Sosyal Bilimler Araştırmaları Dergisi

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CAUSES EXTERNAL DEBT OF THE PRIVATE SECTOR IN TURKEY: A MACROECONOMIC APPROACH[1]

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ABSTRACT

This study examines the causes of the short and long term external debt stock of the private sector by using the Autoregressive Distributed Lag Model (ARDL) and Error Correction Model (ECM) analysis with quaterly data in the period of 2000-2016 in Turkey. According to the ARDL results of Model 1, in which examined the causes of the short term external debt stock of the private sector; there are positive relation between short term external debt stock, budget deficit, real exchange rate and import volume in the long term. Besides, budget deficit has stronger impact in the short term external debt stock than the other variables. On the other hand external interest rate's effect is weak and negative in the short term external debt of the private sector. ARDL results of the Model 2 which was examined causes of the long term external debt stock of the private sector; there is positive relation between foreign interest rate, economic stability, fixed capital expenditure, export volume and long term external debt stock in the long term. On the other hand, real exchange rate's effect is negative in the long term external debt stock. Economic stability has stronger impact than the other variables on the long term external debt. ECM results of Model 1 and Model 2 showed that imbalance in the short term will improve in the long term by the time.

Keywords: *Short Term External Debt of the Private Sector, Long Term External Debt of the Private Sector, ARDL, ECM.*

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TÜRKİYE'DE ÖZEL SEKTÖRÜN DIŞ BORÇLANMA NEDENLERİ: MAKROEKONOMİK BİR YAKLAŞIM

ÖZET

Bu çalışmada, Türkiye'nin 2000-2016 dönemindeki üç aylık verileriyle Otoregratif Dağıtılmış Gecikme Modeli (ARDL) ve Hata Düzeltme Modeli (ECM) analizi kullanılarak özel sektörün kısa ve uzun dönem dış borç stokunun nedenleri araştırılmaktadır. Özel sektörün kısa vadeli dış borç stokunun nedenlerini inceleyen Model 1'in ARDL sonuçlarına göre; uzun dönemde kısa vadeli dış borç stoku, bütçe açığı, reel döviz kuru ve ithalat hacmi arasında pozitif ilişki bulunmaktadır. Ayrıca, bütçe açığının kısa vadeli dış borç stoku üzerinde diğer değişkenlerden daha güçlü etkisi bulunduğu görülmektedir. Diğer yandan özel sektörün kısa vadeli dış borcunda dış faiz oranının etkisi zayıftır. Özel sektörün uzun vadeli dış borç stokunun nedenlerini inceleyen Model 2'nin ARDL sonuçları; uzun dönemde yurtdışı faiz oranı, ekonomik istikrar, sabit sermaye harcamaları, ihracat hacmi ve uzun vadeli dış borç stoku arasında pozitif bir ilişki mevcuttur. Diğer taraftan uzun vadeli dış borç stokunda reel döviz kurunun etkisi negatif etkisi olduğu görülmektedir. Ekonomik istikrarın uzun vadeli dış borç üzerindeki etkisi, diğer değişkenlerden daha fazladır. Model 1 ve Model 2'nin ECM sonuçları, kısa vadedeki dengesizliğin uzun vadede her iki model için de iyileşeceğini göstermiştir.

Anahtar Kelimeler: *Özel Sektörün Kısa Vadeli Dış Borçlanması, Özel Sektörün Uzun Vadeli Dış Borçlanması, ARDL, ECM.*

1. INTRODUCTION

Experienced financial liberalization in Turkey since 1989 has made the external debt an important finance instrument both for the government and private sector. On the other hand, increasing of the private sector external debt in Turkey recently is evaluated as a negative development in some economic environments. This situation arises with effect of the factors such as Turkey's high trade deficit, limitation of technological investments, the private sector consists mainly of Small and Medium-sized Enterprises (SMEs), volatility in exchange rate. However, the debates on foreign debt continue, studies examining the causes of private sector external debt remain quite limited. In this context, this study aims to inform policy makers about private sector external debt and to contribute to studies in this field.

This study examines some fundamental macroeconomic factors affecting the private sector external debt between 2000-2016 in Turkey. Because of it, two models are evaluated to explain short and long term external debt stock of the private sector. These models estimate separately with ARDL and ECM analyses. Variables of this study are; short term external debt stock of the private sector, long term external debt stock of the private sector, budget balance, domestic interest rate, foreign interest rate

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(LIBOR), real effective exchange rate index, fixed capital investment expenditures, export and import volumes and Istanbul Stock Exchange-100 transaction volume.

In the Introduction part of the study, information is given on the external debt of the private sector. In the second part, details of the private sector external debt were presented, between 2000-2016 in Turkey. Literature review is included at the third part. Variables are defined, implementation method and empirical findings are mentioned at the fourth part. Last part is the Conclusions section which shows the results.

2. EXTERNAL DEBT OF THE PRIVATE SECTOR IN TURKEY

End of the 1990's in Turkey, country suffered from high public deficits, external trade deficits, domestic and external debt stock, inflation and a weak financial system. Two economic crisis emerged on November 2000 and February 2001. These crises had occurred as a result structural problems of the economy in particular the revealed weak banking system. On April 14, 2001, a new stand-by agreement was signed with the IMF, which was named 'Transition to the Strong Economy Program'. With this program, it was aimed to reduce inflation, improve economic instability and provide sustainable economic growth. While the inflation rate in Turkey showed the relatively decline until 2008, country experienced high economic growth trend. While the current account deficit continued, fiscal discipline was created in the budget and it was maintaned (Buluş, 2015: 167-171).

