literature Review

Defense expenditures, which are pure public goods and constitute the opportunity cost of other expenditures that may directly affect the development of countries, have been frequently investigated by economists in the historical process. The impact of defense spending on macroeconomic indicators has been the focus of the many studies. The issue of how defense spending has an impact on the economy has always been one of the issues discussed.

All economic schools evaluated public spending from a different perspective. Adam Smith, who is known as the founder of modern economics, and other classical economists stated that the state expenditures should be limited, except in very essential situations.

On the other hand, according to Keynes, states mainly use two basic instruments to stimulate market demand. These are taxes and public spending. The factor that enables increasing demand and increasing growth by using public spending is the 'multiplier mechanism'. According to Keynes, defense spending raises the consumption rate in the economy through the multiplier mechanism which is the factor that enables increasing demand and increasing growth by using public spending. The unemployment rate in the country decreases as the number of personnel to be employed by the armed forces, gendarmerie, coast guard, and police offices. (Esgin, 2010, p.14). As a result, according to the general assessment of Keynesian and Post-Keynesian economists, the increase in defense spending ensures sustainable growth in the country with positive externalities caused by education, infrastructure, R&D, and technological specialization. (Dakurah, 2001, p.21)

Whether the defense expenditure is productive spending for the economy of a related country is very determinative to assess the effect of defense expenditure on economic growth. Thus, we can associate the benefits and costs of defense expenditures regarding their productivity or unproductivity.

Productive defense expenditures may cause to positive influence on innovative defense technology, security, export rate, new working areas, and army to become a deterrent force. On the other hand, unproductive defense expenditures may cause a negative influence on imports, foreign dependency, rising taxes and borrowing, skilled labor loss, and opportunity cost (Deger, 1986, p.27).

An increase in defense spending in some periods may affect the national budgets of the countries and all economic dynamics closely. Because increasing defense expenditures may make it necessary to decrease other expenditure items especially in countries belonging to lower and middle-income groups. Increasing budget deficits and compromising fiscal discipline are among the other risks that may arise from defense spending. The financing method of the burden of defense spending on the economy in these periods will be directly determinant on the economies of the countries. (Ulusoy, 2018, p.21).

Studies researched the impact of defense expenditures on the indicators like economic growth, employment, budget deficit, and inflation. Some of the studies found a positive relationship between defense expenditures and economic growth, while others found negative relationship and still others found no relationship. So there is no consensus on the impact of defense expenditures on economic indicators.

One of the first studies belong to Szymanski (1973) and Benoit (1978). Although first Szymanski investigated the role of defense expenditures on economic growth, Benoit's article is the most prominent article in this field. Benoit (1978) in his influential article, investigated the interaction between defense expenditure and economic growth for the first time and found the positive relationship between these two indicators. Benoit based on the 44 developing countries data for the period 1950-1965 examined this relationship and concluded that military spending may increase economic growth positively. The positive aspect of the relationship attracted the attention of other economists around the world, and it was the beginning of many new researches on the subject. This study has entered the literature as the Benoit Hypothesis. Benoit, in this hypothesis, performed an analysis with traditional panel regression and correlation method with growth and defense data. As a result, a strong positive correlation was found between defense spending and growth rates.

Babin (1986) conducted a study which he searched relationship between defense expenditures and economic growth with 20 years of data from 104 underdeveloped countries. He used Panel Regression analysis in his extensive work. As a result of his study, he concluded a positive interaction between military spending and indicators especially economic growth.

Biswas, Basudeb and Ram (1993) included 74 developing countries to their study. They analyzed the data of 74 developing countries between 1981 and 1989 with the Feder Type Model. As a result of their evaluation, they concluded that the increasing defense spending has an affirmative effect on economic growth in these countries. On the other hand, according the one of important outputs of their research, these increased expenditures may trigger the demand and so may revive the economy.

