Theoretical and Applied Economics
Volume XXV (2018), No. 1(614), Spring, pp. 183-192

Impact of defence expenditures on external debt: An econometric analysis for Turkey and Turkic Republics

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Abstract. *Defense spending is one of the major public expenditure items for many states around the world. Today, defense expenditures for internal and external security are not less than past decades. In addition to the hostilities arising from historical disputes and traditional conflicts, today's governments have to endure higher defense spending for national security in the face of new threats than in previous periods. Turkey and the Central Asian Turkic Republics, which have been in geography where geopolitical and strategic positions have not always been in conflict and threats, are also trying to cope with the increasing burden of military and security expenditures.*
In this study, the relationship between defense expenditures and external debt is investigated in the context of Turkey, Kazakhstan, Kyrgyzstan and Azerbaijan. Findings from alternative methods suggest that there is a positive relationship between defense spending and external debt in the four countries.

Keywords: defence expenditures, external debt, panel data analysis.

JEL Classification: C23, H56, H63.

1. Introduction

Interest related to the impact of defense spendings on the economic structure is increasing. In this framework, the effects of defense spending on economic growth, internal/external debt, employment and budget deficits have been empirically explored for various countries and groups of countries. Although defense spending has always been a significant cost to governments, this cost has increased, especially as military equipment has become technology-intensive in modern times. Emerging economies those have difficulties in financing public spending are trying to meet the burden of defense spending with external debt. Defense spending is one of the major public expenditure items for many states around the world. Today, defense spending for internal and external security is not less than in previous years. In addition to hostilities stemming from historical disputes and traditional conflicts, present-day governments have to endure higher defense spending for national security than previous times in the face of new threats such as international terrorism, energy-related conflicts, ideological disputes, and cyber attacks. Due to their geopolitical and strategic locations, Turkey and the Central Asian Turkic Republics, which have been in a geographical region where conflicts and threats have not been lacking for a long time, are also trying to cope with the increasing burden of military and security expenditures.

In this study, the relationship between defense spendings and foreign borrowing is being investigated in the context of Turkey, Kazakhstan, Kyrgyzstan and Azerbaijan. Different results have been reached regarding the relation mentioned in the empirical literature. In some studies it has been reported that there is a positive relationship between defense spendings and external debt, and a negative relationship in some cases. Nevertheless, an empirical research on the subject in the context of the Turkic republics has not been conducted until today, so the present study is a first step in this respect. Findings from alternative methods suggest that there is a positive relationship between defense spending and external debt in the four Turkic republics.

2. Turkey and Central Asian Turkic Republics: Political and economic structure

The Turkic Republics, which have a very fragile and weak economic structure due to tight state control, weak private sector, inadequate capital accumulation and entrepreneurial spirit that is cursed during long Soviet domination, are also faced with serious security and public order threats. On the one hand, the difficulties encountered on the way of liberalization and administrative confusion that is caused by the state organization which is not yet fully established, on the other side, the Russian-dominated political structure leads to serious problems and congestion in many areas, from the democratization to the development, for the Turkic republics. The political and economic dependence on Russia and the fact that two big powers like Russia and China are right next to them make these countries an important element of global accounts and plans. It is not surprising that this situation brings with it high security requirements and defense spending.

Although the Azerbaijani economy, which is predominantly dependent on hydrocarbon resources, has accumulated a considerable amount in the previous years, economical troubles live in recent years due to low oil prices. Because of the declining oil revenues, public debt is increasing and economic growth is becoming difficult. Nevertheless, it can be said that the ratio of external debt is still low. The strains experienced with Armenia since its establishment and the troubles with Russia about the Caspian Sea have pushed Azerbaijan to high military spending.

Kazakhstan, the largest of the Turkic republics in terms of population and land width, has an economic structure based on underground resources such as oil, coal and grain. Low oil prices and some problems with Russia have also caused difficulties in the Kazakh economy and a high rate of devaluation has been achieved in 2015. The contraction seen in global demand weakened the demand for Kazakh goods. As the budget deficit rises, the volume of foreign borrowing increases.

