THE FACTORS AFFECTING THE EXTERNAL DEBT: CASE OF TURKEY

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ABSTRACT

This study aims to examine the most important factors affecting the external debt in the Turkish economy. The relationship between the external debt and GDP, exports, imports, debt service to exports, foreign direct investment, reserves of foreign exchange and official exchange rates is estimated during the period 1980-2017, based on a number of standard studies in this field. In analyzing the time series, the study applies Johansson's co-integration test and Granger's Causality test within the VAR model. The study concluded to the following results: 1.There is a co-integration relationship between the study variables. That's, that there is a long-term equilibrium relationship between the external debt and its determinants. 2. There is a directional causal relationship from the foreign reserve to the external debt. 3. There is a directional causal relationship from the external debt to the exports. 4. The results of estimating regression model in the long-term showed that GDP, FDI, debt service to exports and foreign reserves are the most important factors affecting the external debt.

Key Words: External debt, Turkish economy, Economic growth, Granger Causality.

1. INTRODUCTION

Many countries resort to external debts no matter how large their economies or multiple financial resources. The main reasons for the external debts are financing development sectors, supporting economic development programs, financing government expenditures, financing the budget deficit or financing war damages, natural disasters and other reasons. The inability of countries and companies, especially in the last two decades, to obtain funds from other sources to achieve their development goals lead them to external debts. External debts have a high risk called debt burden (external debt service).

The increase in the external debt burden payments means that the development returns of the country's economy go to external debt payments. The country's high borrowing rate can reduce the its political influence in international relations (Karagöl, 2010).

Finally, at the beginning of 2007 global financial crisis, with US mortgage loans beginning, credit rating agencies have emerged from time to time in assessing the creditworthiness of countries and companies in the global market. Despite the failure of these institutions to predict the global financial crisis that took place in 2008, Its credit rating has a significant impact on financial markets, macroeconomics and economic and social well-being (Al-Najjar, 2016). The most famous ones of these agencies are Fitch, Moody's, (Standard & Poor's) and others.

The governments of the countries accuse credit rating institutions of being of a political nature because they favor each other and do not commit to the work standards. In assessing a country's economy, the public debt is compared to the gross domestic product in general and external debt in particular. GDP is used as an indicator of the strength of the economic activity and the state's ability to repay its debts.

The aim of this study is to examine and determine the factors that affect the external debt in the Turkish economy during the period 1980-2017, on the one hand, and the causality relationship between economic growth and external debt on the other hand.

The first part of the study is the literature review. We explain the methodology of the study in the second part of the study. Then, in the fourth part research results is presented. Conclusion of the study is stated in the last section.

2. PREVIOUS STUDIES

In the scope of our research subject, the summary findings of some selected studies are presented below:

Afonso & Ibraimo (2018): This study examined the macroeconomic impact of public debt and debt service on real output in Mozambique during the period 2000Q1- 2016Q4. The study was based on the VAR methodology. The study found that the debt service variable has negative effects on the economy and has placed greater pressure on real output than other debt variables, which have no significant effect on real output.

Nguyen (2018): This study examined the relationship between external debt, economic growth, unemployment and national expenditure in Vietnam using the VAR model during the period1987- 2017. The study found a directional causality relationship between external debt and gross domestic product (GDP) and GDP and national expenditure. The study also found a directional causality relationship between unemployment, external debt, GDP and national expenditure.

Jibir et al. (2018): This study aimed to analyze the relationship between the debt and economic growth in Nigeria . The study was based on the econometric method (ARDL) and applied on the time series data for Nigeria during the period 1981-2016. The study showed that the external debt is negatively correlated with the economic growth in the short and long term. The results of the study indicate that the increase in external debt leads to a decline in the economic growth. The study suggested that debt service commitments should not be allowed to rise more than foreign exchange earnings and that loans should be invested in profitable and productive enterprises.

Öztürk & Çınar (2018): This study aimed at examining the relationship between the economic growth and general external debt in the Turkish economy using time series data during the period 1975-2016. The study used the Engle-Granger test to verify the integration of the study variables. It also used the DOLS technique for analyzing long-term transactions. The main finding of the study is that external public debt increases economic growth in the long term.

Tülümce & Yavuz (2017). The aim of this study is to examine whether there is a relationship between the economic growth and the total public debt in Turkey. The study used the ARDL method to investigate the co-integration between the study variables in the short and long terms, and it, also, used the VAR method for analyzing the impulse and response. The results of the ARDL analysis show a co-integration in the short and long terms between the study variables. The impulse and response analysis, included in the VAR method, results indicated that the total debt, domestic and foreign debts, short-term domestic debt and long-term foreign debt negatively affect the economic growth, while long-term domestic debt affecting positively .