On the other hand, studies on Turkey intensify especially after 2000. Sezgin and Yıldırım (2003) searched the relation between military expenditures and

employment for the period between 1950 and 1997 in Turkey. Using ARDL method, they concluded that military expenditures effected the employment negatively. Because, they detected that most of the military expenditure was allocated to expense of military personnel. In addition, Turkey imported all high technology military products and this did not contribute to increase of employment.

Korkmaz (2012) researched the correlation between increasing military expenditures, economic growth and unemployment in Mediterranean Countries. Especially, there was a sharp increasing in military expenditures in these countries during the Arab Spring period. So, researchers wondered about reflections of these expenditures to economies of Mediterranean Countries and they focused to this issue. Using Panel Data Analyses, Korkmaz found that military expenditures effect the economic growth negatively. Furthermore, military expenditures caused to increase unemployment.

Sezgin (2018) analyzed negative and positive effects of defense industry on the economy in Turkey and World. According to the study, although America and a few other developed countries have the most of the share of the world defense industry market, Turkey started to increase its capabilities on high technology defense products. In addition, he concluded that as a positive effect of defense industry, it may create a suitable environment for internal and external investors and also may cause to increase of employment.

Huskic, Satrovic and Muslija (2020) analyzed interaction between army spending and economic growth for MIST (Mexico, Indonesia, South Korea and Turkey) Countries which army spending compose most of the state spending for the period between 1974 and 2018. Using Panel data analyses, they concluded that army spending (since it decreases capital stock, productivity, and saving) has a negative impact on economic growth in the long period.

Nugroho and Pervanti (2021) analyzed the relationship between army budgets and various indicators like population, rule of law, political stability, and economic growth in selected 27 countries for the period between 2002 and 2018. Using Panel Data Analyses they found that, since it has low defense spending to GDP ratio, army budgets, and spending does not affect economic growth dramatically.

Rudy (2022), in his study specific to Russia, investigated the effect of public expenditures, especially military expenditures, on economic indicators. In his study, he determined a positive bidirectional relationship between the labor force employed in the armed forces and economic growth rates.

Dramene (2022) analyzed the relationship between defense expenditures, tax revenues and economic growth in the G54 Sahel countries (Burkina Faso, Chad, Mali, Mauritania and Niger). Using VAR model, he concluded that, while defense expenditures have a negative effect on economic growth, economic growth helps finance defense expenditures. In addition, while tax revenues have no effect on defense expenditures, defense expenditures have a positive effect on tax revenues in a selected period.

According to researches summarized on the top, defense expenditures economic growth nexus was always debatable and inconclusive. It is seen that the results may differ according to the development level of the countries and the geography they are in. As a summary of these works, of course directing the expenditures to productive sectors like infrastructure, education, health and technology is more effective for countries to accelerate economic growth under normal circumstances. However, these 'normal circumstances' issue is not same for all countries. Because all countries have different social, geographical and economic conditions.

Data and Method

As explained above, there are different definitions of defense expenditures. While using the national budget figures to determine defense expenditures in our thesis, the structure of our country has been carefully evaluated. In this context, the expenditures of the National Defense Ministry (land, air, and navy) were taken as the basic defense expenditure item. However, our gendarmerie, coast guard and police elements are actively used within the scope of the counter-terrorism operation both inside and outside the country. They take part in many local and international operations, with the special operations units they have. Gendarmerie and police elements are still on duty at many bases and checkpoints in Syria, Qatar, Libya and Iraq. In addition, our police and gendarmerie elements actively participate in peacekeeping operations with UN and NATO. In addition, the armed forces, gendarmerie, coast guard and police elements carry out joint operations within the scope of the fight against terrorism within the country. Also, it is very difficult to separate the costs of elements used only for counter-terrorism and peacekeeping operations in the gendarmerie, coast guard and police forces. In this context, while the national budget figures are used, the expenditures of the Ministry of National Defense (land, air and naval forces), gendarmerie general command, coast guard command and police are taken as basis, while the defense investment expenditures of Aselsan, a subsidiary of the Turkish Armed Forces Foundation, are also included in the evaluation.

