

Determinants of External Debt Accumulation in Turkey: Evidence from an ARDL Bound Test Approach

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Abstract

External debt is one of the most important problems for underdeveloped countries and emerging markets like Turkey. External debt and its refinancing remain the main challenges for Turkey over the last decades. The purpose of this study is to examine the impact of interest rates, savings, exchange rates and budget deficits on external debt in Turkey through the Autoregressive Distributed Lag (ARDL) bounds testing approach developed by Pesaran, Shin and Smith. The ARDL test has many advantages over the other time series methods. The dependent variable is the ratio of external debt to GDP. The explanatory variables are the exchange rate, interest rate, savings rate and the budget deficit. The results reveal that those variables have significant effect on the accumulation of external debt both in the short and the long runs. To improve this outlook, many structural reforms are required to increase domestic savings and competitiveness and boost potential output.

Keywords: External Debt, savings, budget deficit, interest rates, ARDL

1. Introduction

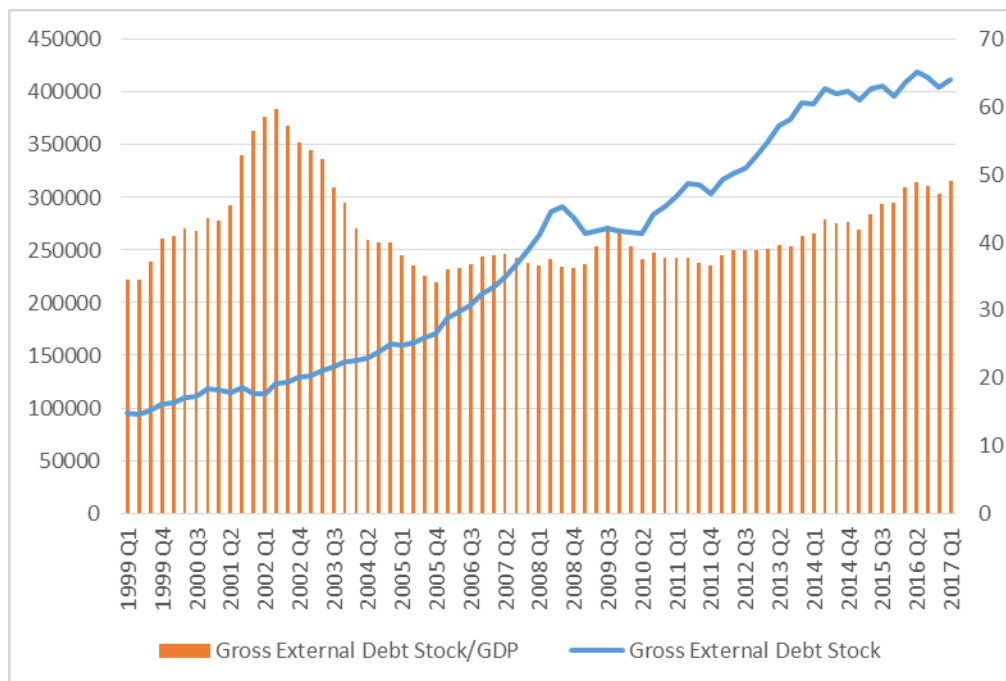
High interest rates, low savings, unstable exchange rates, persistent budget deficits and repeated and very large current account deficits can be regarded as the main macroeconomic determinants of external debt accumulation. The debt burden constrains investments and capital accumulation and affects the economic growth in the negative direction. Therefore; the most basic elements necessary for achieving macroeconomic stability are debt sustainability and the debt burden to be reduced to reasonable levels and kept at these levels. From 2008 to 2012, during the global great recession cycle, the Turkish economy has accumulated net extra external debt amounting to USD 55.8 billion in total most of which is characterized by short term structure. This period with high growth rates can be described as debt-led growth period. But private, household and corporate savings rates which should be the main source of investment and growth are too low, reducing growth potential and generating external imbalances.

The purpose of this study is to examine the impact of interest rates, savings, exchange rates and budget deficits on external debt in Turkey through the Autoregressive Distributed Lag (ARDL) bounds testing approach developed by Pesaran, Shin and Smith (Pesaran et al., 2001). The ARDL test has many advantages over the other time series methods. It employs a single reduced form model and do not require the series to be integrated of the same order. But none of the series should be I(2). Another advantage of this method is that both long run and short run parameters of the model can be estimated at once. Most importantly, the model could be used with limited sample data in which the set of critical values were developed originally by (Narayan, 2004). The dependent variable is the ratio of external debt to GDP ($\ln EXD$). The explanatory variables are the exchange rate ($\ln EXC$), interest rate ($\ln INT$), savings rate ($\ln SAV$) and the budget deficit ($\ln BUD$). The results reveal that those variables have significant effect on the accumulation of external debt both in the short and the long runs. To improve this outlook, many structural reforms are required to increase domestic savings and competitiveness and boost potential output.