In February 2001, the government initiated a comprehensive Banking Sector Restructuring and Rehabilitation Program which will increase supervision in the banking sector and make the banking sector more effective and competitive. After this program the banking system was strengthened in Turkey. Besides, according to the Central Bank Law on 25 April 2001, the Turkish Republic Central Bank shall determine independently the monetary policy it will implement and the monetary policy tools (CBRT, 2012).

Besides, during this period, there was a stable period in both national and international financial markets. After 2008, as a result of the global economic crisis, the exchange rate started to rise again, the Turkish Lira depreciated against foreign currencies, inflation rate and domestic interest rates rose, external deficits continued. One of the policies that continued and gave confidence to the markets was the implementation of policies giving importance to fiscal discipline and implementing independent monetary policies by the government (Yamaçlı, 2017: 109). Between 2000-2016, data on private sector external debt stock of Turkey is given in Table 1.

Table 1. Private Sector External Debt Stock of Turkey in the Period of 2000-2016 (Million USD)

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Period	Private Sector Short Term (a)	Private Sector Long Term (b)	Private Sector Total (a+b)	Total External Debt Stock	Private Sector Total External Debt Burden*	Private Sector Total External Debt Stock/GDP
2000	25.187	29.244	54.431	118.600	0,45	0,20
2001	14.632	27.480	42.112	113.590	0,37	0,21
2002	13.854	29.212	43.066	129.600	0,33	0,18
2003	18.812	30.139	48.951	144.160	0,33	0,15
2004	27.076	36.993	64.069	161.147	0,39	0,16
2005	34.018	50.902	84.920	170.757	0,49	0,17
2006	38.540	82.302	120.842	208.107	0,58	0,22
2007	38.697	122.012	160.709	250.035	0,64	0,23
2008	47.390	141.142	188.532	280.932	0,67	0,24
2009	43.615	128.588	172.203	268.879	0,64	0,26
2010	71.389	119.746	191.135	291.809	0,65	0,25
2011	73.304	126.950	200.254	303.867	0,66	0,24
2012	88.079	140.477	228.556	339.667	0,67	0,26
2013	111.858	157.049	268.907	390.085	0,69	0,28
2014	113.390	168.703	282.093	402.286	0,70	0,30
2015	87.698	195.413	283.111	397.690	0,71	0,33
2016	90.826	207.941	298.767	421.434	0,71	0,33

*****Private sector total external debt burden in Table 1 indicates the share of private sector in total external debt. Private sector total external debt burden data for each period are calculated as follows; "private sector external debt stock / total external debt stock".

Source: Central Bank of the Republic of Turkey, Statistical Data (EVDS, 2018), https://evds2.tcmb.gov.tr/index.php?/

Table 1 shows external debt stock of the private sector which was 54.431 million dollars in the period of November 2000 crisis, decreased to 42.112 million dollars in 2001 and it increased again in 2002-2005 period. In this period, the growth rate of short term external debt stock of the private sector is higher than the long term debt stock of the private sector. While the economic and political confidence provided increased external debt of the private sector, the shortenings of the maturity structure are discussed. In 2008-2009 period, there decreasing of the external debt of the private sector was experienced. In 2016, the private sector was directed towards external debt. Excluding the years 2015-2016, the growth rate of short term external debt in total external debt is high. Beside these, the private sector total external debt stock/gross domestic product (GDP) ratio was 20% on average in 2000-2001, the 2002-2005 period was below 20%, It risen to 26% during the 2006-2009 period, it decreased to %24 on average in 2010-2011 period, it increased again and it was between 30% and 33% in Turkey[1].

[1] About indicator, the benchmark set by the World Bank and the International Monetary Fund for public debt is 30% -50%; Within the scope of the Maastricht Criteria, it is 60% (World Bank 1990: 24; Rebuplic of Turkey Ministry of Treasury and Finance 2018: 4). As well as the concept of external debt burden is used in the literature to determine the indebtedness of the public sector, this study has also been calculated for the private sector.

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Whether the private sector external debt poses a risk in the economic aspect should be evaluated not only by the debt indicators but also by economic growth and other fiscal policies. This situation was effective in determining the variables used in the implementation phase of the study.

3. LITERATURE REVIEW

The literature about external debt can be evaluated in three groups. First group, there are studies on causes and sustainability of total external debt stock without distinction of private-public sector. Second group are the studies about external debt of the public sector are included. Third group, mentions that studies conducted on the private sector external debt. In contrast to the studies in the first two groups, the studies examining the external debt of the private sector, are limited. Also, these studies generaly focuses on relation between private sector external debt stock and economic growth. The samples of all three groups are presented in Table 2.

Table 2. Literature Research

Author/ Date	Period/ Country	Method	Variables	Findings
Akduğan (2017)	1970-2015/ Turkey	ARDL Analysis	Total external debt stock, Inflation rate, exchange rate, gross domestic savings, GDP per capita, debt service, budget balance, money supply, domestic loans, external deficit.	The inflation rate, the exchange rate and the external effect of the money supply are significant and negative on the external debt stock. The effect of GDP per capita, debt service, budget balance, external openness and effect of domestic credits is found to be statistically significant and positive.
Dücan (2017)	2002–2015/ Turkey	VAR Analysis, Johansen Cointegration Analysis	Private sector foreign long term credit debt stock, imports, exports, industrial production index.	There are positive relation between private sector foreign debt, total export of goods and industrial production index.
Al-Fawwaz (2016)	1990-2014/ Jordan	ARDL Analysis	Total external debt stock, GDP per capita, budget deficit, external deficit, terms of trade, exchange rate.	The external openness ratio and the foreign trade volume have a positive effect on the external debt stock and the GDP per capita has a negative effect on the external debt stock.
Dücan and Bakan (2015)	2010-2015/ Turkey	VAR Analysis, Granger Causality Analysis	Foreign short term credit debt stock of the private sector, Total imports of goods, total exports of goods, industrial production index.	Private sector short term credit debt stock and variables of industrial production index is the causes for imports and exports.

