NEAR EAST UNIVERSITY
GRADUATE SCHOOL OF SOCIAL SCIENCES
BANKING AND FINANCE PROGRAM

THE RELATIONSHIP BETWEEN OIL PRICES, EXCHANGE RATES AND EXTERNAL DEBT: EVIDENCE FROM TURKEY

FULDEN YESILTEPE

MASTER’S THESIS

NICOSIA
2018

THE RELATIONSHIP BETWEEN OIL PRICES, EXCHANGE RATES AND EXTERNAL DEBT: EVIDENCE FROM TURKEY

FULDEN YESILTEPE

NEAR EAST UNIVERSITY GRADUATE SCHOOL OF SOCIAL SCIENCES
BANKING AND FINANCE PROGRAM

MASTER’S THESIS

THESIS SUPERVISOR
ASSOC. PROF. DR. ALIYA ISIKSAL

NICOSIA
2018

ACCEPTANCE/APPROVAL

We as the jury members certify the **'The Relationship Between Oil Prices, Exchange Rates and External Debt: Evidence From Turkey'** prepared by Fulden Yesiltepe defended on 12/12/2018 has been found satisfactory for the award of degree of Master.

JURY MEMBERS

....

Assoc. Prof. Dr. Aliya ISIKSAL
Near East University
Faculty of Economics and Administrative Science and Department of Banking and Accounting

....

Assist. Prof. Dr. Nil GUNSEL RESATOGLU (Head of Jury)
Near East University
Faculty of Economics and Administrative Science and Department of Banking and Finance

....

Assist. Prof. Dr. Behiye CAVUSOGLU
Near East University
Faculty of Economics and Administrative Science and Department of Economics

....

Prof. Dr. Mustafa SAGSAN
Graduate School of Social Sciences
Director

DECLARATION

I am a master student at the Banking and Finance Department, hereby declare that this dissertion entitled ‘The Relationship Between Oil Prices, Exchange Rates and External Debt: Evidence From Turkey’ has been prepared myself under the guidance and supervision of ‘Assoc. Prof. Dr. Aliya Isıksal’ in partial fulfillment of the Near East University, Graduate School of Social Sciences regulations and does not to the best of my knowledge breach and Law of Copyrights and has been tested for plagiarism and a copy of the result can be found in the Thesis.

- The full extent of my Thesis can be accesible from anywhere.
- My Thesis can only be accesible from Near East University.
- My Thesis cannot be accesible for two(2) years. If I do not apply for extention at the end of this period, the full extent of my Thesis will be accesible from anywhere.

Date: December 12, 2018

Signature

Name Surname: Fulden Yesiltepe

DEDICATION

This thesis dedicated to my father and my mother who has shaped into the strong and dedicated person that I’m today.

ACKNOWLEDGEMENTS

I would first like to thank my thesis supervisor **Assoc. Prof. Dr. Aliya Işıksal** for her endless support and for her valuable advices. I would also like to express my profound gratitude to **Prof. Dr. Serife Zihni Eyupoglu** and **Assist. Prof. Dr. Nil Resatoğlu** for their encouragement and for their great confidence in me.

I am deeply thankful to my teacher and my mentor Prof. Dr. Hatice Jenkins. She has taught me more than I could ever give her credit in here. She has shown me, by her example, what a good academician and a person should be. Furthermore, I am grateful to my eternal cheerleader, my little brother Efe Yesiltepe for his continuous love.

ABSTRACT

THE RELATIONSHIP BETWEEN OIL PRICES, EXCHANGE RATES AND EXTERNAL DEBT: EVIDENCE FROM TURKEY

Despite a recent significant hike in the policy interest rate by Central Bank of Turkey, Turkish exchange rate remains volatile accompanied with significant depreciation over the course of 2018. Consequently, Turkey’s foreign currency denominated external debt and imported oil dependency pose high risks for Turkey’s economy.

This thesis empirically investigates the dynamic interactions among oil prices, exchange rates and external debt for Turkey for the period from 2003:Q1 to 2018:Q1. Johansen cointegration test suggests no long run relationship among variables. Toda-Yamamoto causality test reveals unidirectional causality running from external debt to real exchange rates. Generalized forecast error variance decompositions (GFEVDs) shows that innovations in real oil price explain significant proportion of the volatility in real exchange rate, relative to their impact on external debt. On the other hand, innovations in real exchange rate explain higher proportion of the volatility in external debt. Generalized impulse response functions (GIRFs) illustrates that an upsurge in oil prices increases external debt burden whereas real appreciation of exchange rate decreases external debt burden. Furthermore, oil price hikes and an increase in external debt induces real exchange rate depreciation. Empirical results have important monetary and energy policy design implications.

Keywords: External debt, exchange rates, oil prices, GFEVDs, GIRFs, Toda-Yamamoto causality test

ÖZ

THE RELATIONSHIP BETWEEN OIL PRICES, EXCHANGE RATES AND EXTERNAL DEBT: EVIDENCE FROM TURKEY

Türkiye Cumhuriyeti Merkez Bankası'nın son dönemde yaptığı politika faiz oranlarındaki ciddi artışa rağmen, Türk döviz kuru dalgalanmaya devam ederek 2018 yılı boyunca önemli bir değer kaybı yaşamıştır. Bu nedenle, Türkiye'nin döviz cinsinden olan yüksek dış borcu ve ithal petrol bağımlılığı Türkiye ekonomisi için yüksek risk teşkil etmektedir.