In the presented study, a 20-year data set covering the period of 2000-2020 was created for Economic Growth (Gross Domestic Product - GDP) and other figures like Gross Domestic Savings, Foreign Trade Balance and Unemployment, which are macroeconomic variables related to economic growth. And defense expenditures from two different sources (SIPRI and National Budget) were added to this data set. The Turkish Statistical Institute (TUIK), Ministry of Development, Ministry of Trade, Aselsan and Turkish Armed Forces Foundation Annual Reports, and Stockholm International Peace Research Institute (SIPRI) resources were used in compiling the data. All data are % change. The collected data were analyzed using the Eviews 11 software program. Information about the variables used in the analysis is presented in Table below.

Table 2. *Variables Used in Research*

Variables	Explanation	Sources	Codes
Economic Growth (Gross Domestic Product – GDP)	% Change	TSI (TURKISH STANDARDIZATION INSTITUTE)	GDP
Gross Domestic Savings	% Change	Ministry of Development	GDS
Balance of Trade	% Change	Ministry of Trade	BOT
Unemployment	% Change	TSI	EMP
National Budget Defense Expenditures	% Change	Central Administration Budget Law	NBDE
Defense Expenditures	% Change	SIPRI	SIPRI

As can be seen in Table 2, all variables were taken as percentages and analyzed. The first of the data used in the study is GDP growth. (Deger, 1986). Turkey's *Economic Growth, Gross Domestic Saving Rates and Balance of Trade* growth figures for the years 2000-2020 are shown below.

Table 3. *Economic Growth, Gross Domestic Saving Rates and Balance of Trade Rates*

Economic Growth, Gross Domestic Saving and Balance of Trade							
Years	**GDP**	**GDS**	**BOT**	**Years**	**GDP**	**GDS**	**BOT**
2000	6.80%	18.40%	50.96%	2011	8.50%	14.40%	56.01%
2001	-5.70%	18.40%	75.69%	2012	2.20%	14.50%	64.45%
2002	6.40%	18.60%	69.94%	2013	4.00%	13.30%	61.91%
2003	5.60%	15.50%	68.15%	2014	2.60%	14.90%	66.30%
2004	9.40%	16.00%	64.76%	2015	4.00%	14.60%	70.68%
2005	8.40%	15.90%	62.92%	2016	2.90%	24.50%	73.82%
2006	6.90%	16.60%	61.28%	2017	7.40%	15.10%	68.91%
2007	5.00%	15.50%	63.08%	2018	2.60%	13.90%	76.65%
2008	1.10%	16.80%	65.37%	2019	0.90%	13.40%	85.97%
2009	-4.7%	13.20%	72.48%	2020	1.8%	20.20%	79.60%
2010	8.9%	13.90%	61.38%				

Source: *TUIK, Ministry of Development and Ministry of Trade, 2020.*

Besides economic growth, gross domestic savings, the balance of trade, and the unemployment rate are other macroeconomic indicators that are closely related the economic growth. Therefore, the relation between defense expenditures and gross domestic savings, the balance of trade, and the unemployment rate have also been analyzed. The increasing foreign trade deficit may cause the currency to depreciate and therefore the cost of imported goods to increase and inflation.

The next variables used in the study are unemployment rates and defense expenditures. First, the defense data obtained from the SIPRI source, then the data obtained from the Central Government Budget Law and ASELSEN annual reports were used as defense expenditure data. For the data compiled from the Central Government Budget Source, the budget data of the Ministry of National Defense, the Gendarmerie General Command, the Coast Guard Command, the Turkish Police and the Defense Industry Presidency are taken as a basis. In addition to these data, ASELSAN budget data is also included in the evaluation, especially in terms of defense investment. SIPRI uses UN, NATO, IMF and some other statistical institutions as data sources. In addition, military aid, figures spent on foreign bases, and retired military personnel salaries are also data sources for SIPRI. Turkey's unemployment and defense figures for the years 2000-2020 are shown below.