2. Turkish External Debt Experience

The abundance and availability of low priced loans after the quantitative easing policies adopted by Federal Reserve and European Central Bank led to the accumulation of external debts in developing countries like Turkey. The purpose of this type of expansionary monetary policy was to lower interest rates and spur economic growth for US and European countries.

Lower interest rates allow banks to make more loans and some of those loans are obtained by the Turkish Banks. At the end of 2002 total external debts of Turkey was 130 billion \$ and after 15 years from this, in 2017 total external debt was 412 billion \$ which is a %210 increase. The ratio of external debt to GDP which is around %50 in not very high when compared to USA, Germany and Japan. But in addition to this accumulated debt Turkey has another disadvantage which is the ongoing current account deficit. As the domestic savings are not enough to close this deficit more foreign savings and more external borrowing is required each year. As the growth of industrial production is low, the economy do not have adequate foreign exchange earning capacity. Another problem is the import dependency of exports. Turkish exports mainly depend on imported energy and imported raw materials. In some export sectors the ratio of exported raw materials is about 80 percent. These structures of the industry do not allow Turkish economy to use the foreign exchange earnings for accumulation and investment. Also the short term maturity of external debt increases the problem. In case of large capital outflows during disorderly market conditions, banks and corporates would have difficulties in rolling over external debt.



Source: The Under secretariat of Treasury, General Directorate of Public Finance

Figure 1: Gross External Debt Stock of Turkey (Billions of US \$)

External debt needs of the countries arise because of the insufficient domestic savings. This type of external borrowing permits countries to make productive activities by complementing local savings. A country may also borrow from external sources in the short-term to close current account deficits and strengthen its international reserve position. External borrowing is a necessary and desirable resource to accelerate economic growth if it can be channeled into investments that will increase the productive capacity of the country.

Turkey's gross foreign debts rose from 30 to 35 percent of GDP in the period from 1989 to 1999, to more than 40 percent in 1999 and to 58 percent in the 2001 crisis. In the following years the ratio has fallen to below 40 percent again. The European Union membership negotiations with the European Union started at the end of 2004 has a great role in this decline. With the start of negotiations, direct foreign capital inflows to Turkey have emerged and have taken the place of foreign debt. Starting from 2009, the seriousness of the candidacy period in the first years has disappeared, and with this development, there was a reversion from foreign direct investment to accumulation of external debt. Shortly there is an increasing trend in the external debt to GDP ratio. The reason of this increasing trend was the 2001 economic crises in the first place.

But the reason in the following years was the depreciation of TL against US Dollar. Because GDP is calculated in Turkish Lira and converted to US Dollar by using the current exchange rate. But the external debt is calculated in US Dollar terms. Even the external debt level is constant when GDP has fallen because of the depreciation, External Debt/GDP ratio has increased. External debt continued to increase and is estimated to reach 50 percent of GDP in 2017. Both the government and the private sector have so far refinanced maturing debt in international markets flush with global liquidity.

As of 2016:Q3, the pace of external debt accumulation has slowed, reflecting the weakening economy and domestic credit, but also increased investor concerns.

Table 1: Gross External Debt Stock of Turkey by Public and Private Sector

(Million USD)	PUBLIC SECTOR			PRIVATE SECTOR			GROSS EXTERNAL DEBT STOCK	GROSS EXTERNAL DEBT STOCK / GDP (%)
	SHORT TERM	LONG TERM	TOTAL (I)	SHORT TERM	LONG TERM	TOTAL (II)		
2015 Q1	18,165	95,311	113,476	109,607	166,888	276,495	392,082	42.0
2015 Q2	16,924	98,820	115,744	108,346	178,070	286,416	404,139	44.2
2015 Q3	15,355	99,715	115,070	102,678	186,337	289,015	405,637	45.8
2015 Q4	14,550	98,547	113,097	87,154	194,283	281,437	395,862	46.0
2016 Q1	17,559	100,915	118,474	88,254	201,709	289,963	409,742	48.2
2016 Q2	16,486	104,664	121,150	90,169	206,779	296,948	419,265	48.9
2016 Q3	17,086	104,325	121,411	85,325	206,513	291,838	414,213	48.4
2016 Q4	16,279	103,436	119,715	81,620	202,734	284,354	404,890	47.3
2017 Q1	16,515	106,359	122,874	85,613	203,079	288,692	412,375	49.1