Kyrgyzstan, which in general has an economy based on agriculture and light industrialization, has serious problems especially in domestic politics despite the relatively low population and land size. The coup attempts and the political contests are losing energy and the country is also suffering from the dependence on Russia and Kazakhstan. Due to the economic stagnation in these countries, the decline in foreign exchange and foreign trade leads to hard times in the economy. Internal tensions as well as border issues with Uzbekistan are causing pressure on defense spending.

Turkey is at the forefront in terms of population and economic size among the countries in the sample, and she is in the upper class both politically and economically. Turkey, which is an important actor on the international scale with its economic and political power, has a relatively long history of industrialization and development. The transition from agriculture to industrialization, which started in the 1950s, gained a different impetus with the liberalization wave of development based on exports in the early 1980s. Turkey has been struggling with many internal and external economic crises in the aftermath of the outward opening, and has lost its 1990s with many shocking economic and political turmoil. These years have taken its place in history as economically and politically turbulent periods in which public finance is now at the brink of bankruptcy due to unsustainable debts, and chronic and high inflation could not be broken anyhow. At the same time coalition governments followed one another, ethnic and ideological terrorist organizations were added alongside traditional military threats such as Greece, Iran, and Armenia. Apart from worrying about jumping in conflicts that are not lacking in neighboring countries, terrorist incidents, especially in eastern and southeastern Anatolia, have caused tens of billions of dollars to be spent on armed struggle. Although the economy and political environment have been relatively calm since the beginning of the 2000s, it can not be said that terrorism and external threats have shown the same tranquility. This means that there is no decline in Turkey's defense spending.

3. Related literature

When the empirical literature on the economic effects of defense spending is examined, it is seen that the focus is mainly on the impact of military spending on economic growth. However, there is an increasing interest in the economic effects of military expenditures, which can reach huge proportions in public expenditures for some countries, on the basis from employment to budget deficit, from external debt volume to foreign trade. In this regards, the impact of defense spending on the external debt volume has been the subject of various researches in recent years in the context of single country examples as well as country groups.

When the studies are examined, it is seen that researches on developing countries from Asia and Africa have been carried out more extensively. The common result obtained with the exception of a few is that defense expenditures have an effect on the enhancing factor on the debt stock. Even though there is not a perfect fit in terms of the models used in the studies and the explanatory variables involved, defense expenditures, GDP, foreign exchange reserves and foreign trade components, which are mainly derived from the World Bank or SIPRI and are partly based on estimations, are the main explanatory variables. No studies have been carried out so far for developed countries such as the United States, which has one of the world's largest defense budget and one of the countries with the highest budget deficit.

4. Empirical analysis

4.1. Model and data

It can be expected that defense spending will have an impact on foreign borrowings from the three main channels which are not mutually exclusive, rather they might be contemporaneous. First, budgetary allocation is required to cover defense spending. When tax incomes are insufficient, the budget deficit must be financed in some way. If domestic borrowing opportunities are limited, the financing of defense spending will be provided by external borrowing, which will increase the debt stock. However, it is hard to identify directly to what extent defence expenditures contribute to external debt accumulation since as non-defence spending items might also press on the budget and function-specific borrowing is not a common budgetary practice (Günlük-Şenesen, 2004). The second channel is based on the lack of foreign exchange. If there is not enough foreign exchange to buy imported defense items in the country, foreign exchange needs will be provided through outsourcing, which again will result in an increase in external debt volume. The last channel is the increase in external borrowing due to the demand for high-tech imported goods and machines required by the defense industry (Smyth and Narayan, 2009).