EVAN et al. (2015): This study aimed to examine the macroeconomic determinants of external debt in Malaysia during the period 1970-2013. The study used the co-integration test, the Granger causality test, and the variance components analysis. The results showed a short term causal relationship between the external debt and macroeconomic indicators.

Korkmaz (2015): This study aimed to examine the relationship between the external debt and the economic growth in Turkey using VAR model. The study used quarterly time series data for the period (Q1:2003 - Q3:2014). The results show a positive relationship between the economic growth and the external debt which means that the external debt positively affects the economic growth in Turkey during the period of the study.

Peker & Bölükbaş (2013): The study examined the factors determining the external debt in Turkey during the period (Q2:1994-Q2: 2010 and Q3:2001- Q2:2010). The study used the Granger causality test. After checking the time series stationary of the variables by using the ADF, the results showed that domestic debt had a strong effect as a determinant of external debt during the period (1994: Q2-2010: Q2), while public expenditure was the most important determinant factor of external debt during the period (Q3:2001 - Q2:2010).

3. METHODOLOGY AND DATA

The main objective of this study is to examine and determine the most important factors affecting the external debts of the Turkish economy during the period 1980-2017, on the one hand, and examining the causal relationship between the economic growth and the external debt, on the other hand. The study is based on annual data from 1980 to 2017 obtained from the International Development Indicators database, the World Bank and the Central Bank of Turkey.

Table 1. Data sources and variables definition

Variable	The definition	Source
EXD	External debt logarithm	World Development Indicators
GDP	GDP logarithm at current prices	World Development Indicators
EXP/GDP	Exports to GDP	World Development Indicators
IMP/GDP	Imports to GDP	World Development Indicators
RE	Foreign exchange reserve logarithm	World Development Indicators
DES/EXP	Debt service to exports	World Development Indicators
FDI/GDP	Net direct foreign investment flows to GDP	World Development Indicators
EXR	The logarithm of the official exchange rate	TCMB

3.1. Research Model

In this section, we will rely on Johanson's cointegration test and Granger's causality test, which are within the VAR model, to analyse the time series. Time series stationary will be tested by the Dickie Fuller (ADF) test. We will use a model in which the external debt is a dependent variable and GDP, net direct foreign investment inflows as a share of GDP, exports as a share of GDP, debt service as a share of exports, official exchange rates and foreign reserves of foreign currencies except gold are independent variables.

The mathematical form of the model:

$$EX = \left(GDP, \frac{EXP}{GDP}, \frac{IMP}{GDP}, \frac{DES}{EXP}, \frac{FDI}{GDP}, EXR\right) \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots \text{ [1]}$$

The above mathematical function can rewriten by adding the random error limit (u_t) and entering the natural logarithm of the function's two ends, to be suitable for the econometric model as follows:

$$LnEXD = \delta_0 + \delta_1 LnGDP + \delta_2 \frac{EXP}{GDP} + \delta_3 \frac{IMP}{GDP} + \delta_4 LnRE + \delta_5 \frac{DES}{EXP} + \delta_6 \frac{FDI}{GDP} + \delta_7 LnEXR + u_t \dots \text{2]}$$

Where δ_0 represents the intercept limit, $\delta_1 - \delta_7$ are the parameters of external debt logarithm (LnEXD), GDP logarithm (LnGDP), exports to GDP ($\frac{EXP}{GDP}$), imports to GDP ($\frac{IMP}{GDP}$), debt service rate to GDP ($\frac{DES}{EXP}$), foreign reserve logarithm (LnRE), direct foreign investment as a percentage of GDP ($\frac{FDI}{GDP}$), exchange rate logarithm (LnEXR) and u_t represents random error limit.

4. Empirical Analysis

4.1. Time Series Stationary Test

In this study, the time series stationary of both external debt and its determinants must be examined before applying the cointegration test and causality test. The other thing that must be considered is whether the time series is stable (non-unit root) or unstable (unit root is existed), and in the absence of stability, the, obtained, estimated regression model is unacceptable (false regression). There are several tests which are used in examining time series stationary, but the most common one is Augmented Dickey Fuller (ADF). ADF is used to examine the time series stationary according to the following model:

$$\Delta y_t = \delta_0 + \phi y_{t-1} + \sum_{i=1}^{p-1} \phi_i \Delta y_{t-1} + \delta_1 t + u_t \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots \text{ [3]}$$

Where Δ represents the first difference and y_t represents the variable of which time series stationary to be examined (external debt logarithm). The null hypothesis of the Dicky Fuller test states that the hypothesis is rejected if the T statistic is less than the critical value.