Source: The Undersecretariat of Treasury, General Directorate of Public Finance

External debts of the private sector; consist of external debt of banks, financial institutions and the real sector (companies). During the last decades there has been a huge increase in the external debt of the private sector. At the beginning of 2003, the external debt stock of Turkey was 130 billion dollars. Of this debt stock, \$ 87 billion (two thirds) belonged to the public sector, \$ 43 billion, that is, only one third belonged to the private sector. A permanent change began in 2005 and the share of the private sector grew rapidly, while the share of the public sector began to decline. The share of private sector in the total external debt stock has climbed from 34 percent to 60 percent from 2002 to 2007. According to the latest figures, \$ 288 billion of the total gross external debt stock of \$ 412 billion (about 70 percent) belongs to the private sector. Bank loans constitute about over 60 percent of total external debt of the outstanding debt stock of the private sector. As we can see from the table there is a structural transformation in the debt burden. The share of the public sector in external borrowing is decreasing. In the country Report No. 17/32 by the International Monetary Fund (International Monetary Fund, 2017) it is estimated that total external financing needs are about 30 percent of GDP over the next few years. Over 60 percent of total external debt, including debt with short maturities is indexed to global interest rates. As a result, a tightening of global liquidity conditions, an increase in Turkey spreads, or capital outflows from emerging markets in general could quickly translate into higher borrowing costs. According to the DSA simulation results, an increase in interest rates by 1 standard deviation compared to the baseline would increase the debt level by additional 3 percentage points to 66 percent of GDP. Moreover, a sudden stop in capital flows may trigger a simultaneous rise in both borrowing costs and exchange rate pressure. Turkish economy relies heavily on short-term portfolio investments, or hot money. The roadmap of the US Federal Reserve makes emerging economies like Turkey less attractive to short-term investors, and the Turkish currency has already weakened. When this interest accrual process gains momentum the depreciation of the Turkish Lira will be more and the ratio of external debt to GDP ratio will rise again.

3. Literature Review

In one of the few studies for Turkey's external debt accumulation (Kizilgol.Q.A. & Ipek.E, 2014) analyze the empirical relationship between trade openness and external debt for the Turkish economy, using quarterly time series data from 1990:1-2012:2 periods. Their empirical results indicate that increasing trade openness affects external debt positively in both the short run and long run. (Önel & Utkulu, 2006) empirically investigates the sustainability of Turkey's external debt by employing Hakkio and Rush's (1991) testing procedure. The findings of the paper show that the external debt of Turkey is weakly sustainable in the long run whether possible structural breaks are considered or not.

From a positive angle, the empirical results of the paper look promising since the “weak sustainability” is achieved. Although it keeps on rising, Turkey's external debt stock does not seem to be greater than the future expected payments. It can be concluded that this result is mostly due to the implementation of fiscal discipline and of some strict structural adjustment measures following the years of financial crisis.

Tiruneh (Tiruneh, 2004) finds that poverty (the savings gap), income instability, and external factors that include debt service payments and capital flight to be the main causes of overseas borrowing by developing countries in the 1980s and 1990s. According to the findings of the study poverty and past accumulated debt are the cardinal factors responsible for the failure of poor nations in meeting their contractual international debt obligations.

(Abdullahi, Bakar and Hassan, 2015) has examined the macroeconomic factors of external debt accumulation in Nigeria by using an ARDL bound test approach. They found that external debt stock accumulation in Nigeria is determined by the macroeconomic components of interest rate, national savings, exchange rate and budget deficit both in the short and long run. (Murwirapachena and Kapingura, 2015) used the vector auto-regression model to analyze the determinants of the South African external debt utilizing annual data from 1980-2013. Empirical results reveal that external debt in South Africa is mainly due to sluggish levels of economic growth and high levels of government spending on infrastructure.

(Greenidge, Drakes, & Craigwell, 2010) has observed the foreign debt stock of the Caribbean Community by employing recent developments in panel unit root and co-integration analysis. The major contributing factors were the output gap, real effective exchange rate, exports, real interest rate and current deviation of government expenditure from its trend value.