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Author/ Date	Period/ Country	Method	Variables	Findings
Erdem, Akdemir and İlgün (2014)	1995-2005/ 27 EU and Euro Zone	Panel Data Analysis	EU defined public debt stock/GDP, 10-year term government bond interest rate, price index, natural logarithmic values of GDP real per person, general budget balance/national income, previous period value of debt stock.	In countries with high debt stock, it was determined that the debt stock has a positive effect between interest rates and national income and has a meaningless effect with inflation. It is determined that the debt stock has a positive effect with inflation and has a negative effect on budget balance in countries with low debt stock.
Imimole, Imoughele and Okhuese (2014)	1986-2010/ Nigeria	Johansen Cointegration Analysis, ECM Model	Total external debt stock /GDP, GDP, external deficit, terms of trade, external debt service/ export, budget deficit/ GDP, foreign direct investment, exchange rate.	The main determinants of the external debt stock have been determined as the variables of GDP, external debt service / export and exchange rate.
Abdelhafidh (2011)	1970-2008/ Tunisia	ARDL Model, Granger Causal Analysis, VECM Model	Total external debt stock, economic growth, internal savings.	There is a one-way causality relation from short term debt to savings and growth. The causes for long-term debt are savings and growth.
Awan, Asghar and Rehman (2011)	1972-2008/ Pakistan	VAR Analysis, Granger Causality Analysis	Total external debt stock, exchange rate, public deficit, terms of trade.	There is a positive relation between long term external debt stock and exchange rates, a negative relation with terms of trade and a meaningless relation with the public deficit. In the short term, no significant relation was found with three variables.
Udoka and Anyingang (2010)	1970-2006/ Nigeria	Least Squares Method	Total external debt stock, GDP, exchange rate, public deficit, LIBOR interest rate and terms of trade.	There is a positive correlation between exchange rate, public deficit, LIBOR ratio, terms of trade and external debt.
Hallak (2009)	1990-2007/ Developing Countries South Korea and İceland	Least Squares Method	Private sector external debt service and long term external debt stock, exchange rate, economic growth, investment expenditures, inflation rate, external openness, macro-economic environment, political stability.	Financial stability has a significant impact on private sector external debt of countries. There is a negative correlation between external debt stock of private sector and investments; there is a positive correlation between external debt stock of private sector and economic growth, openness ratio, inflation and debt service.
Cordella, Ricci and Arranz (2005)	1970-2002/ Developing 79 countries	Panel Data Analysis	Total external debt stock, economic growth.	There is a negative correlation between external debt stock and growth.

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Author/ Date	Period/ Country	Method	Variables	Findings
Tinureh (2004)	1982-1998/ Developing 60 Country	Panel Data Analysis	Total external debt stock, GDP, capital outflow, total debt service, openness, capital escape, term of trade.	External debt stock is positively related to GDP, income instability, total debt service, level of openness. Except for some years, it has been determined that there is a positive relation with capital flight and external terms of trade.
Schclarek (2004)	1970-2002/ 24 Developed Country and Developing 59 Country	Generalized Moments Method (GMM), Panel Data Analysis	Total external debt stock, economic growth, total factor efficiency, special savings rates.	There was a negative correlation between public external debts and economic growth in developing countries, and there was no statistically significant relation between private sector external debt and economic growth.
Lane (2004)	1970-1998/ Low and Middle Income 55 Country	Panel Data Analysis	External debt stock per person, GDP per capita, openness, education.	It has been determined that there is a positive relation between per capita external debt stock and GDP per capita, openness and education.
Edo (2002)	1980-1999/ Morocco and Nigeria	Least Squares Method	Total external debt stock, foreign trade balance, domestic savings, public expenditures, LIBOR.	It has been determined that it has a negative relation between external debt and global interest rate (LIBOR) and public expenditures, positive balance and internal savings.
Hajivassiliou (1987)	19701982/ Developing 79 Country	Panel Data Analysis	Total debt stock, economic growth rate, total debt service, import, debt interest, debt principal.	There was a positive correlation between import, debt interest and debt principal. There was a negative correlation between total debt stock and economic growth rate.

According to Table 2, In general there are the positive relation between external debt stock and budget deficit, investment expenditures, external openness, export and import volume, LIBOR and inflation rate (Dücan, 2017; Akduğan, 2017; Al-Fawwaz, 2016; Hallak, 2009; Edo, 2002; Hajivassiliou, 1987); there is negative relation among external debt, GDP, money supply, domestic savings and exchange rate variables (Akduğan, 2017). Some studies also find a positive relation between external debt and GDP (Erdem, Akdemir and İlgün, 2014; Cordelle, Ricci and Arranz, 2005; Tinureh, 2004; Lane, 2004).

In this study some main macroeconomics variables which affect the external debt of the private sector are examined. Besides, this the study can help to produce a comprehensive policy at this area by analyzing the short and long term debt of the private sector with two different models. In this context, the aim of this study is to inform the policy makers and to contribute to literature.

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4. VARIABLES AND EXPECTATIONS

In this paper macro economic factors that affect private sector external debt are examined using the ARDL and ECM analysis utilizing quaterly data between 2000-2016 in Turkey. Information about dependent and independent variables are shown in Table 3.