Bu tez, 2003 yılının ilk çeyreğinden 2018 yılının ilk çeyreğine kadar Türkiye'nin döviz kuru, dış borcu ve petrol fiyatları arasındaki dinamik etkileşimleri ampirik olarak incelemektedir. Johansen Eşbütünleşim testi, değişkenler arasında uzun dönemli bir ilişki olmadığını göstermiştir. Toda-Yamamoto nedensellik testi dış borçtan reel döviz kuruna tök yönlü nedensellik olduğunu göstermiştir. Genelleştirilmiş hata varyansı araştırmaları reel petrol fiyatlarındaki hata varyansının dış borçlara olan etkisine oranla, reel döviz kurlarındaki dalgalanmaların önemli oranını açıkladığını belirtmiştir. Reel döviz kurundaki hata varyansı ise dış borç dalgalanmaların önemli oranını açıklamaktadır. Genelleştirilmiş etki tepki fonksiyonları, petrol fiyatlarındaki artışın dış borç yükünü arttırdığını, döviz kurunun reel değer kazanmasının dış borç yükünü azalttığını göstermiştir. Ayrıca, reel petrol fiyatlarındaki ve dış borçlardaki artışın reel döviz kurunun değer kaybetmesine neden olduğunu göstermiştir. Elde edilen ampirik sonuçlar önemli mali ve enerji politikası çıkarımlarına sahiptir.

Anahtar Sözcükler: Dış borç, döviz kurları, petrol fiyatları, genelleştirilmiş tahmin hatası varyans ayrıştırmaları (GFEVDs), genelleştirilmiş etki-tepki fonksiyonları (GIRFs), Toda-Yamamoto nedensellik testi

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF EQUATIONS

LIST OF ABBREVIATIONS

ARDL:	Autoregressive-Distributed Lag
ARIMA:	Autoregressive Integrated Moving Average
bn:	Billion
CBRT:	Central Bank of Republic of Turkey
CCC-GARCH:	Constant Conditional Correlation GARCH
CUSUM:	Cumulative Sum
CUSUMQ:	Cumulative Sum of Squares
DCCA:	Detrended Cross Correlation Analysis
DCC-GARCH:	Dynamic Conditional Correlation GARCH
DOLS:	Dynamic Ordinary Least Square
DSGE:	Dynamic Stochastic General Equilibrium Modeling
GARCH:	Generalized Autoregressive Conditional Heteroscedasticity
GDP:	Gross Domestic Product
GFEVDs:	Generalized Forecast Error Variance Decompositions
GIRFs:	Generalized Impulse Response Functions
GMM:	Generalized Method of Moments
IMF:	International Monetary Fund
m:	Million
MF-DCCA:	Multifractal Detrended Cross Correlation Analysis
MGARCH:	Multivariate GARCH
NATREX:	Natural Real Exchange Rate
NYMEX:	New York Merchantile Exchange
OECD:	Organisation for Economic Co-operation and Development
PLS-SEM:	Partial Least Squares Syructural Equation Modeling
TURKSTAT:	Turkish Statistical Institute
US:	United States

INTRODUCTION

Since 1970's steep rise in the external debt burden of the developing countries has created serious debate among economists and policy makers. The main concern of ongoing debate is whether or not foreign financing promotes growth and development in borrower countries. The far reaching conclusion is that external debt is a two-edged sword. Numerous benefits and opportunies can be achieved by obtaining external debts if they are utilized properly. For instance, utilization of external debt in the form of productive investments may accelerate the economic growth and development. Accordingly, the borrowing country can easily settle their debt payments and reduce its fiscal deficit. However, inefficient use of external debt can hamper economic growth and development alongside with political sovereignty of the debtor country. If the borrowing country can not meet the regular repayment requirements, it would face with the heavy burden of interest and principal repayments, hence cumulated level of debt and increased level of inflation. Consequently, the nation would become vulnerable to stipulated conditions of the usage of the borrowed funds and internal policies dictated by the creditor country thereby foreign dependency becomes inevitable. Additionally, when a country does not pay back the debt on time; it's considered as a high risk country, and such a nation has to pay a significant amount of interest while obtaining the external debt again. It's sovereign credit ratings may downgraded by international credit rating agencies which is likely to dampen already depressed economy. Furthermore, economic vulnerability induces loss of investor confidence hence leading to further deterioration in economic balances.

In the context of our research, studies conducted on the relationship between Turkey's external debt and its economic growth concluded that external debt negatively impacts economic growth and development in both short term and long term (Uysal et al., 2009; Karagol, 2012; Doğan and Bilgili, 2014). Since the literature suggest the negative relationship between Turkey's external debt and its economic growth, it is crucial to understand the market-driven factors in the economy that generate foreign financing needs and their relationship with the external debt. So that, necessary steps could be taken by policy makers to reduce country's vulnerability to those elements thereby enhance economic and social welfare.