Some of the studies were concentrated on the household debt rather than the government debt. (Meng, Hoang, & Siriwardana, 2013) employs a cointegrated Vector Autoregression (CVAR) model to explore the determinants of Australian household debt. The results show that housing prices, GDP and the population in the economy have a positive effect on household borrowing. Meanwhile, interest rates, the unemployment rate, the number of new dwellings and inflation are found to have a negative effect on Australian household debt. Of these, interest rates are the most significant. (Bader & Magableh, 2009) examined the role of government budget deficit, saving gap, size of foreign aids and real exchange rate on debt accumulation in Jordan during the period 1980-2005. The results suggested that all the endogenous variables contributed to the debt burden with the real exchange rate indicate the most significant effect on ED.

In a Panel study by Bittencourt (Bittencourt, 2015) the main determinants of government and external debt in the young democracies of South America was investigated between 1970 and 2007. The results, based on dynamic panel time-series analysis, suggest that economic growth has significantly reduced the debt ratios in the region. Other candidates suggested by the literature—for example, inflation, inequality, and constraints on the executive—do not present the expected or clear-cut estimates on government and external debt. The results suggest that an economic environment geared toward generating economic activity and prosperity is an important factor in keeping the debt ratios under control in the region.

In order to emphasize the importance of international capital flows on the accumulation of external debt (Lane, 2004) paint a statistical portrait of the determination of external debt for a set of low- and middle-income countries. Empirically, they find that external debt is strongly increasing in the level of initial output. This remains true even when they control for variation in productivity and creditworthiness. More open economies also are found to have higher debt levels.

The study by (Lau & Lee, 2016) aims to investigate the determinants of External Debt in Thailand and the Philippines for the period 1976 to 2013 using several econometric procedures. Their results show the existence of a long-run relationship between the External Debt and the endogenous variables in both Thailand and the Philippines. Focusing on the short-run causality linkages, the results depict that inflation and Real Interest Rates are significant factors that determine the External Debt in Thailand in the short-run. As for the Philippines, although there is no evidence of short-run linkages.

External debt accumulation is also related with the export competitiveness of the countries. (Ouyang & Rajan, 2014) found that once external debt exceeds a certain threshold it is negatively associated with export growth. The results of the study show that countries with larger foreign reserves are able to hold larger external debt ratios. Also countries with deeper financial markets are able to manage larger debt shares.

They find that countries with flexible currencies, greater reserve holdings, solid credit history (no previous financial crisis), well-developed bond market but highly concentrated banking system (limited extent of deregulation) are more likely to have accumulated larger levels of external debt (as a share of GDP).

4. Methodology

In the study of long term relationships between variables, cointegration method is used. (Engle & Granger, 1987), (Søren Johansen & Juselius, 1990), and (Soren Johansen, 1991; Søren Johansen, 1988) tests are the most commonly used traditional tests. But application of these tests requires the variables to be integrated of the same order. In order to overcome this problem ARDL framework developed by (Pesaran, M. H., Shin, 1999) and (Pesaran et al., 2001) is used in this study. Pesaran *et al.*, cointegration approach, also known as bounds testing, has certain econometric advantages in comparison to other single cointegration procedures. Contrary to other cointegration methods, there is no restrictive assumption that all of the variables used in the ARDL model should be integrated of the same order. So I(0) and I(1) variables can be used together. However, as a limiting condition, no variables should be integrated of the second or higher order. With this approach, problems arising from non-stationary series are largely eliminated. It is not necessary that all of the variables have the same lag length as in the VAR model. The variables involved in the analysis can have different lag lengths. Also the long and short-run parameters of the model in question are estimated simultaneously. The model makes it possible to achieve an Error Correction Model that combines short-term and long-term relationships without losing long-term knowledge by applying linear transformations. Finally another important advantage is that it can be applied to small samples. It provides consistent and reliable results even in cases where there are limited numbers of observations.

The ARDL model is chosen because of its stated advantages and model (1) is estimated.

$$\Delta LEXD_t = \alpha_0 + \sum_{i=1}^m \alpha_1 \Delta LEXD_{t-i} + \sum_{i=0}^m \alpha_2 \Delta LBUD_{t-i} + \sum_{i=0}^m \alpha_3 \Delta LEXC_{t-i} + \sum_{i=0}^m \alpha_4 \Delta INT_{t-i} + \sum_{i=0}^m \alpha_5 \Delta LSAV_{t-i} + \lambda_1 LEXD_{t-1} + \lambda_2 LBUD_{t-1} + \lambda_3 LEXC_{t-1} + \lambda_4 INT_{t-1} + \lambda_5 LSAV_{t-1} + \varepsilon_t \quad (1)$$