Table 3. Description and sources the variables

Variable	Descriptions	Data source
PLD/GDP	Private Sector Long Term External Debt Stock/GDP	T.R. Central Bank Electronic Data Distribution System
PSD/GDP	Private Sector Short Term External Debt Stock/GDP	T.R. Central Bank Electronic Data Distribution System
BD/GDP	Budget Balance/GDP.	T.R. Central Bank Electronic Data Distribution System and T.R. Ministry of Treasury and Finance Statistics
ITR	Domestic Interest Rate.	T.R. Central Bank Electronic Data Distribution System
LIBOR	London Interbank Offered Rate.	Bank Of England- Interactive Database
EXC	Real Effective Exchange Rate (based CPI)	T.R. Central Bank Electronic Data Distribution System
INV/GDP	Fixed Capital Investment Expenditure/GDP	T.R. Central Bank Electronic Data Distribution System
E/GDP	Export Volume/GDP	T.R. Central Bank Electronic Data Distribution System
I/GDP	Import Volume/GDP	T.R. Central Bank Electronic Data Distribution System and T.R. Ministry of Treasury and Finance Statistics
BIST-100/GDP	Istanbul Stock Exchange-100 (XU:100) Transaction Volume.	T.R. Central Bank Electronic Data Distribution System

In this study, the private sector short and long term debt stock variables are dependent variables and other variables are independent variables. The economic expectations among the variables can be summarized as following:

A positive relation is expected between the budget deficit and the private sector external debt. That is explained by the “Crowding Out Effect” in the literature. Domestic interest rates are increasing due to the compensating of the budget deficits with domestic funds. Therefore, cost of private sector domestic debt increases and may lead to foreign debt. Similarly, positive relation is expected between domestic interest rate and private sector external debt. The economic expectation is also negative between foreign interests and private sector external debt. On the other hand, because increaseing in foreign interest rates may adversely affect the interest payments on the debts, a positive relation can be observed between these two variables. The general expectation is negative relation between the exchange rate and the private sector's external debt stock. Besides, positive relation is expected between

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external debt of the private sector, investment expenditure, export and import volume. A large part of the exports made by Small end Medium Enterprises (SMEs) in Turkey. Although the export increase in SMEs creates foreign exchange gains, imported goods are used as intermediate and investment goods. It is thought that there is a positive relation between BIST indicator and private sector external debt stock. We took the BIST-100 indicator as a sign of domestic stability. Because the positive increase of BIST indicator will increase reliability in the international markets, this situation is thought to expand the volume of resources in the external debt of the private sector.

5. METHODS AND RESULTS

In this study, firstly, the data were purified from seasonally effect by the Exponential Correction Method. Then, ADF (Extended Dickey-Fuller) and KPSS (Kwiatkowski, Phillips, Schmidt, Shin) unit root tests were used to test the stationary of the variables. Akaike and Schwarz Information Criteria were used in determining the lag levels of the models. In the ADF test, while the null hypothesis expresses the presence of the unit root (non-stationary), the null hypothesis of the KPSS Test refers to the presence of stationary (Yamaçlı and Saatçi, 2017: 59). In table 4, the stationary levels of the variables are presented, depending on the results of the ADF and KPSS unit root tests.

Table 4. ADF and KPSS Unit Root Tests Results

ADF Unit Root Test				
Variables	**Const.**	**Prob.**	**Trend&Const.**	**Prob.**
PSD/GDP Level	-1.753	0.400	-3.268	0.081***
PLD/GDP Level	-1.756	0.398	-3.286	0.078***
BD/GDP Level	-1.238	0.653	-3.857	0.020**
EXC Level	-4.187	0.001*	-4.101	0.002*
ITR Level	-1.965	0.301	-3.195	0.094***
LIBOR Level	-3.332	0.017**	-3.567	0.041**
INV/GDP Level First Dif.	-1.353 -5.005	0.599 0.000*	-2.554 -4.962	0.302 0.000*
E/GDP Level	-4.300	0.001*	-5.164	0.000*
I/GDP Level	-2.988	0.041**	-3.606	0.037**
BIST/GDP Level	-7.010	0.000*	-6.344	0.000*

Note: *, **, and *** denote the rejection of the null hypothesis at the 1%, 5%, and 10% levels, respectively.

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KPSS Unit Root Test				
Variables	Level		First Dif.	
	Constant	Constant&trend	Constant	Constant&trend
PSD/GDP	0.600*	0.200*	0.206***	0.075***
PLD/GDP	0.710*	0.069***	0.047***	0.035***
BD/GDP	0.704*	0.198*	0.098***	0.095***
EXC	0.461**	0.182*	0.041***	0.037***
ITR	0.802	0.229	0.128***	0.128**
LIBOR	0.568*	0.068***	0.119***	0.076***
INV/GDP	0.680*	0.102***	0.106***	0.102***
E/GDP	0.601*	0.087***	0.101***	0.100***
I/GDP	0.475*	0.098***	0.097***	0.095***
BIST/GDP	0.102***	0.107***	0.141***	0.081***
Critical values				
1% level: *	0.739	0.216	0.739	0.216
5% level: **	0.463	0.146	0.463	0.146
10% level: ***	0.347	0.119	0.347	0.119

According to the results of ADF and KPSS tests, variables were stationary at different levels. Results of the ADF test; The PSD/GDP, PLD/GDP, BD/GDP, EXC, ITR, LIBOR, E/GDP, I/GDP and BIST/GDP variables are I(0); INV/GDP variable is I(1). As for the results of KPSS test; the PSD/GDP, BD/GDP, INV/GDP and ITR are I(1), PLD/GDP, EXC, LIBOR, E/GDP, I/GDP and BIST/GDP variables are I(0). Possible outcomes of applying these stationary tests are as follows (Statsmodels, Stationarity and Detrending, 2020); firstly, ADF and KPSS tests conclude that the series is not stationary at the level, the series is not stationary. Secondly ADF and KPSS tests conclude that the series is stationary at the level, the series is stationary. Thirdly KPSS indicates stationarity and ADF indicates non-stationarity, the series is trend stationary. Trend needs to be removed to make series strict stationary. Fourtly KPSS indicates non-stationarity and ADF indicates stationarity, the series is difference stationary. Differencing is to be used to make series stationary. PSD/GDP, BD/GDP, INV/GDP and ITR variables are compatible with the fourth case. Therefore, the first differences of these variables are used in the models.