The use of energy is a key input of production of almost all goods and services thus it's considered as prime factor in ensuring economic growth and development of all modern economies. In the context of our research; the use of energy is one of the most important factor in Turkey's economy that generate foreign financing needs. Turkey's energy demand, mainly on oil and natural gas, is rapidly increasing relative to other OECD countries. Unfortunately, Turkey imports almost all of its oil ingredients due to its limited oil reserves hence its external debt constitutes considerable amount of energy bill (U.S Energy Information Administration, 2017). As a key oil importing country, Turkey's external debt, hence its economy is directly influenced by international oil price changes. Although international oil prices have experienced cyclical movements throughout its history; the recent increase in global demand for oil, upsurged the oil prices (Figure 1.1). While this upsurge in oil prices bring larger capital inflows, hence favourably impact macroeconomic variables of oil exporting countries; oil importing economies, like Turkey, face with serious adverse impacts.

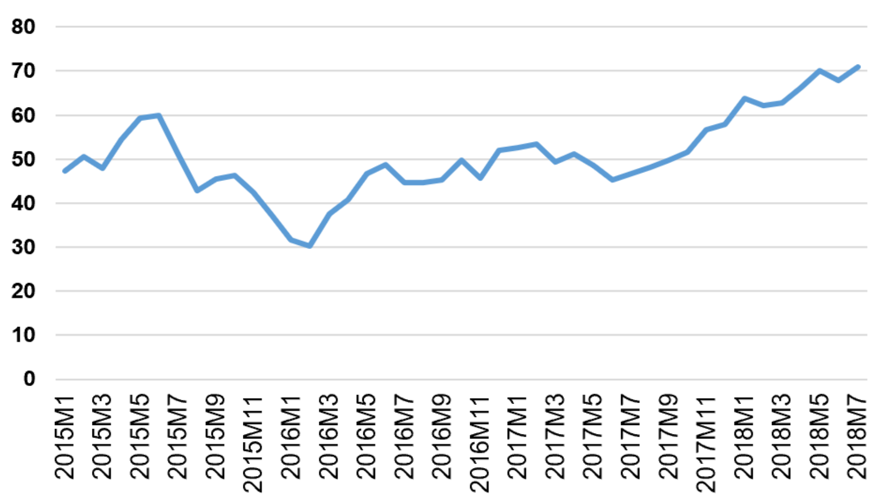


Figure 1.1 West Texas Intermediate (WTI) Crude Oil Price History (Dollars per barrel)

Source: Author's own calculations

In theory, an upsurge in oil prices leads to a deterioration of current account balances of oil importers due to a transfer of wealth to oil exporters. For this reason, domestic currencies of oil exporters appreciate, whereas currencies of oil importers depreciate. Furthermore, an increase in the current account deficit leads to an increase in foreign liabilities and debts with the rest of the world. Substantial amount of foreign exchanges are spent on paying out these debts and this puts further pressures on oil importers' exchange rate dynamics.

Another important factor in Turkey's economy that impacts its foreign financing needs is its exchange rate volatility. Despite a significant increase in the policy interest rate, exchange rate remains highly volatile with Lira depreciating substantially. Furthermore, due to its chronic high inflation and currenct account deficit Turkey has long been dependent on external financing and holds foreign currency denominated debt. In history, foreign currency denominated debt has led to bankruptcy of generations of debtor countries due to rapid devaluation of exchange rates hence increased nominal cost of liabilities. The well known example of this case is the developing country debt crisis of early 1980's ,when Latin American countries currencies depreciated rapidy due to sharp increase in oil prices, thereby their foreign debts exceeded their earning power and they were not able to repay them. For instance, Mexico had dollar denominated debt burden and rising US dollar exchange rates accompanied with an increase in interest rates made debt repayment unfeasible. Although Latin American countries case provides insights about the impact of exchange rate dynamics on external debt, in the relevant literature it's widely agreed that foreign currency denominated debt and exchange rate have a bidirectional relationship. For instance, the empirical study conducted by Lima and Panizza (2017) concluded that cumulated debt and depreciation in real exchange rate increases the public external debt burden. On the other hand, Couharde, Rey and Sallaneva (2016) found that high external indebtedbess of the Europen countries have generated adverse pressures on real exchange rate dynamics of the Europen countries. The recent study conducted by Calderón and Kubota (2018) noted that debt related financial openness may contribute to higher real exchange rate volatility in developing countries.

CHAPTER 1
GENERAL BACKGROUND

1.1 Introduction and the Significance of the Topic

Since the wake of global financial crisis, Turkey's economic growth has been higher than nearly all other emerging countries (International Monetary Fund, 2018). Although Turkey reeled from a failed coup attempt by members of the military in 2016, growth rallied significantly from the beginning of 2017 by a large credit impulse, fiscal stimulus policies and favorable external conditions.

However, this rapid growth is accompanied by a wider current account deficit and incrased private and public external indebtedness. This is reflected in the rising imbalances of the Turkey's economy, most notably in positive output, inflation well above target and an increase in nominal borrowing costs, hence rising defaults on loans. Government policy interventions are in vain, including interest rate hikes to curb substantial depreciation of Turkish lira. Accordingly, Turkey's foreign currency denominated external debt and imported oil dependency pose high risks for Turkey's economy. Meanwhile, Turkey's economy also struggling amid political uncertainity and regional instability due to shift in diplomacy structure, integration of refugees in Turkey, ongoing foreign policy tensions and threats from terrorist groups. Consequently, Turkey's economy is showing clear signs of overheating recently and it cannot simply continue down its current path. Therefore, structural reforms and reformulated policy implications are required to help sustain the country's strong achievements of the past decade.