Where $LEXD$ is the log of total external debt to GDP ratio, $LBUD$ is the log of budget deficit to GDP ratio, $LEXC$ is the log of US Dollar Exchange Rate to Turkish Lira, INT is the secondary market interest rate of the government bonds, $LSAV$ is the ratio of national saving to GDP. The coefficients λ_1 to λ_5 at the right hand side of the equation indicates the long-term relationship between the variables. The bounds testing procedure is based on the F or Wald-statistics and is the first stage of the ARDL cointegration method. The long run relationship of the variables is determined using F-statistics to test the significance of the one lagged level variables (Pesaran et al. 2001). The coefficients from α_1 to α_5 indicates short term dynamic relations between variables. The symbol Δ is the first difference operator, α_0 is the constant and ε_t is the white noise error term.

Estimation of short and long-term dynamics with the ARDL bound test approach requires several steps. In the first step, Model (1) is estimated and an F test is performed to check the long-term relationship between the variables by testing the joint significance of one lagged variables. The null hypothesis $H_0 : \lambda_1 = \lambda_2 = \lambda_3 = \lambda_4 = \lambda_5 = 0$ states that there is no long-term relationship or shortly no cointegration between the variables. The alternative hypothesis is $H_1 : \lambda_1 \neq \lambda_2 \neq \lambda_3 \neq \lambda_4 \neq \lambda_5 \neq 0$. F test used for this procedure has a non-standard distribution. If the computed F-statistic exceeds the upper critical bounds value, then the H_0 is rejected. If the F-statistic is below the lower critical bounds value, the null hypothesis is not rejected and it implies no cointegration. Lastly, if the F-statistic falls into the bounds then the test becomes inconclusive.

After determining the co integration relationship, appropriate lag lengths are determined for variables using the model selection criteria such as Hannan Quinn Information Criteria (HQ), Akaike Information Criteria (AIC), and Schwarz Criteria (SBC). In ARDL (p, q, r, s, t) model, p is the lag length of the dependent variable $LEXD$, q is the lag length of the first independent variable $LBUD$, r is the lag length of the second independent variable $LEXC$, s is the lag length of the third independent variable INT and t is the lag length of the fourth independent variable $LSAV$. In the third step, the error correction model determined by Model 2 is estimated.

$$LEXD_t = \alpha_0 + \sum_{i=1}^m \alpha_1 \Delta LEXD_{t-i} + \sum_{i=0}^m \alpha_2 \Delta LBUD_{t-i} + \sum_{i=0}^m \alpha_3 \Delta LEXC_{t-i} + \sum_{i=0}^m \alpha_4 \Delta INT_{t-i} \quad (2)$$

$$+ \sum_{i=0}^m \alpha_5 \Delta LSAV_{t-i} + \varphi ECT_{t-1} + \varepsilon$$

Here the coefficients from α_1 to α_5 are short-term dynamic coefficients that bring the model to equilibrium. φ is the coefficient of the error correction term (ECT) and defines the adjustment mechanism to the long term equilibrium of the model as a result of a short-term shock. This coefficient should be negative and statistically significant. The higher the magnitude of the ECT term, the better will be the speed of adjustment. In order to determine whether the predicted model is stable, Pesaran and Pesaran (1987) recommended to use the CUSUM and CUSUMSQ tests developed by (Brown, Durbin, & Evans, 1975). CUSUM and CUSUMSQ statistics are repeated sequentially and are marked against break points. A visual inspection of the graphs of the estimated recursive parameters gives information on the structural break or the stability of the model. If the CUSUM and CUSUMSQ statistics are between critical limits drawn at the 5% significance level, the null hypothesis that the model is stable is not rejected.

In the analysis, annual data between 2000 and 2016 were used. $LEXD$ is the log of total external debt to GDP ratio and is obtained from The Under secretariat of Treasury, General Directorate of Public Finance. $LBUD$ is the log of budget deficit to GDP ratio and is obtained from the Republic of Turkey Prime Ministry The Under secretariat of Treasury, $LEXC$ is the log of US Dollar Exchange Rate to Turkish Lira and is obtained from The Central Bank of the Republic of Turkey, INT is the secondary market interest rate of the government bonds and they are calculated from the treasury bulletins and reports, $LSAV$ is the gross savings (% of GDP) and is obtained from the World Bank Database.

5. Empirical Results

Before estimating the ARDL model, stationary and order of integration of the series were investigated using Augmented Dickey Fuller (ADF) and Phillips Perron unit root tests. Our goal in doing this is to make sure that none of the series is I(2). Because the critical F bounds offered by (Pesaran et al., 2001) can only be applied when the variables are I(0) and I(1). The results of the tests are presented in Table 2.