Table 1. *Literature summary*

Paper	Unit	Period	Method	Explanatory Variables	Findings
Azam and Feng (2015)	10 Asian countries	1990-2011	Panel data analysis (REM, FEM)	ME/GDP, GDP, Tax Revenues/ GDP, inflation, foreign exchange reserve, per capita GDP growth	Positive relationship between military expenditures and external debt volume
Ahmed (2012)	25 Sub-Saharan countries	1988-2007	Panel data analysis (FMOLS, DOLS, DFEM)	Military expenditures, GDP, export, import, current account deficit	Positive relationship between military expenditures and external debt volume
Anfofum et al. (2014)	Nijerya	1986-2011	VAR, Granger causality	Military expenditures, GDP, debt service ratio, gross capital formation	Positive relationship between military expenditures and external debt volume
Dunne et al. (2004a)	Argentina, Brazil, Chile	1970-2000	ARDL model	ME/GDP, GDP, export/GDP, interest rate, foreign exchange reserve /GDP	Positive relationship between military expenditures and external debt volume for Argentine and Brazil. No relationship for Chile.
Dunne et al. (2004b)	11 developing countries	1960-2000	Panel data analysis (REM, FEM, GMM)	Growth, defense burden, foreign exchange reserve, external funding, interest payments, public sector size, tax revenues, debt service, arms imports, exports	Positive relationship between military expenditures and external debt volume
Karagöl (2004)	Turkey	1955-2000	Johansen Cointegration, Granger causality	Defence expenditures	Bidirectional causality between military expenditures and external debt volume
Karagöl and Sezgin (2004)	Turkey	1955-2000	Probit model	Debt/export ratio, export/GNP ratio, public expenditures/GNP, defence expenditures share	Growth in defense expenditures does not increase debt reschedule possibility
Kollias et al. (2004)	Greece	1960-2001	Regression analysis	Military expenditures, budgetary balance, GDP, political stability	Positive relationship between military expenditures and external debt volume
Narayan and Narayan (2005)	Fiji	1970-2005	Cointegration, VAR	Military expenditures, GDP	Positive relationship between military expenditures and domestic/external debt volume
Sezgin (2004)	Turkey	1979-2000	E-G Cointgeration	GDP, foreign trade balance, defence expenditures, arms imports, expenditures on defense equipments	No relationship between defense expenditures and external debt volume
Shahbaz et al. (2016)	Pakistan	1973-2009	Cointegrated regression, error correction model	Military expenditures, GDP, investment expenditures	Positive relationship between military expenditures and external debt volume
Smyth and Narayan (2009)	6 Middle Eastern Countries	1988-2002	Panel data analysis (FMOLS, DOLS)	Military expenditures, GDP	Positive relationship between military expenditures and external debt volume
Georgantopoulos and Tsamis (2011)	4 North African countries	1988 - 2009	Granger causality, error correction model	Military expenditures	Causality from military expenditures to external debt volume for Egypt
Muhanji and Ojah (2014)	10 African countries	1970-2010	Dynamic stochastic general equilibrium model	Military expenditures, domestic consumption, imports	Positive relationship between military expenditures and external debt volume

In response to these three channels, different models have been used in empirical literature to investigate the relationship between external debt and defense spending. Differences arise as to the explanatory variables used, depending in part on the sample and partially emphasized case. However, as Dunne et al. (2004a) pointed out, when modeling the relationship between defense spending and external borrowing, since the ultimate goal is not to fully explain the dynamics of borrowing, it can be faced with various model structures from simple to complex. In the current study, in order to keep the analysis simple, external debt volume has been associated with defense spending and the country's ability to borrow from international markets. The use of GDP as an approximate measure of the borrowing capacity of countries is a common practice (Looney, 1989; Dunne et al., 2004a, 2004b; Sezgin, 2004; Ahmed, 2012; Azam and Feng, 2015). There are two opposing views on the impact of the rise in GDP on the external debt volume. According to the first opinion, the country will be able to borrow more easily and much more, as the international creditors' debt ceiling will rise due to the increase in income (Smyth and Narayan, 2009). According to the other opinion, since the income increase will also increase the public revenue by the tax channel, both the borrowing requirement will decrease and the direct payment capacity of the country will increase. Another reason for the low number of variables in the model is that the panel used is small ($T = 21$, $N = 4$). Accordingly, the model to be estimated is as follows:

$$\ln DS_{it} = \beta_{0i} + \beta_{1i} \ln DE_{it} + \beta_{2i} \ln GDP_{it} + \varepsilon_{it}$$