The aim of this thesis is to investigate the trilateral dynamic relationship between international oil price, exchange rate and external debt for Turkey. This empirical investigation aims to be a reference point for the development of effective hedging strategies for commodity and currency trade and aims to help sustain the Turkey's strong economic achievements of the past decade by its monetary and energy policy recommendations.

The importance of this thesis is that it adds value by contributing to inherent theoretical and methodological investigations in the oil price - exchange rate - macroeconomy literature. Second, it provides insights for both monetary and energy policy design. It also provides insights for hedging strategies for portfolio managers, traders and financial investors. Third, it fills an inherent gap since a through research on the relevant literature yielded no related article investigating dynamic relationship among international oil price, exchange rate and external debt. Lastly, the conclusions drawn from the empirical analysis can be an indication of the status in other developing countries having similar characteristics to Turkey, particularly the ones that are dependent upon oil imports such as India (Sakaki, 2018).

1.2 Research Question

Our research on general economic background of Turkey revealed that Turkey's external debt, hence its welfare is threatened by its exchange rate volatilities and fluctuations in the international oil market. Thus, this thesis seeks to address the follow-up questions;

- How Turkey's exchange rate and its external debt are affected by international oil price fluctuations?
- How Turkey's external debt and international oil price are affected by Turkey's exchange rate volatility?
- How Turkey's exchange rate and international oil price are affected by Turkey's external debt?

1.3 Theoretical Background

The starting point of the relationship from exchange rates to oil prices stems from the fact that international oil trade is carried out with the US dollar. Thus, USD exchange rate plays a leading role in transmitting oil shocks to global economy. According to law of one price theory, abstracting transaction costs, depreciation of US dollar relative to other currencies leads to a decrease in the oil price hence the demand for oil increases and vice versa (Bloomberg and Harris, 1995). The supply side of the relationship is important yet has not been investigated explicitly since oil price could be affected by several factors such as production capacity, drilling activity as well as price setting strategy of an oil exporter country.

The impact of oil price volatility, on the other hand, can be transmitted to exchange rates by means of three direct transmission channels; the terms of trade channel, the wealth effect channel and the associated trade balance and portfolio reallocation channels (Habib et al., 2016).

Chen and Chen (2017) empirical study was first to introduce the terms of trade channel within two country framework. This channel establishes a connection with real oil prices and real exchange rates according to energy insensitiveness of the trading partner countries. To clarify, if the home country's economy is more energy intensive than its trading partner, an upsurge in real oil price may leads to an increase in price of tradeable goods of the home country due to an increase in inflation, by a greater proportion than in its trading partner. Consequently, the home country's currency depreciates and its trading partner's currency appreciates in real terms.

The theoretical underpinning of our work is based on the wealth effect channel, introduced by Krugman (1983) and Golub (1983). This channel concentrates on the wealth transfer impacts of an increase in oil price on the exchange rate dynamics. The underlying idea from the oil-exporters perspective is that, an upsurge in oil prices transfers wealth from oil-importing countries to oil-exporting countries. This wealth transfer leads to an increase in export revenue hence improvement of current account balances of oil-exporters. Contrarily, a decrease in wealth in the oil-importing countries accompanied with reduction in their US dollar reserves leads to an increase in their trade deficit. Thereof, oil importers' currencies tend to depreciate whereas oil exporters' currencies tend to appreciate in effective terms as a result of an upsurge in oil prices (Beckmann and Czudaj, 2013). Furthermore, deterioration in the current account balance increases foreign liabilities and debts with the rest of the world. Large amount of foreign debt dries up foreign exchange reserves as substantial amount of foreign exchange are spent to pay principal and interest of the foreign debt (Hameed, Ashraf and Chaudhary, 2008). Due to lack of foreign exchange reserves to back-up domestic currency accompanied with an increase in demand for hard currencies to pay external debt induces domestic currency depreciation.

Marshall-Lerner condition, on the other hand, states that when the domestic currency of a country depreciates relative to other currencies, its tradeable goods will become cheaper thereby exports will increase and the trade balance of the country will improve in the long run. Similarly, according to foreign purchases effect theory; if the price level of one country decreases, other countries purchase more of that goods due to its cheapness, thereby net exports increase and current account balances improve. Furthermore, decline in the value of domestic currency, due to an increased nominal cost of imported goods, will increase the demand for domestic goods which in turn boosts the economic growth (Palić et al., 2018). In the literature, scholars suggested that trade balance of a country follows a J shaped path in response to a currency depreciation. That is, a real depreciation of the currency has an initial negative affect on the trade balance, and then the balance gradually increases to a level higher than the previous state in the long run. However, earlier studies have not been successful at showing the existence of J-Curve, especially in the context of Turkey (see, e.g., Kale, 2001; Halicioglu, 2007; Vural, 2016). As it's supported by prior empirical research, this benefit does not occur in every case. Many developing and less developed countries around the world have a problem of high import dependence hence high external indebtedness. Since the majority of developing countrys' debt is held in foreign currency, real depreciation of the exchange rate leads to an increase in the nominal value of the external debt payments (Asonuma, 2016).