Table 2: ADF and PP Unit Root Test Results

	Variables	Level		First Difference	
		ADF	PP	ADF	PP
Test Statistic (Constant)	LEXD	-2,335 (1)	-2,015 (0)	-4,371* (0)	-4,372* (0)
	LEXC	-3,232** (1)	-4,401*(2)		
	LBUD	-1,591 (0)	-1,704 (1)	-4,764* (0)	-4,765* (1)
	LSAV	-0,532 (3)	-1,565(2)	-5,054*(2)	-10,323*(3)
	INT	-0,777(0)	-0,798(4)	-4,500*(1)	-4,929*(9)

Notes: The values in parentheses represent the lag lengths for the ADF and the bandwidth for the PP. The Schwarz Information Criteria (SIC) was used to select the lag length. Bandwidth was determined by Newey West using the Bartlett Kernel. *significant at %1, ** significant at %5

According to the results of the ADF and PP unit root tests, External Debt ($LEXD$), Budget Deficit ($LBUD$), Saving Rate ($LSAV$) and Interest Rate (INT) are I(1) and exchange rate ($LEXC$) series is I(0). The ARDL model can be estimated as we have determined that no variable is I(2).

Using the Akaike Information Criteria (AIC), it has been determined that the appropriate model is the ARDL (3,1,3,3,2) model. Accordingly 3 lags of External debt ($LEXD$), 1 lag of Budget Deficit ($LBUD$), 3 lags of Exchange Rate ($LEXC$), 3 lags of Interest Rate (INT) and 2 lags of Saving Rate ($LSAV$) were included in the model. The order of the appropriate models according to the Akaike Information Criteria is shown in Figure 2.

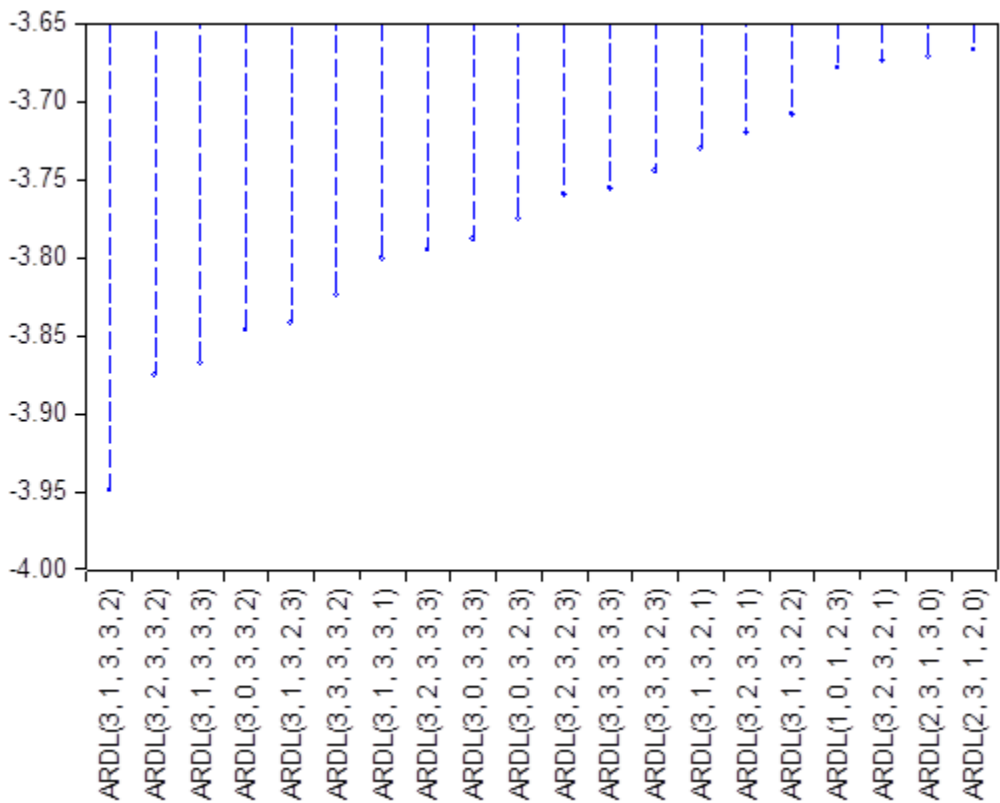


Figure 2: Top 20 Models based on Akaike Information Criteria

The ARDL Bounds Test results to investigate the long run relationship between External debt and our explanatory variables (Budget Deficit, Exchange Rate, Interest rate and Saving Rate) and the critical value bounds which are calculated by (Pesaran et al., 2001) are presented in Table 3.