where, *ln* denotes the natural logarithm, *DS* stands for external debt stock, *DE* for level of defense expenditures, *GDP* is the gross domestic product volume, and ε is the white noise error term. All figures are in million US dollars and the sample period covers the years 1994-2015. Total external debt and GDP data were obtained from the World Bank online database (WDI) and defense spending data were obtained from Stockholm International Peace Research Institute (SIPRI) database. The model is estimated for Turkey, Kazakhstan, Kyrgyzstan and Azerbaijan. Due to lack of data, Uzbekistan, Turkmenistan and Tajikistan could not be included in the sample.

4.2. Methods

In order to estimate the above model, stationarity of the series is first investigated via unit-root tests. The significance of the long term relationship between the non-stationary variables is examined by panel cointegration methods and coefficient estimates of cointegration relation are obtained by dynamic least squares (DOLS), fully modified least squares (FMOLS) and fixed effects (FE) models. The estimation of the model for each country in the sample is not preferred due to the lack of sufficiently long time series regarding the variable of defense expenditures for the other three countries except Turkey. Another reason for the use of panel data analysis is that, as emphasized by Smyth and Narayan (2009), there is not much variation over time, especially in the series of defense spending. In order to overcome this problem, panel data analysis, which allows to make use of the differences between units, offers a suitable tool. Thus, with more information, more variability, a higher degree of freedom, more efficient estimates are possible.

The panel data analysis applied here consists of three steps: In the first step unit-root tests are used to check whether the series are stationary and the integration orders are being investigated. Because the test processes can give conflicting results from time to time, existence of unit-root is examined with two different tests (Breitung, 2000; Im et al., 2003). In the second step, the existence of cointegration relation is questioned with the Fisher type-Johansen test and Kao test. In the last step, long term coefficients are estimated with DOLS, FMOLS and FE model.

4.3. Findings

The data used is in the form of a long panel and the time dimension is long enough to allow for non-stationary behavior. For this reason, the stationarity of the variables was investigated firstly. The results reported in Table 2 consist of test statistics and probability values obtained according to both test methods mentioned above. According to the tests carried out all three series become stationary in their first difference, while they are not stationary in levels (have unit-root). Accordingly, the existence of a cointegration relationship between the variables should be investigated so that a regression relation to be established is not to be spurious.

Table 2. *Panel unit-root test results*

Panel A. Breitung test	Test statistic	p-value
ln *DS*	0,5525	0,7097
Δln *DS*	– 3,5473	0,0002
ln *DE*	1,3941	0,9184
Δln *DE*	– 3,8617	0,0001
ln *GDP*	2,8175	0,9976
Δln *GDP*	– 0,2154	0,4147
Panel B. Im, Pesaran and Shin test	Test statistic	p-value
ln *DS*	– 0,7132	0,2379
Δln *DS*	– 5,3943	0,0000
ln *DE*	– 1,2280	0,1097
Δln *DE*	– 2,4874	0,0064
ln *GDP*	1,3794	0,9161
Δln *GDP*	– 1,3466	0,0890
Panel C. Levin, Lin and Chu test	Test statistic	p-value
ln *DS*	0,9309	0,8240
Δln *DS*	– 6,6655	0,0000
ln *DE*	– 0,6328	0,2634
Δln *DE*	– 3,0594	0,0011
ln *GDP*	1,3799	0,9162
Δln *GDP*	– 2,9602	0,0015

The significance of the long-run relationship between the variables was investigated by Kao test based on Fisher-type Johansen and Engle-Granger methods, having found that all variables were first-order integrated (I (1)). The results presented in Tables 3 and 4 point to the existence of a statistically significant long-term relationship between variables.