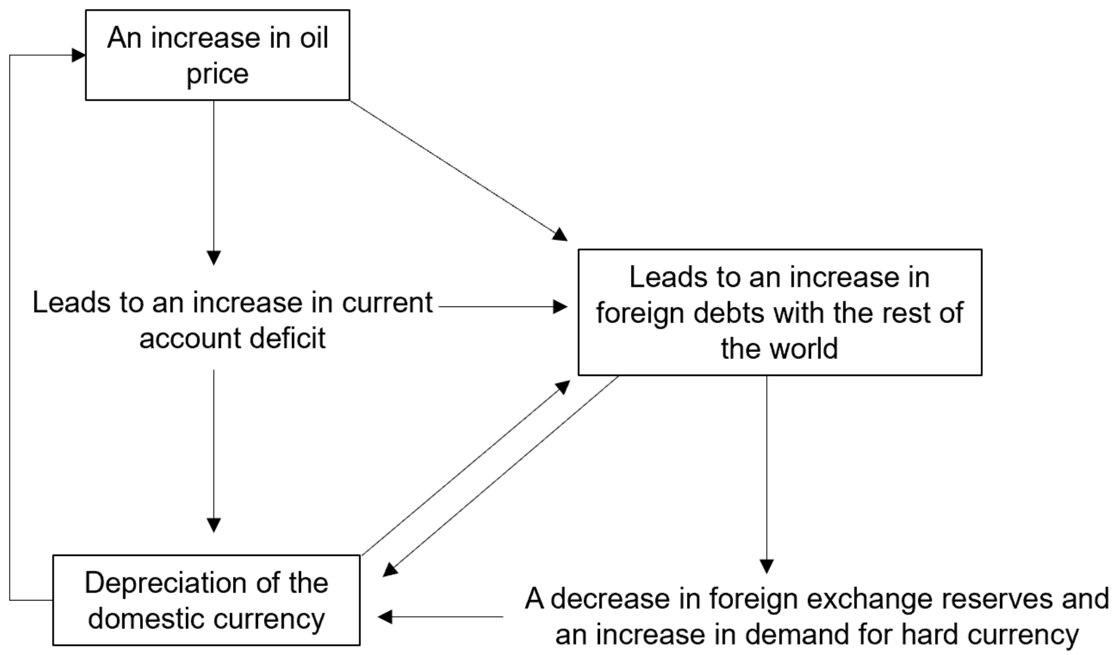


Figure 1.2 Theoretical Framework for Turkey

Source: Author's own calculations

As previously mentioned, Turkey's oil demand has been higher than other OECD countries over the last 15 years and due to its limited domestic reserves Turkey imports nearly all of its oil supplies. Furthermore, due to its rising energy demand Turkey's economy is heavily dependent on imported oil thus amid the significant depreciation of lira, the country has to maintain its crude oil purchases. Due to these reasons, we expect that an increase in the oil prices would lead to an increase in the Turkey's foreign financing needs hence an increase in its external debt and depreciation of the domestic currency will become inevitable. Furthermore, Turkey holds foreign currency denominated external debt, therefore we expect that decline in the value of domestic currency will put further pressures on its nominal external debt burden (Figure 1.2).

1.4 Explanation of the Key Terms

1.4.1 Foreign Trade Dynamics of Turkey

Turkey became an open economy in the 1980s by implementing neoliberal economic policies and ever since international trade has become one of the vital elements for Turkey's economy growth (Kahya, 2011).

Turkey's current foreign trade dynamics presented in Figure 1.2 illustrates that; exports increased about 9.4 percent and reached to $116.2 m since 2015, whilst imports rose by 12.5 percent to $225.2 m in 2017, according to data retrieved from Central Bank of Republic of Turkey (CBRT). Although Turkey produces oil and natural gas, the production capacity of the Turkish Petroleum Corporation is not sufficient enough. A significant increase in oil demand accompanied with limited reserves makes the country a total importer of energy. Consequently, energy imports make a substantial difference in current account balances. For instance, Turkey's current account deficit stood at $47 bn with energy import in 2017, however it could stood at $15 bn deficit without energy import within the same year (Figure 1.3)

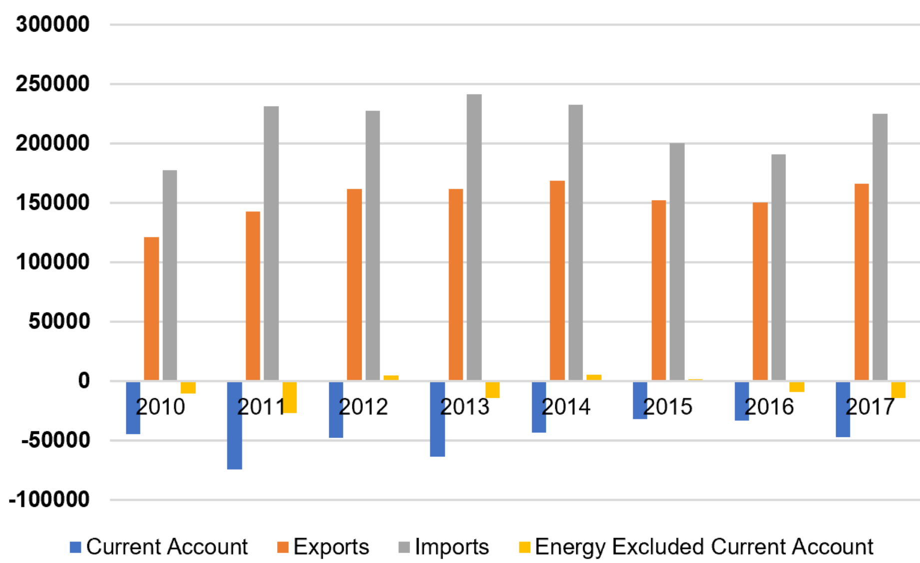


Figure 1.3 Trade Dynamics of Turkey (million US $)