Table 4. *Unemployment Rate and Defense Expenditures*

Unemployment Rate and Defense Expenditures							
Years	**EMP**	**SIPRI**	**NBDE**	**Years**	**EMP**	**SIPRI**	**NBDE**
2000	6.50%	3.66%	4.38%	2011	9.8%	2.04%	2.48%
2001	8.40%	3.60%	4.20%	2012	9.2%	2.02%	2.46%
2002	10.4%	3.80%	3.49%	2013	9.7%	1.94%	2.49%
2003	10.5%	3.30%	3.44%	2014	9.9%	1.88%	2.43%
2004	10.8%	2.70%	3.14%	2015	10.3%	1.82%	2.28%
2005	10.6%	2.41%	2.81%	2016	10.9%	2.06%	2.47%
2006	10.2%	2.36%	2.62%	2017	10.9%	2.07%	2.33%
2007	10.3%	2.22%	2.70%	2018	11%	2.55%	2.70%
2008	11.0%	2.20%	2.53%	2019	13.4%	2.72%	2.92%
2009	14.0%	2.49%	3.36%	2020	13.2%	2.40%	3.49%
2010	11.9%	2.29%	3.04%				

Source: *Ministry of Trade, Sipri and Central Government Budget, 2020.*
NBDE: *National Budget Defense Expenditures*
EMP: *Employment*

It has also been seen in the review in literature that the most frequently used method between defense expenditures and economic growth is causality analysis. Granger Causality Analysis was the most applied and the most successful one among the Causality Analysis. Because, if there is a time-lagged relationship between two variables, the most common test used to statistically determine the direction of causality of the relationship is the Granger causality test.

In the presented study, the relationship between defense expenditures and economic growth and other macroeconomic variables related to economic growth are examined. Since this relationship was made for a certain time period, time series analysis has been used to investigate the relation between defense expenditures and economic growth in Turkey. Since econometric analysis with non-stationary series results in spurious regression, the first step is to determine whether the data is stationary or not. For this reason, extended Dickey-Fuller (ADF) was performed. Then, Granger causality analysis was applied to reveal the relationship between defense expenditures and economic variables.

Since the data used in the analysis of time series represent a certain time, the variables are likely to contain unit-roots. Therefore, whether the series used in the analysis are stationary or not was investigated by the extended Dickey-Fuller (ADF) test (Mushtaq, 2011, p. 8).

It is widely known that there may be co-integration relations between economic variables. Engle and Granger (1987) developed a test for the existence of co-integration. Granger causality is a predictive statistical causality concept. (Salman and Shukur, 2004, p. 493). In other words, the Granger causality test is defined as a hypothesis test to reveal whether one-time series is useful in estimating another time series. Granger causality analysis is based on two basic principles. These;

- The cause precedes the effect,
- The cause has unique knowledge of the future value of her influence (Bayraktar, 2019: 72). The results obtained by applying all these steps are evaluated below.

Findings

The study is based on two hypotheses about whether there is a relationship between defense expenditures and macroeconomic indicators. In the findings section of the study, the results of unit root test (ADF Unit Root Test) and causality analysis results are given in tables to reveal the relationship between defense expenditures and macroeconomic variables. In this context, firstly, The ADF unit root test results for the data are given in Table.