Table 3. *Fisher type Johansen panel cointegration test result*

Number of C. E.	Fisher statistic (trace)	p-value	Fisher statistic (Max-Eigen value)	p-value
r = 0	80,03	0,0000	53,89	0,0000
r ≤ 1	40,25	0,0000	25,98	0,0011
r ≤ 2	30,35	0,0002	30,35	0,0002

Table 4. *Kao panel cointegration test result*

ADF	t-statistic	p-value
	-3,1815	0,0007
Residual variance	0,0459	
HAC variance	0,0701	

The long-term effect of *DE* and *GDP* on *DS* is estimated by Panel DOLS developed by Kao and Chiang (2000), panel FMOLS proposed by Pedroni (2000) and fixed effects (FE) model (Table 5). The coefficient of *DE* was statistically significant (at 10% level) according to DOLS and FE model with positive sign according to all three methods. Accordingly, a 1% expansion in defense spending increases the foreign borrowing rate by 1.39% (DOLS) and 0.39% (FE) respectively. The coefficient of *GDP* is negative with DOLS and FMOLS methods and positive with FE. However, only the FE estimate (at the 1% level) is significant. According to this result, an increase of 1% in the yields raises the foreign debts by 0.66%.

Table 5. *Long run elasticities*

	lnDE	lnGDP
DOLS	1,3856*	-1,3052
	(1,9558)	(-1,6814)
FMOLS	0,2686	-0,2793
	(0,8419)	(-0,7778)
FE	0,3894*	0,6620**
	(1,7979)	(2,6925)

Notes: Figures in parentheses are t-statistics.
* and ** denote significance at 10% and 1% level, respectively.

The short-term effect of defense spending and income on foreign debt stock is also estimated and the results are given in Table 6. Both variables seem to have an enhancing effect debt stock in the short-term, but the coefficients are not significant. On the other hand, the coefficient of a one period lagged error correction term, which indicates the speed of adjustment of the system to the equilibrium after a shock, is statistically significant and negative. Accordingly, when a sudden change in defense spending and / or income occurs, the fluctuation in the outbound debt stock tends to return to the equilibrium level. It can be said that the rate of return to the equilibrium is not too high if the magnitude of the coefficient is taken into consideration.

Table 6. *Short run elasticities*

Variable	Coefficient	t-statistic
Intercept	0,1315**	6,0611
$\Delta \ln DE_t$	0,0099	0,9344
$\Delta \ln GDP_t$	0,2581	0,1080
ECT_{t-1}	-0,1761**	0,0002
R^2	0,2581	
$\bar{R}^2$	0,2004	

Note: ** denotes significance at 1% level.

The causality relationship between defense spending and external debt stock was investigated by the dual Dumitrescu-Hurlin panel causality test (Table 7). The results indicate that there is a stable causality relationship from defense spending to the amount of external debt in 1-5 lag lengths (at the level of 10% significance). Accordingly, a change in defense spending (upwards or downwards) contains information about the change that will occur in the level of external debt within the next few years.

Table 7. *Pairwise Dumitrescu-Hurlin panel causality test result*
H_0: Defence spending does not cause to external debt.

Lags	W-statistic	$\bar{Z}$-statistic	p-value
1	9,5977	9,6655	0,0000
2	10,0184	5,7227	0,0000
3	7,7895	2,2362	0,0253
4	19,8859	5,4666	0,0000
5	15,8803	1,6657	0,0958

Conclusion

In this study, the effects of defense expenditures on external debt stock were investigated empirically, in the case of four Turkish republics (Turkey, Kazakhstan, Kyrgyzstan and Azerbaijan), each of which struggles with serious internal and external threats. Findings from panel data analysis indicate that the increase in defense spending in the sample countries has an enhancing effect on the external debt. On the other hand, evidence has been obtained that the increase in income has a statistically insignificant negative effect on external borrowing. The error correction model estimates also show that the fluctuations caused by shocks in defense spending and/or income tend to return to the equilibrium level. According to the causality test conducted, there is a causality relation from defense spending to external debt volume. This relationship is maintained at different lag lengths.

Findings from the study suggest that the governments should take into account the negative effects of defense spending on the country's level of external debts, and hence economic growth and development. In this respect, it is of utmost importance that governments develop policies that will ensure economic stability and sustainability in external debts without causing a weakness in the defense of the country.

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