The ARDL analysis can be performed at the stationary level of I(0) or I(1). Therefore, ARDL analysis was used in the analysis of long and short term relation between variables. Below, Model 1 and Model 2 are presented for the macroeconomic causes of short and long term private sector external debt with ARDL method. Therefore, ARDL analysis was used to determine the relationships between variables.

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Model 1:

$$\Delta PSD/GDP=\beta_1(PSD/GDP)_{t-1}+\beta_2(BD/GDP)_{t-1}+\beta_3(EXC)_{t-1}+\beta_4(ITR)_{t-1}-\beta_5(LIBOR)_{t-1}+\beta_6(INV/GDP)_{t-1}+\beta_7(E/GDP)_{t-1}+\beta_8(I/GDP)_{t-1}+\beta_9(BIST/GDP)_{t-1}+\sum_{i=0}^{m}\beta_{10}\Delta(PSD/GDP)_{t-1}+\sum_{i=0}^{m}\beta_{11}\Delta(BD/GDP)_{t-1}+\sum_{i=0}^{m}\beta_{12}\Delta(EXC)_{t-1}+\sum_{i=0}^{m}\beta_{13}\Delta(ITR)_{t-1}-\sum_{i=0}^{m}\beta_{14}\Delta(LIBOR)_{t-1}+\sum_{i=0}^{m}\beta_{15}\Delta(INV/GDP)_{t-1}+\sum_{i=0}^{m}\beta_{16}\Delta(E/GDP)_{t-1}+\sum_{i=0}^{m}\beta_{17}\Delta(I/GDP)_{t-1}+\sum_{i=0}^{m}\beta_{18}\Delta(BIST/GDP)_{t-1}+u_t \quad (1)$$

Model 2:

$$\Delta PLD/GDP=\alpha_1(PLD/GDP)_{t-1}+\alpha_2(BD/GDP)_{t-1}+\alpha_3(EXC)_{t-1}+\alpha_4(ITR)_{t-1}-\alpha_5(LIBOR)_{t-1}+\alpha_6(INV/GDP)_{t-1}+\alpha_7(E/GDP)_{t-1}+\alpha_8(I/GDP)_{t-1}+(BIST/GDP)_{t-1}+\sum_{i=0}^{m}\alpha_{10}\Delta(PLD/GDP)_{t-1}+\sum_{i=0}^{m}\alpha_{11}\Delta(BD/GDP)_{t-1}+\sum_{i=0}^{m}\alpha_{12}\Delta(EXC)_{t-1}+\sum_{i=0}^{m}\alpha_{13}\Delta(ITR)_{t-1}-\sum_{i=0}^{m}\alpha_{14}\Delta(LIBOR)_{t-1}+\sum_{i=0}^{m}\alpha_{15}\Delta(INV/GDP)_{t-1}+\sum_{i=0}^{m}\alpha_{16}\Delta(E/GDP)_{t-1}+\sum_{i=0}^{m}\alpha_{17}\Delta(I/GDP)_{t-1}+\sum_{i=0}^{m}\alpha_{18}\Delta(BIST/GDP)_{t-1}+u_t \quad (2)$$

Estimation of the 1 and 2 equations show that which variables are effective on the short and long term external debt of the private sector or not. In the process of Error Correction Model (ECM); the variable EC(-1) refers to the lag period values of the error terms, obtained from the long term relation. EC(-1) is must be negative and its value is between zero and one. If these conditions are occured we can say that imbalance in the short term in a model will improve in the long term. In order to together interpret the short term and long term coefficients of the models, obtained ARDL Analysis and ECM result tables are presented consecutively in the appendices section.

The appropriate model selection for this lag is presented in Table 6 Appendix 1 for Model 1 and Model 2. According to Akaike Information Criteria, the most appropriate lag length was determined as four periods for these two models. Descriptive tests of Model 1 and Model 2 are presented in Table 7 Appendix 2 and Appendix 3 Table 8.

In the Table 5, the results of ARDL Bound Test are presented for Model 1 and 2.

Table 5. ARDL Bound Test Results

Models	F-statistics	Critical Values						Term k
		%1		%5		%10		
		Lower Boundary	Upper Boundary	Lower Boundary	Upper Boundary	Lower Boundary	Upper Boundary	
Model 1	10.403	2.62	3.77	2.11	3.15	1.85	2.85	8
Model 2	3.666	2.62	3.77	2.11	3.15	1.85	2.85	8

The term k indicates the number of independent variables. H_0 hypothesis for long term (cointegration); There are no long-term relations among variables.

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The H_0 hypothesis was rejected in both models because the calculated F statistics were greater than the upper limit of 1% for Model 1 and 5% for Model 2. The existence of the co-integration relation was confirmed for both models.