Table 5. *ADF Unit Root Test Outputs*

	I(0)						
ADF Test Model	Variables						
	PP Test	GDP	BOT	GDS	NBDE	EMP	SIPRI
Unfixed and Trendless Model	T-statistics (p-value)	-2.69 (0.0098) ***	-0.51 (0.4805)	-1.01 (0.2687)	-0.40 (0.5226)	0.80 (0.8777)	-1.58 (0.1048)
Fixed and Trendless Model	T-statistics (p-value	-4.28 (0.0036) ***	-1.75 (0.3910)	-2.65 (0.0998) *	-3.91 (0.0080) ***	-2.83 (0.0725) *	-2.15 (0.2259)
Fixed and Trend Model	T-statistics (p-value	-4.20 (0.0177) **	-1.45 (0.8103)	-1.09 (0.9054)	-3.70 (0.0460) **	-3.09 (0.1353)	-1.17 (0.8881)
	I (1) (First Degree)						
Model	Variables						
	PP Test	d(GDP)	d(BOT)	d(GDS)	d(NBDE)	d(EMP)	SIPRI
Unfixed and Trendless Model	T-statistics (p-value)	-4.31 (0.0002) ***	-5.07 (0.0000) ***	-3.60 (0.0011) ***	-5.28 (0.0000) ***	-3.81 (0.0007) ***	-3.13 (0.0035) ***
Fixed and Trendless Model	T-statistics (p-value)	-4.17 (0.0053) ***	-4.97 (0.0009) ***	-3.49 (0.0199) **	-5.06 (0.0010) ***	-3.79 (0.0107) **	-3.20 (0.0360) **
Fixed and Trend Model	T-statistics (p-value)	-4.04 (0.0266) **	-4.63 (0.0089) ***	-4.79 (0.0061) ***	-5.06 (0.0045) ***	-3.67 (0.0501) *	-3.61 (0.0557) *

*p value between 0,01 and 0,05; There is a statistically significant difference. (Significant at the 10% level)
**p value between 0,001 and 0,01; There is a high level of significant difference. (Significant at the 5% level)
***if p value lower 0,001; There is a very high level of statistically significant difference. (Significant at the 1% level)

Table shows the ADF unit root test findings. While the variables were not stationary in all model variants at the I(0) level, when the first differences of the variables were taken, the data became stationary in all models. That is, the variables became stationary at the 1st difference and therefore the first differences of the variables were taken. As a result of both tests, the variables became stationary and the null hypothesis H0, which argued that the variables contain unit root, was rejected.

Table 6. *Lag Selection Criteria*

Lag	LogL	LR	FPE	AIC	SBC	HQIC
0	-212.2540	NA*	382.7683*	22.97411	23.27235*	23.02458*
1	-175.8003	46.04688	453.5776	22.92634*	25.01405	23.27967

* shows the delay order selected by the criterion
LR: Sequential Modification LR Test Statistics (Every Test at %5 Level);
FPE: Last T Error;
AIC: Akaike Data Criteria;
SBC: Schwarz Data Criteria;
HQIC: Hannan-Quinn Data Criteria.

According to Table, the appropriate lag length to be used to test the co-integration has been chosen as VAR=0. That is, the VAR model was set up and the appropriate lag length was found to be 0. Although the co-integration analysis gives information about the long-term relationship between the variables, it does not provide information about the direction of the relationship between the variables. Granger causality analysis should be done within the causality relationship of the variables. The granger causal relationship between defense expenditures and economic growth (GDP) is given in Table below.

Table 7. *Causality Relationship between Defense Expenditures (SIPRI) and Economic Growth*

Dependent Variable	**Independent Variable**	**Chi-square**	**Degree of Freedom**	**Possibility Value (p)**
GDP	Defense Expenditures (SIPRI)	4.2120	1	0.0407
Defense Expenditures (SIPRI)	GDP	3.7582	1	0.0427

In Table, there is a bidirectional causality relationship between defense expenditures and economic growth because in both cases, since the p probability value is less than 0.05, it is understood that there is bidirectional granger causality between these two variables. In other words, the increase in economic growth positively affects defense expenditures. Similarly, an increase in defense spending positively affects economic growth. The fact that defense expenditures have export-enhancing and employment-provoking features in the field of innovative military technology are decisive factors in terms of increasing economic growth.