Source: Author's own calculations

Furthermore, current account balance of Turkey could register a surplus in 2012, 2014 and 2015 without energy import, as the first annual average surplus since 2001 (Figure 1.3). Since energy makes up the biggest portion of imports of Turkey, the current account balance is highly vulnerable to international energy price changes. In particular, the current account deficit of Turkey recorded $2.59 bn in August 2018 which is $1.66 bn larger than the deficit recorded in August 2017, driven by recent upsurge in energy prices. Since current account deficit of Turkey is financed with debt; external debt burden of the country is increasing as deficit increases.

Since international oil trade is carried out with US dollar, substantial depreciation of Turkish Lira relative to US dollar accompanied with recent upsurge in international oil prices increased the nominal cost of oil imports. Nevertheless, Turkey maintains its crude oil pruchases amid the significant depreciation of lira since it is dependent on imported oil. While the country imported 1.5 m tone crude oil in January 2018, in September 2.08 m tone crude imported, the data retrieved from TURKSTAT showed (Figure 1.4). Accordingly, Turkey's total import bill increased by 17.7 percent in 2017, out of which energy accounted for 15.9 percent, and amounted to $233.79 bn (Sengül, 2018).

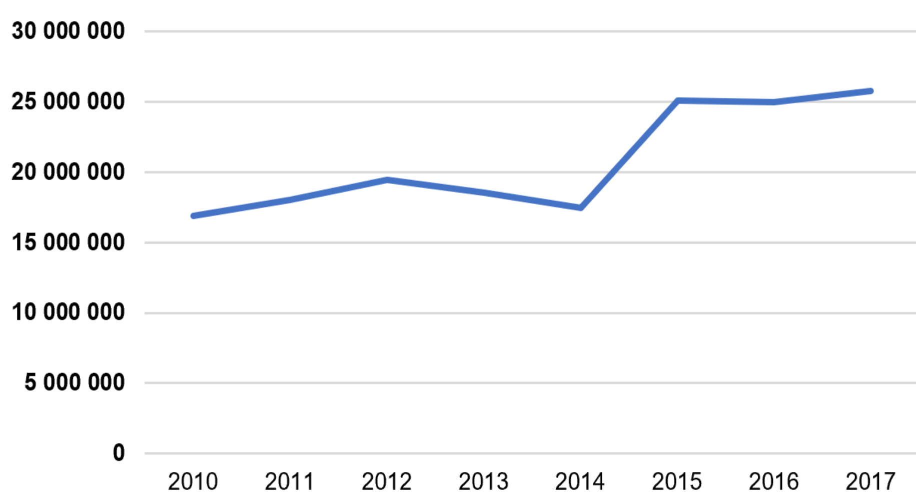


Figure 1.4 Crude Oil Imports (tone)

Source: Author's own calculations

Persistent high inflation could damage economic and social welfare thus, a target level of inflation of many governments is low but positive. In the context of our research, Turkey saw a stronger than expected rise in inflation over the course of 2018. Inflation Report 2018 – IV published by the CBRT noted that consumer inflation increased by 9.1 percent in September 2018 from a year earlier, and reached to 24.5 percent (Central Bank of Republic of Turkey, 2018). Furthermore, inflation has increased to 25.2 percent in October, marking the highest inflation rate in last 15 years. In order to curb with inflation, Turkey's Cental Bank raised its one-week repo rate to 24 percent from 17.75 percent in September. However, this attempt was late and yet has not been effective so far.

The sharp depreciation in the Turkish Lira combined with deterioration in pricing behaviour were main drivers of increase in inflation. In particular, the value of Turkish lira has fallen by about 40 percent against the US dollar since the start of 2018 (Figure 1.5). In particular, lira lost about 16.82 percent of its value following US administration announcement about doubling tariffs on steel and aluminum imports from Turkey and slumped to a record low of 7.24 TL against the dollar in August.