Normalized cointegration equation for Model 1:

D(PSD/GDP)= -0.2119-0.0031LIBOR-0.0005D(ITR)+0.0011EXC+1.2851BIST/GDP						
t value	-5.238	- 2.499	1.657	3.505	1.133	
S.E.	(0.040)	(0.001)	(0.001)	(0.000)	(1.134)	
+1.0469D(BD/GDP)+0.5617D(INV/GDP)-0.0360E/GDP+0.1723I/GDP						**(3)**
t value	5.24		1.96	-0.47	4.80	
S.E.	(0.199)		(0.286)	(0.072)	(0.036)	

Normalized Cointegration Equation for Model 2:

D(PLD/GDP)= -0.2478-0.0157LIBOR+0.0022D(ITR)-0.0011EXC+7.1502BIST/GDP						
t value	3.066	7.168	1.752	-2.709	2.121	
S.E.	(0.081)	(0.002)	(0.001)	(0.000)	(3.371)	
+0.7149D(BD/GDP)+1.2637D(INV/GDP)+1.0907E/GDP-0.0870I/GDP						**(4)**
t value	1.650		1.829	4.775	-0.987	
S.E.	(0.433)		(0.691)	(0.228)	(0.088)	

In the Table 9 for about Model 1 (Appendix 4) shows that there are positive relation between private sector short term external debt stock, exchange rate, budget balance, import volume. Other side there is negative relation between private sector short term external debt and LIBOR. In addition to that, budget deficit has stronger impact than the others on the private sector short term external debt stock.

On Table 10 for about Model 1 (Appendix 5) shows results of the Error Correction Model (ECM). According to the ECM results, EC(-1) is (-0.58) and it is indicates that effect of the factor affecting the dependent variable will decrease by an average of 0.6 in the next quarter. There is positive relation between fixed capital investment expenditures and private sector short term external debt stock for level values. There is negative relation between budget balance, domestic interest rate, LIBOR, import volume and private sector short term external debt stock generaly for delayed values.

Table 11, Model 2 ARDL results (Appendix 6) shows there is positive relation between LIBOR, BIST-100 indicator, export volume and long term external debt stock in the long term. Other side, there

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is negative relation between exchange rate and long term external debt stock. Looking to the long term determinants, BIST variable is stronger impact than the others.

In Table 12 (Appendix 7) shows the results of the ECM for Model 2. Accorging to the results, EC(-1) indicates effect of the factor affecting the dependent variable will decrease by an average of 0.77 in the following quarter. In the short term, there is positive relation between domestic interest rate, fixed capital investment expenditures, export, import volume and private sector long term external debt stock, at level. There is negative relation between budget balance, exchange rate, LIBOR and long term external debt stock of the private sector.

6. CONCLUSION

In this study, relation between private sector external debt and some macroeconomic policy variables are examined by using ARDL and ECM analyzes between 2000-2016 in Turkey. The short and long term external debt of the private sector were analyzed with Model 1 and Model 2. At the Model 1, dependent variable is short term externel debt stock of private sector and independent variables are foreign interest rate, domestic interest rate, exchange rate, budget deficit, fixed investment expenditure, import and export volume, economic stability indicator. According to ARDL analysis results of the Model 1, there are positive relations between private sector short term external debt stock, exchange rate, budget balance, import volume. On the other side there is a negative correlation between foreign interest rate and private sector short term external debt. Besides, budget balance is the most important variable affecting the short term external debt of the private sector. In this sense, the government's continued implementation of the equivalent budget policy may reduce the short term external debt of the private sector. In addition to that, increase in the real effective exchange rate, namely the appreciation in the Turkish Lira, increases the external debt of the private sector in the short term. Besides, Model 1 showed that private sector short-term external debt increased as fixed capital investment expenditures increased. As long as private sector total external debt turns to productive areas such as fixed capital investments, it will not create a problem for Turkey’s economy. In addition, decrease in imports will reduce the short-term external debt of the private sector. But there is a high dependence on imports of Turkey's exports. Therefore, it can be said that the production of goods and services that will prevent import dependency in the domestic market instead of reducing imports will reduce the private sector short term external debt. However, the short term external debt of the private sector is decreasing as the foreign interest rate increases. Domestic interest rate, export volume and economic stability variables did not have any effect on private sector’s short term external debt. In the Model 2, dependent variable is long term externel debt stock of private sector, independent variables are foreign and domestic interest rates, exchange rate, budget deficit, fixed ınvestment expenditure, import and export volumes, economic stability. According to ARDL analysis results of the Model 2, there are positive relations between

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foreign and domestic interest rates, economic stability, export and long term external debt of the private sector. The economic stability on the long term external debt of the private sector has a stronger effect than other variables. Compared to other variables, the effect of exchange rate on private sector long-term external debt is weak and negative. This result is remarkable. Because the exchange rate has continued to increase in recent years. While the discussions that the high exchange rate will increase the risk of external debt of the private sector, the government took steps to encourage borrowings in Turkish Lira as a precaution. These policies have relatively reduced the negative impact of increases in exchange rates on borrowing and debt repayments. In this sense, the results of the study are in line with the stated policy results. In addition, low domestic interest rates will have a decreasing effect on the private sector's long term external debt.