In addition, the causal relationship between the National Budget Defense Expenditures and the macroeconomic variables discussed within the scope of the study was examined by considering the National Budget Defense Expenditures instead of SIPRI as a defense expenditure item.

Table 8. *Causality Relationship between National Budget Defense Expenditures (NBDE) and Economic Growth (GDP)*

Dependent Variable	Independent Variable	Chi-square	Degree of Freedom	Possibility Value (p)
GDP	Defense Expenditures (NBDE)	3.8675	1	0.0446
Defense Expenditures (NBDE)	GDP	0.7709	1	0.6801

Table shows the causality relationship between national budget defense expenditures and economic growth. There is a one-way causality relationship between national budget defense expenditures and economic growth, and this causality runs from economic growth to national budget defense expenditures because the p probability value is less than 0.05. In other words, there is no causal relationship from national budget defense expenditures to economic growth. This result is different from SIPRI defense spending. While there is a two-way relationship when SIPRI is made by considering defense expenditures, a one-way relationship is found when national budget defense expenditures are taken into account. The reason for this can be evaluated as SIPRI's use of resources other than the Central Government Budget Law to determine the amount of defense expenditures.

Table 9. *Causality Relationship between National Budget Defense Expenditures (NBDE) and Balance of Trade (BOT)*

Dependent Variable	Independent Variable	Chi-square	Degree of Freedom	Possibility Value (p)
BOT	Defense Expenditures (NBDE)	1.1938	1	0.4505
Defense Expenditures (NBDE)	BOT	3.3757	1	0.0749

According to Table, no causality was found between the foreign trade balance and the national budget defense expenditures. The increase or decrease in these two variables does not affect each other, and this result is the same as the Granger analysis results based on SIPRI data.

Table 10. *Causality Relationship between National Budget Defense Expenditures (NBDE) and Gross Domestic Products (GDS)*

Dependent Variable	Independent Variable	Chi-square	Degree of Freedom	Possibility Value (p)
GDS	*Defense Expenditures (NBDE)*	*4.4745*	*1*	*0.0268*
Defense Expenditures (NBDE)	*GDS*	*1.5782*	*1*	*0.4542*

As seen in table, there is a one-way causality relationship between the national budget defense expenditures and the gross domestic savings, and this relationship is from gross domestic savings to national budget defense expenditures. This result is the same when SIPRI defense expenditures are taken into account.

Table 11. *Causality Relationship between National Budget Defense Expenditures (NBME) and Unemployment (EMP)*

Dependent Variable	Independent Variable	Chi-square	Degree of Freedom	Possibility Value (p)
EMP	Defense Expenditures (NBDE)	1.5337	1	0.3645
Defense Expenditures (NBDE)	EMP	0.2877	1	0.8660

Table shows the relationship between unemployment and national budget defense expenditures, and there is no granger causality between these two variables. This result is the same when SIPRI defense expenditures are considered. While unemployment increases or decreases do not affect defense expenditures, in the same way, more or less defense expenditures have no effect on unemployment.

As a summary, the data were stabilized by performing root analyzes first. Afterward, the causality between defense expenditures and economic growth and other macroeconomic variables such as gross domestic savings, foreign trade balance and unemployment was analyzed. Defense expenditures are used in two ways as both SIPRI data and national budget expenditure defense expenditures. The causality relationship between both SIPRI and national budget defense expenditures data and economic and macroeconomic data was found to be very similar. While there was a bidirectional causality relationship between only SIPRI data and economic growth, a unidirectional relationship was found between national budget defense expenditures and economic growth.

Conclusion

Defense expenditures must be made in order to create an environment of national freedom and security and to protect the country against internal-external threats, which can lead to the status of an "investible" country in terms of economy. In addition, it is the main effort of countries to gain an economic and political advantage by using the deterrent effect of a strong army. In today's world, the basic condition of having a deterrent army is to be strong in the field of military industry and technology.