Table 3: ARDL Bounds Test Results

Calculated F Statistics: 4,66	Critical Value Bounds	
	<i>I</i> (0) Bound	<i>I</i> (1) Bound
%1 Significance Level	3,29	4,37
%5 Significance Level	2,56	3,49
%10 Significance Level	2,2	3,09

Since the calculated F Statistics 4,66 is greater than the upper bound of 4,37 at %1 significance level, we reject the null hypothesis of no long run relationship and conclude that there is a co integration relationship between our variables. After identifying the cointegration relation between the variables, the long term coefficients of the selected ARDL (3,1,3,3,2) model according to the Akaike Information Criteria were determined and the results are presented in Table 4.

Table 4: Long Run Coefficients

Dependent Variable: <i>LEXD</i>			
Variable	Coefficient	t-Statistic	Prob.
<i>LBUD</i>	0,0965	2,6197	0,0344
<i>LEXC</i>	0,1343	5,0956	0,0014
<i>INT</i>	-0,0219	-3,4800	0,0103
<i>LSAV</i>	-2,1432	-3,6733	0,0079

According to the results in table 4, Budget deficit and exchange rate have a significant positive relationship with the external debt. When budget deficit increases, if international financial condition is available with less costly funds and low interests, external borrowing is preferred to domestic borrowing. Consequently accumulation of external debts increases. When exchange rate increases (depreciation of Turkish Lira against US \$ and Euro) external debt GDP ratio also increases. Because GDP is calculated with Turkish Lira and is converted to US \$ by using the current exchange rate. An increase in the exchange rate means a lower GDP in terms of US Dollar. But the external debt is originally in Dollar terms. As a result there is a significant positive relationship with the exchange rate and external debt/GDP ratio. Apart from these factors, economic and productive structure of the Turkish economy also increases the foreign exchange requirement after an increase in the exchange rates. The investments which are mainly in the construction sector are financed by external borrowing. But these investments do not have a foreign exchange earning capacity as the sales are mostly to Turkish citizens with national currency TL. Also in the productive sectors with export capacity, import dependency of exports are very high. Because of this production structure, more external borrowing have to be made to finance the increasing costs of imported raw materials.

There is a negative significant relationship between interest rates and external debt to GDP ratio. The reason can be a switch from external borrowing to domestic borrowing. In the periods of high interest rates and exchange rate risks like increased volatility, domestic borrowing can be a better alternative. There is also a significant negative relationship between savings and external debt. If savings increases less external debt will be required to finance the deficits. There were some measures like compulsory participation to individual pension system to increase the saving to GDP ratio.

Another important output of the study of the short-term dynamics of the model is the calculation of the coefficient of the Error Correction Term. The lagged error correction term and its coefficient are shown in the bottom line of Table 5. The error correction coefficient is negative and significant at 1% significance level (Prob = 0.0002). The coefficient of the error correction term indicates the adjustment to the long term equilibrium after a shock in the short term. Here we can interpret the error correction coefficient of -0,44 as follows: 44% of the imbalance experienced in the external debt to GDP ratio after the shock that occurred in the previous period will close in the current period and move back to the long term equilibrium. This value indicates a fairly quick adjustment.

In the diagnostic tests, no econometric problems were seen in the model. According to the Breusch Godfrey LM test results, we accept the null hypothesis that there is no autocorrelation in the model. According to the white heteroscedasticity test results, null hypothesis of homoscedasticity is accepted. According to the Jarque Bera Normality test, the null hypothesis which states that error terms are normally distributed, is accepted. According to the Ramsey RESET test results, the zero hypotheses, which indicates that no specification error has been made in the model, is accepted at the 5% significance level. Shortly we can say that the model is correctly specified and there are no econometric problems.

Table 5: Cointegration Form of the ARDL Model

Dependent Variable : <i>LEXD</i>			
<i>Variable</i>	<i>Coefficient</i>	<i>t-Statistic</i>	<i>Prob.</i>
$\Delta LEXD_{t-1}$	-0,044871	-0,385796	0,7111
$\Delta LEXD_{t-2}$	-0.396558	-4,035766*	0,0050
$\Delta LBUD$	0,067442	6,369517*	0,0004
$\Delta LEXC$	0,673208	16,383223*	0,0000
$\Delta LEXC_{t-1}$	0,118686	1,145221	0,2898
$\Delta LEXC_{t-2}$	0,282392	3,249409*	0,0141
ΔINT	-0,003422	-5,161947*	0,0013
ΔINT_{t-1}	0,003935	3,587967*	0,0089
ΔINT_{t-2}	0,001497	2,692651**	0,0310
$\Delta LSAV$	0,464532	6,048549*	0,0005
$\Delta LSAV_{t-1}$	-0,230827	-2,095913***	0,0743