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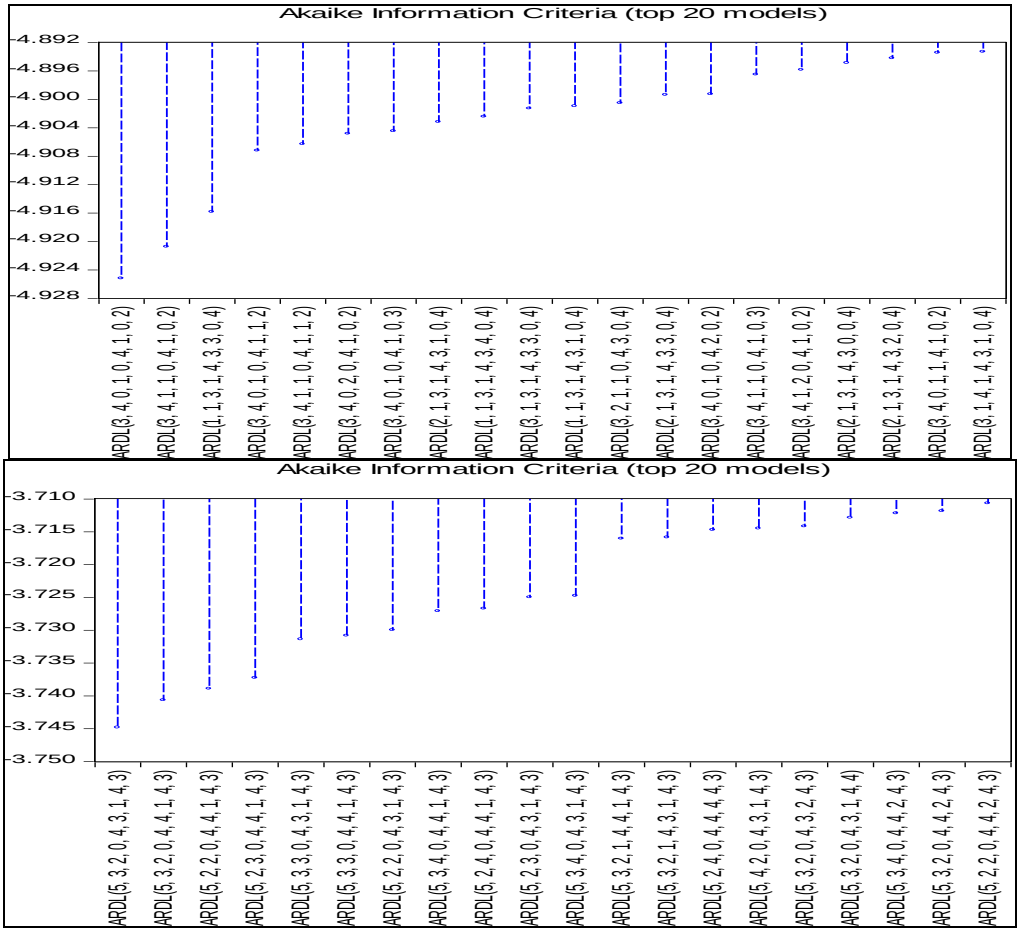
APPENDIX

Appendix 1. Table 6: Results of the Selection Criteria for Model 1, 2



Appendix 2. Table 7: Test Results Concerning Error Term and Reliability

Model 1:

R2= 0.86 F-Statistics= 10.747 Possibility: 0.000

Breusch-Godfrey Autocorrelation Test, F- statistic: 0.486 Possibility: 0.784;

Breusch-Pagan-Godfrey Changing Variance Test, F-statistic: 1.108 Possibility: 0.378;

Jarqua-Bera Normality Test, JB=0.950 Possibility: 0.621

Model 2:

R2= 0.93 F-Statistics:11.173 Possibility: 0.000;

Breusch-Godfrey Autocorrelation Test, F- statistic: 0.771 Possibility: 0.58;

Breusch-Pagan-Godfrey Changing Variance Test, F-statistic: 0.832 Possibility:0.695;

Jarqua-Bera Normality Test, JB: 0.108 Possibility: 0.947

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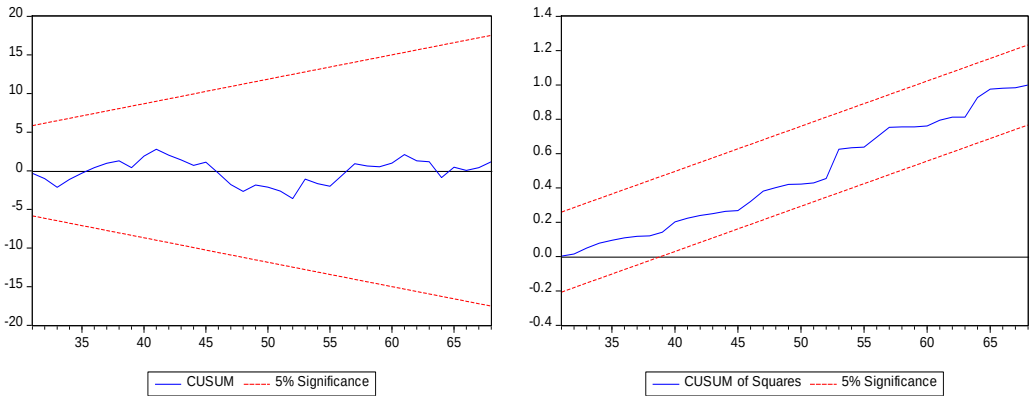
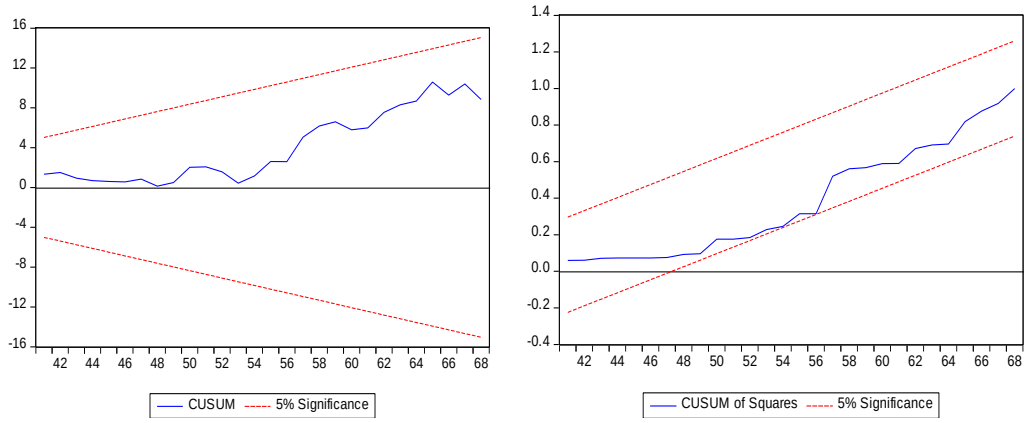
Appendix 3. Table 8: Results of CUSUM and CUSUM Q Tests for Models