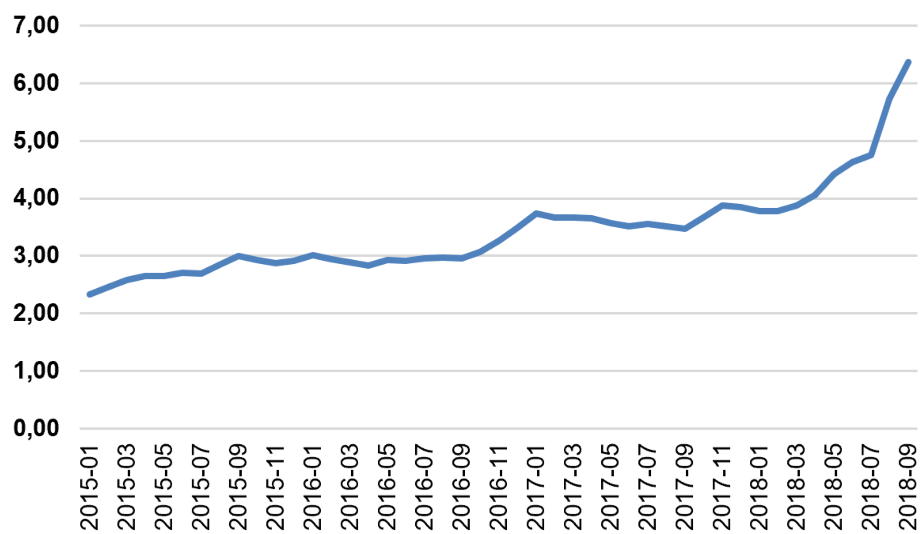


Figure 1.5 Turkey Exchange Rate relative to US Dollar

Source: Author's own calculations

1.4.2 Dimensions of the External Debt Problem

Turkey's economy has long been dependent on foreign financing as a result of persistent high inflation and deficit in its current account balance. Thus, it's also crucial to know the foreign debt structure of the country besides knowing the factors that lead substantial accumulation of external debt. The important structural aspects to consider in the foreign currency denominated debt are; gross external debt as a percentage of GDP, its maturity and borrower profile, and its currency decomposition.

In particular, the gross external debt to GDP ratio is the principal indicator to measure financial leverage of the economy, hence the country's credibility. Gross external debt of Turkey increased by 16.6 percent since 2015, to $46.67 bn in the first quarter of 2018, data retrieved from CBRT showed (Figure 1.6). Furthermore, the gross external debt amounted 53.4 percent of GDP at the end of 2017 and is estimated to increase 54.6 percent of GDP in 2019, according to Turkey 2018 Article - IV released by IMF (International Monetary Fund, 2018). The continuous rising of this ratio reflects that the external borrowing of a country increases more than of that country's domestic product.

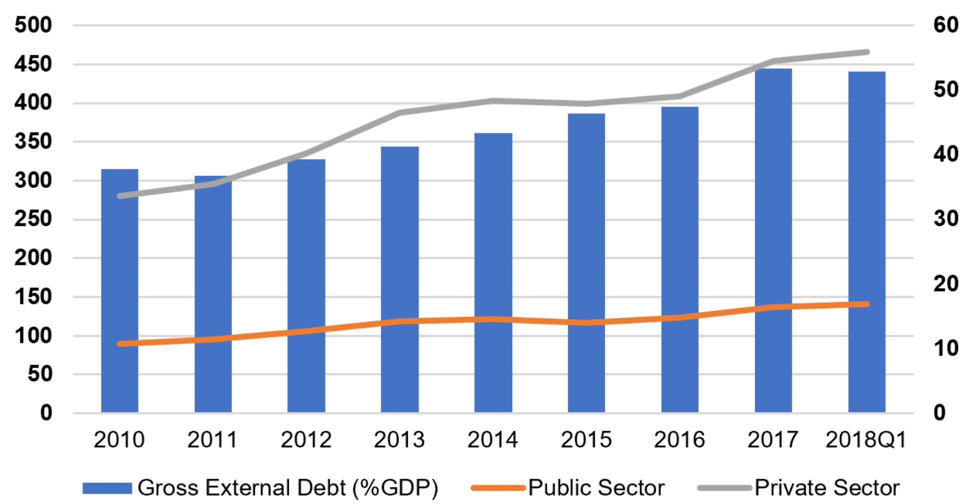


Figure 1.6 Gross External Debt Structure of Turkey by Borrower (billion US $)

Source: Author's own calculations

Borrower profile of external debt presented in Figure 1.6 also illustrates that private sector's external debt has been greater than public sector's external debt during the last decade, mostly due to growing private sector and their ability to borrow easily. Strong credit expansion of Turkey to stimulate slowed economic activity in 2016, has also spurred private spending recently. In particular, private sector foreign liabilities rose by 15.2 percent to $325.1 bn and public sector foreign liabilities increased by 21 percent to $141 bn from 2015 to the end of first quarter of 2018.

In case of external debt maturity, Turkey's gross short term external debt increased by 14.5 percent to $122.3 bn at the end of the first quarter of 2018, the highest level recorded since 2016 (Figure 1.7), according to data retrieved from CBRT. According to J.P.Morgan estimates, $179 billion of gross external debt matures from 2018 to July 2019 which is equivalent to almost a quarter of Turkey's annual economic output (Rao, 2018). Only around $33 bn of this maturing debt belongs to public sector. Combined with weak Lira and high inflation, Turkey's banks and corporations, whose debt to foreign creditors have almost doubled since 2010, may face difficulties paying foreign curreny debt hence they may declare failures and/or bankrupts.