ECM_{t-1}	-0.443589	-6,924566*	0,0002
$ECM = LEXD - (0,0965 * LBUD + 0,1343 * LEXC - 0,0219 * LINT - 2,1432 * LSAV - 2,1193)$			
Diagnostic Tests			
Autocorrelation LM Test = 2,156 (0,647)			
White Heteroscedasticity Test = 9,9926 (0,867)			
JB Normality Test=0,5186 (0,7715)			
Ramsey RESET Test= 0,5908 (0,4712)			

*indicates significance at %1 ** indicates significance at %5 *** indicates significance at %10
 Values in parentheses in diagnostic tests are probability values.

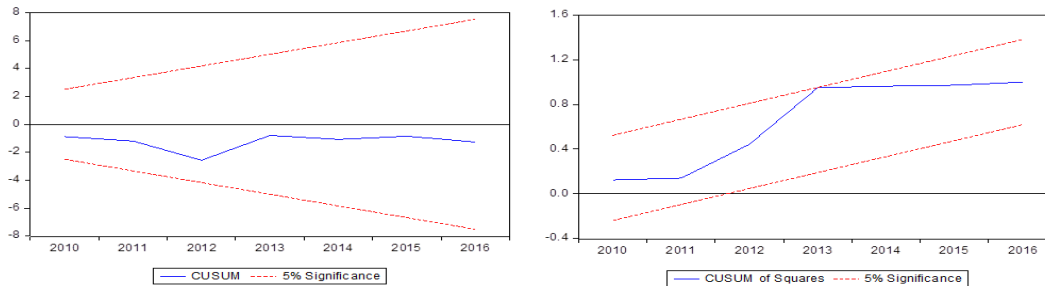


Figure3: Cusum and Cusum Of Squarestests

According to the CUSUM and CUSUMSQ tests given in Figure 3, we can say that all the coefficients in the error correction model are stable since the test statistics are between the critical limits plotted at the 5% significance level. Since the parameters follow a stable course in the estimation period, the estimated model can be used for policy purposes.

6. Conclusion

According to the empirical results of the study, budget deficit and exchange rate have a significant positive relationship with the external debt. When budget deficit increases, if international financial condition is available with less costly funds and low interests, external borrowing is preferred to domestic borrowing. Consequently accumulation of external debts increases. When exchange rate increases (depreciation of Turkish Lira against US \$ and Euro) external debt GDP ratio also increases. Because GDP is calculated with Turkish Lira and is converted to US \$ by using the current exchange rate. An increase in the exchange rate means a lower GDP in terms of US Dollar. But the external debt is originally in Dollar terms. As a result there is a significant positive relationship with the exchange rate and external debt/GDP ratio. There is a negative significant relationship between interest rates and external debt to GDP ratio. The reason can be a switch from external borrowing to domestic borrowing. In the periods of high interest rates and exchange rate risks like increased volatility, domestic borrowing can be a better alternative. There is also a significant negative relationship between savings and external debt. If savings increases less external debt will be required to finance the deficits. Therefore it can be concluded that external debt stock accumulation in Turkey is determined by the macroeconomic factors of budget deficit, exchange rate, interest rate and national savings both in the short and long runs. Also error correction coefficient of -0.44 indicates a fairly quick adjustment from the imbalance experienced in the external debt to GDP ratio. In recent years Turkish economy has become more dependent on external variables. As expected by many researchers, the availability of foreign exchange in the financial markets is coming to the end. So the supply of foreign exchange will be lower in the near future. Now it is time to pay back a significant portion of the foreign currency loans received by Turkish firms and banks. Even Turkey have enough Turkish Lira to pay back, Turkey need to find foreign currency to pay the foreign exchange debts. However, Turkish exports, tourism income and other foreign exchange revenues are not rising to the extent of increasing foreign debt installments. Because most of the debts were used for imports and construction instead of foreign exchange creating tradable sectors. The lower supply and increased demand of foreign exchange will continue to create a pressure on the exchange rate in the near future.

As Turkey do not have any effect on the supply of foreign exchange in the world financial market, Turkey have to do something on the demand side. By investing in productive and export oriented sectors, accumulation of external debt must be stopped by taking necessary measures.

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