Model 1:



Model 2:



Appendix 4. Table 9: Long term Coefficients of ARDL Analysis Model 1

Variable	Coefficient	Std. Error	t-ist.	Possibility
LIBOR	-0.003	0.001	-2.499	0.016
D(ITR)	-0.000	0.000	-1.657	0.105
EXC	0.001	0.000	3.505	0.001
BIST_GDP	1.285	1.134	1.133	0.264
D(BD_GDP)	1.046	0.199	5.239	0.000
D(INV_GDP)	0.562	0.286	1.959	0.057
E_GDP	-0.036	0.072	-0.496	0.622
I_GDP	0.172	0.036	4.798	0.000
C	-0.212	0.040	-5.238	0.000

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Appendix 5. Tablo 10: Error Correction Model (ECM) Estimation Results for Model 1

Variable	Coefficient	Std. Error	t-ist.	Possibility
D(PSD_GDP(-1))	0.353	0.109	3.223	0.002
D(PSD_GDP(-2))	0.265	0.084	3.149	0.003
D(LIBOR)	0.003	0.006	0.582	0.563
D(LIBOR(-1))	-0.014	0.007	-2.217	0.032
D(LIBOR(-2))	0.003	0.006	0.494	0.623
D(LIBOR(-3))	-0.014	0.005	-2.664	0.011
D(ITR, 2)	-0.001	0.0002	-4.438	0.000
D(EXC)	-0.000	0.0003	-0.975	0.335
D(BIST_GDP)	1.615	1.649	0.979	0.333
D(BD_GDP)	0.096	0.064	1.492	0.143
D(BD_GDP(-1))	-1.141	0.157	-7.249	0.000
D(BD_GDP(-2))	-0.643	0.117	-5.454	0.000
D(BD_GDP(-3))	-0.201	0.078	-2.555	0.014
D(INV_GDP)	0.264	0.093	2.825	0.007
D(E_GDP)	-0.135	0.109	-1.244	0.220
D(I_GDP)	0.125	0.066	1.870	0.069
D(I_GDP(-1))	-0.087	0.018	-4.756	0.000
EC(-1)	-0.582	0.158	-3.669	0.000

Appendix 6. Table 11: Long term Coefficients of ARDL Analysis Model 2

Variable	Coefficient	Std. Error	t-ist.	Possibility
LIBOR	0.015	0.002	7.168	0.000
D(ITR)	0.002	0.001	1.752	0.091
EXC	-0.001	0.000	-2.709	0.011
BIST_GDP	7.150	3.371	2.121	0.043
D(BD_GDP)	0.715	0.433	1.650	0.110
D(INV_GDP)	1.264	0.691	1.829	0.078
E_GDP	1.091	0.228	4.775	0.000
I_GDP	-0.087	0.088	-0.987	0.332
C	-0.248	0.081	-3.066	0.005

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Appendix 7. Table 12: Error Correction Model (ECM) Estimation Results for Model 2

Variable	Coefficient	Std. Error	t-ist.	Possibility
D(PLD_GDP(-1))	0.592	0.233	2.542	0.017
D(PLD_GDP(-2))	0.331	0.168	1.975	0.058
D(PLD_GDP(-3))	-0.019	0.126	-0.151	0.881
D(PLD_GDP(-4))	0.247	0.097	2.537	0.017
D(LIBOR)	0.022	0.011	1.908	0.066
D(LIBOR(-1))	-0.042	0.013	-3.151	0.004
D(LIBOR(-2))	0.017	0.011	1.498	0.145
D(ITR)	0.002	0.001	2.628	0.013
D(ITR(-1))	-0.002	0.001	-3.123	0.004
D(EXC)	-0.002	0.001	-3.968	0.000
D(BIST_GDP)	6.357	3.365	1.889	0.069
D(BIST_GDP(-1))	-2.327	3.956	-0.586	0.562
D(BIST_GDP(-2))	1.122	3.392	0.331	0.743
D(BIST_GDP(-3))	-12.067	3.707	-3.254	0.003
D(BD_GDP)	0.096	0.092	1.047	0.304
D(BD_GDP(-1))	-0.802	0.180	-4.458	0.000
D(BD_GDP(-2))	-0.304	0.103	-2.937	0.006
D(INV_GDP)	0.999	0.344	2.908	0.007
D(E_GDP)	0.652	0.257	2.540	0.017
D(E_GDP(-1))	-0.594	0.249	-2.383	0.024
D(E_GDP(-2))	-0.503	0.188	-2.665	0.012
D(E_GDP(-3))	0.361	0.083	4.343	0.000
D(I_GDP)	0.092	0.149	0.612	0.545
D(I_GDP(-1))	0.166	0.134	1.241	0.225
D(I_GDP(-2))	0.366	0.126	2.903	0.007
EC(-1)	-0.777	0.285	-2.727	0.000

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