Table 2. Augmented Dickey-Fuller (ADF) Test

Variables	Augmented Dickey-Fuller (ADF) Test			
	At level		At First Difference	
	Intercept	Intercept & Trend	Intercept	Intercept & Trend
EXD	-0.568(no)	-2.0873(no)	-4.8747***	-4.858***
GDP	-0.5679(no)	-2.309(no)	-5.8387***	-5.7506***
EXP/GDP	-2.8855*	-3.8757**	-6.6581***	-6.6528***
IMP/GDP	-2.0972(no)	-4.5201**	-5.653***	-5.5565***
RE	-1.304(no)	-0.6393(no)	-4.8593***	-5.3202***
DES/EXP	-2.9973**	-2.86(no)	-6.0954***	-6.0602***
FDI/GDP	-2.0734(no)	-2.7633(no)	-5.4714***	-5.3991***
EXR	-1.2577(no)	-1.7373(no)	-5.7171***	-5.7506***
Notes: a: (*)Significant at the 10%; (**)Significant at the 5%; (***) Significant at the 1% and (no) Not Significant b: Lag Length based on SIC c: Probability based on MacKinnon (1996) one-sided p-values.				

In table (2), the Augmented Dickey-Fuller (ADF) test was applied to examine the time series stationary in the logarithmic form of the model at the level and at first Differences using the Intercept and the Intercept & Trend . The results of testing time series stationary, based on the SIC criterion in determining the lag length ,indicated that the time series were not all at the level but all are stable and integral at their first differences at a significant level of 0.001. So, we reject the null hypothesis which states that the variables time series has a unit root (the time series is not stable) and we accept the alternative hypothesis which states that the variables time series has no unit root in the first difference (the time series is stable), that's, it is integrated of the first grade l (1).

4.2. Co-integration Test

After examining time series stationary of the study variables and ensuring that the time series are stable and integrated of the first grade, the next step is to apply Johanson's co-integration test which is used in the case of more than two variables in the model. The main objective of co-integration test is to ensure a long-term equilibrium relationship between the study variables. In order to apply the co-integration test, the number of optimal lag length in the VAR model will be firstly determined according to the lowest value specified by the criterion (HQ, AIC).

Table 3: Lag Length Selection Criteria

Lag Length Selection Criteria						
Lag	LogL	LR	FPE	AIC	SC	HQ
0	-392.4470	NA	0.633911	22.24706	22.59895	22.36988
1	-166.3249	339.1832	8.47e-05	13.24027	16.40731*	14.34565
2	-66.61337	105.2510*	2.05e-05*	11.25630*	17.23848	13.34424*
*Indicates lag order selected by the criterion LR: sequential modified LR test statistic (each test at 5% level) FPE: Final prediction error AIC: Akaike information criterion SC: Schwarz information criterion HQ: Hannan-Quinn information criterion						

Depending on the following statistical criteria (HQ, AIC), the results in table (3) show that the number of optimal lag length is two lag orders (2 years) and that the lowest value of these criteria is the second lag order .

Table 4: Results of Co-integration Test

Unrestricted Cointegration Rank Test (Trace)				
Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.992356	444.7906	159.5297	0.0000
At most 1 *	0.922118	279.0785	125.6154	0.0000
At most 2 *	0.888464	192.2914	95.75366	0.0000
At most 3 *	0.738148	117.7155	69.81889	0.0000
At most 4 *	0.590447	72.15642	47.85613	0.0001
At most 5 *	0.523851	41.80503	29.79707	0.0013
At most 6	0.314682	16.57618	15.49471	0.0343
At most 7 *	0.103864	3.728540	3.841466	0.0535
Notes:Trace test indicates 7 cointegrating eqn(s) at the 0.05 level * denotes rejection of the hypothesis at the 0.05 level **MacKinnon-Haug-Michelis (1999) p-values				

By applying co-integration test, the results of (Trace test) in table (4) show that the value of (λtrace) is greater than the critical value at a significant level of 5% and that the number of cointegration vectors is r = 7 at a significant level of 5% which means that there is a long-term equilibrium relationship between some variables and this relationship between the variables does not differ in the long term.

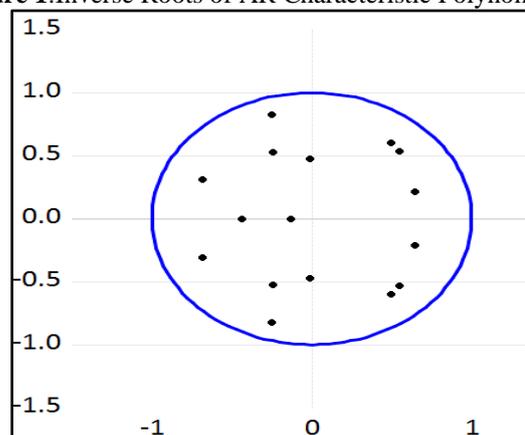**Figure 1**:Inverse Roots of AR Characteristic Polynomial

Figure 1 shows that the estimated VAR model achieves the Stability Condition. All transactions are smaller than one and that all the roots are within one circle which means that the model does not have a problem in the errors correlation or heteroscedasticity.