However, there is no common practice across the states regarding the level of the shares allocated for defense from national resources. Because there are many factors that affect the amount of the budget allocated for defense. These factors may force countries to increase the share they allocate for defense from their budgets.

The impact of the budgets allocated for compulsory defense expenditures on the economy and their positive and negative externalities have always been discussed throughout history. There is no clear consensus on this subject, which has a large literature. While some studies have concluded that there is a positive relationship between defense expenditures and some macroeconomic variables related with economic growth, some have obtained negative results.

Many factors can be shown as the reason why the results obtained vary from country to country and from period to period. As mentioned before, many factors such as the development level of countries, their degree of foreign dependency, their geographical-strategic location, and the education and welfare level of their people may cause the results to differ from each other.

Turkey is important country due to its deep-rooted history, geographical location, proximity to conflict zones, rich natural resources it has or is close to, qualified workforce, production capacity, and developing technological infrastructure. For this reason, it always continues to maintain its importance due to its critical geopolitical position in the changing and developing world order.

In this study, the relationship between defense expenditures and some macroeconomic variables were examined for Turkey. In order to determine the direction of the relationship between the variables, Granger Causality Analysis was performed.

As a result of the Granger Causality Analysis, a bidirectional relationship was found between the defense expenditure data obtained from the SIPRI source and the economic growth figures, and a unidirectional relationship between the gross domestic savings. However, no causal link was found between foreign trade balance and unemployment data and defense expenditure data. In the analysis made using the defense expenditure data obtained from the Central Government Budget Laws and Aselsan annual reports, results similar to the analysis made using the SIPRI resource were obtained. The only difference is in their relationship to

economic growth. While a bidirectional relationship was found between SIPRI resource data and growth, a unidirectional relationship was found between Central Government Budget Laws and data obtained from Aselsan resources and growth.

This study is one of the first studies with national budget data. There are differences between the data obtained from the Sipri source and the national budget data. In this context, there are pros and cons of using national budget figures. While Sipri collects data with standard methods for all countries, it is considered that the data obtained by compiling national budget figures cover more realistic results for Turkey. Because in most of the countries, the gendarmerie and police units only perform public order duties, while in our country they carry out tasks for counter-terrorism. In addition, Aselsan is a company that belongs to a foundation working for the benefit of the army. Thus, the technological investment expenditures of Aselsan are also specific to our country, in order to improve our military capabilities and capabilities.

The impact of defense expenditures on the economy cannot be seen in a short time. Of course, the developments in the Turkish Defense industry, which has gained great momentum recently, will have a positive effect on economic growth. But it will take time for this effect to occur. Innovative technologies and increasing export potential in the defense industry can be expected to make a positive contribution to the economy in the upcoming period.

Considering the results of the analysis, it is seen that there is a one-way positive relationship from economic growth to defense expenditures. It is seen that this relationship is bilateral in developed countries such as US. It can be said that technology is of great importance as the main reason for this. Considering our recently increasing level of development in the field of the national and domestic defense industry, it is considered that it is of great importance for our country to prioritize and support high-tech innovative investments as a government policy.

Thanks to this kind of government policy, it is inevitable that Turkey's defense industry, which is strengthened by new investments and technological developments, will bring many positive externalities to the country. The country may gain momentum in economic growth with the innovative technology, export, and employment potential that the defense industry will bring. The increase in domestic production at the level of intermediate goods and final products in the defense industry may also mobilize many sectors that the defense industry is related to. In this context, the foreign trade balance of the country, which reduces its foreign dependency, may also be affected positively.

In the field of the defense industry, where technology creates a multiplier effect, it is of great importance to train the qualified workforce and increase R&D studies. Private investments in this field should be planned, R&D studies should be increased and new projects should be developed to increase the level of technological development with the cooperation of the state-private sector and university.

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