4.3. Granger's Causality Test

The Granger causality test is applied to determine the causality direction in the estimated model variables. The null hypothesis of the model states that there is no causal relationship between the variables.

Table 5: Results of Granger Causality Test

Variables	$\chi 2$ statistics	Probability value	Decision
R E→ EXD	8.882180	0.0118	Causality
DES/EXP→EXD	4.836161	0.089*	Causality
RE→ GDP GDP→ RE	11.67079 9.825461	0.0029 0.0074	Bidirectional Causality
EXR → GDP	6.194654	0.0452	Causality
FDI/GDP→ RE	9.342224	0.0094	Causality
EXP/GDP →R E	6.097541	0.0474	Causality
DES/EXP→ RE RE→ DES/EXP	7.982037 10.05821	0.0185 0.0065	Bidirectional Causality
EXR → R E	8.803893	0.0123	Causality
EXD → EXP/GDP	13.02108	0.0015	Causality
GDP→ EXP/GDP	12.47615	0.0020	Causality
IMP/GDP→ DES/EXP	6.639338	0.0362	Causality
Note: *significant at 10%.			

The results of Granger's causality test in Table 5 show

1. a directional causal relationship from the foreign reserves and debt service to the external debt (RE → EXD DES / EXP → EXD) and bidirectional causal relationship between the foreign reserves and GDP(RE→ GDP ، GDP→ RE), as well as a bidirectional causal relationship between debt service / exports and foreign reserves.

2. a directional causal relationship from the foreign direct investment, exports and exchange rates to the foreign reserves, and a bidirectional causal relationship between the foreign reserves, debt service and exports.

3. a directional causal relationship from the exchange rates to the exports.

4. a directional causal relationship from the external debt to the exports, and a directional causal relationship from GDP to the exports.

5. a directional causal relationship from the imports to the debt service.

4.4. Model Estimation

Table 6: Estimating The Model Variables In The Long Run

VARİABLES	MODEL OF DEBT		
	COEFFICIENT	T-STATS	PROB.
CONSTANT	− 12.7	-3.686921	0.0102
GDP	1.73	7.526444	0.0003
EXP/GDP	0.08	3.979766	0.0073
IMP/GDP	0.02	0.623954	0.5556
RE	− 0.45	-3.024997	0.0232
DES/EXP	0.021	2.161667	0.0739
FDI/GDP	0.15	2.364863	0.0559
EXR	0.027	1.777432	0.1258
ADJ. R-SQUARED	0.99		
D-WSTAT	2.1		

In table 6, the results of the model analysis in the long-term by using Dynamic Least Squares show that all the independent variables in the model positively affect the dependent variable (external debt) in the Turkish economy, except for the foreign reserves which negatively affects the external debt. In other words, there is a positive relationship between the external debt and (GDP, exports, imports, debt service to exports, foreign direct investment, exchange rate) and a negative relationship with foreign reserves. However, if we consider the model in terms of the statistical significance, the GDP, exports and foreign reserves are the most important determinants which show a strong relationship with external debt at a significant level of 5%. Foreign direct investment and debt service to exports show a weak relationship with external debt at a statistical level of 10%. So, we can say that the rise in foreign exchange reserves leads to a reduction in the external debt and the rise in debt service leads to an increase in the external debt.

5. CONCLUSION

External debt plays a major role in the economic activity, on the one hand, and it becomes a heavy burden on the economic development and future generations if it is not exploited according to its main purpose, on the other hand. Therefore, external debt can be a tool for the countries' destruction, while it becomes a constructive tool in other countries where it is effectively used and managed.

Throughout our study on determining the factors affecting the external debt in the Turkish economy (where the main aim of this study is to examine the effect of some macroeconomic variables on the external debt in the long-term and examining the external debt relationship to the economic growth in Turkey using econometric methods) during the study period (1980-2017) and according to the results, the economic indicators and the references that we examined, we concluded to the following results:

1. There is a co-integration relationsship between the study variables. That's, that there is a long-term equilibrium relationship between the external debt and its determinants. 2. There is a directional causal relationship from the foreign reserve to the external debt. 3. There is a directional causal relationship from the external debt to the exports. 4. The results of estimating regression model in the long-term showed that

GDP, FDI, debt service to exports and foreign reserves are the most important factors affecting the external debt.

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