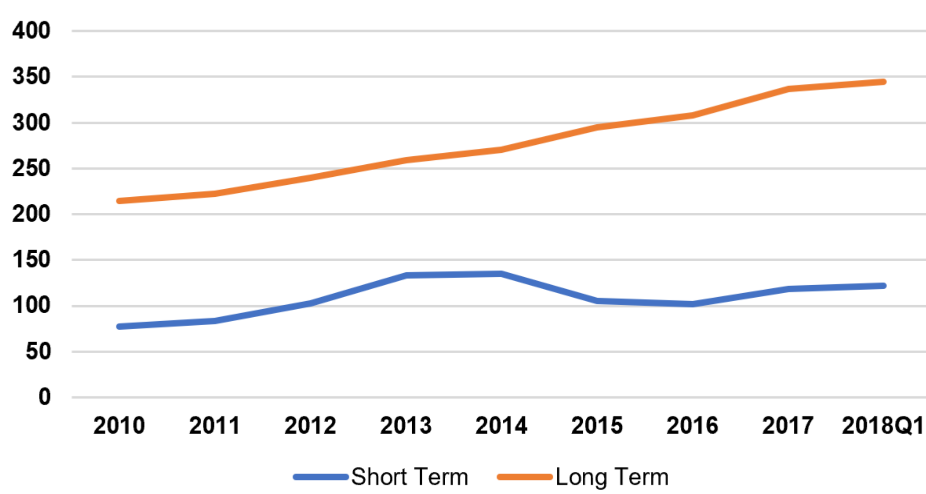


Figure 1.7: Gross External Debt Structure of Turkey by Terms (billion US $)

Source: Author's own calculations

According to data retrieved from Republic of Turkey Ministry of Treasury and Finance, Turkey projects to pay out a total of $23 m short term external debt, in which $4 m belongs to public sector and $19 m belongs to private sector, in the year to July 2019. In addition, the country projects to pay out a total of $65.7 m long term debt in 2019 (Appendix 1). It's clear that the projected external debt payout is well below the JPMorgan estimates. Consequently, economic turmoil and signs of hard-currency denominated debt defaults of major conglomerates have raised concerns regarding whether or not Turkey is heading to IMF bailout.

In case of external debt currency decomposition, the vast majority of Turkey's gross external debt is denominated in US dollars followed by, Euro, Turkish Lira and Japanese Yen (Figure 1.8). Currency collapse and insufficient foreign currency reserves have worsened Turkey's already dangerous reliance on external financing. Severe devaluation of Turkish Lira has almost doubled nominal value of Turkey's external debt over the course of 2018. Foreign currency reserves declined by 14 percent to $77 m, from the beginning of 2017 to July 2018, the data from the CBRT showed (Appendix 2).

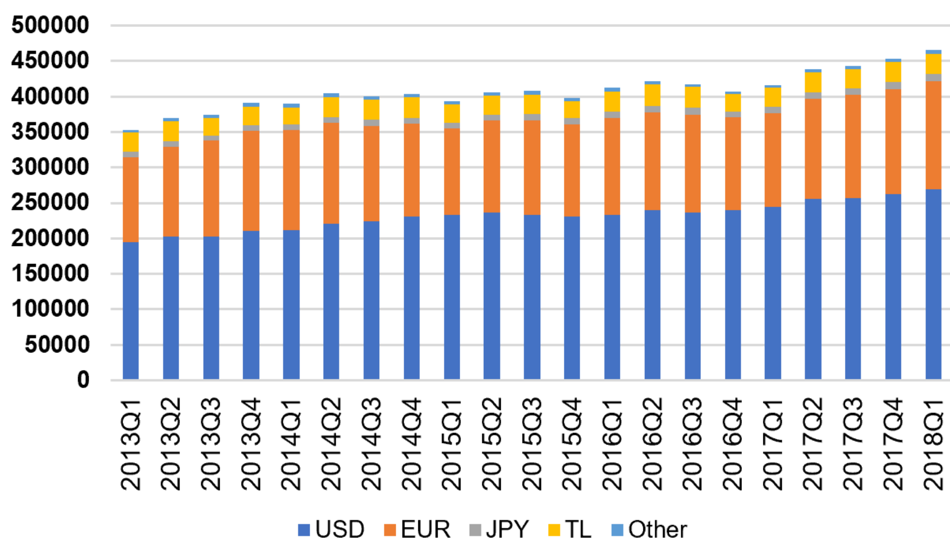


Figure 1.8 Gross External Debt Structure of Turkey by Currency Decomposition

Source: Author's own calculations

In addition, economic instability has adversely affected investor perceptions of Turkey's creditworthiness. Consequently, banks and other sectors are having trouble with rolling over their debt, that is issuing new debt to pay off old debts. Rolling over debt is also not permanently sustainable, since principal and interest repayments are vulnerable to interest rate changes. An adverse rise in interest rates leads to an increase in the nominal cost of borrowing hence borrowers fall into debt trap.

In particular, total external debt roll-over ratios of Turkey's banks increased by 4.8 percent to 101.2 percentage points while other sectors' roll-over ratios increased by 18.7 percent to 129.7 percentage points from January 2017 to April 2018, according to the data retrieved from CBRT (Figure 1.9).

Furthermore, this situation is worsened when Federal Reserve (FED) raised interest rates to a range 2 percent to 2.25 percent in 2018 and signaled one more hike, most likely in December. As a consequence of this, debtor sectors will have to refinance their debt at a higher rate thereby incur more interest charges in the future.

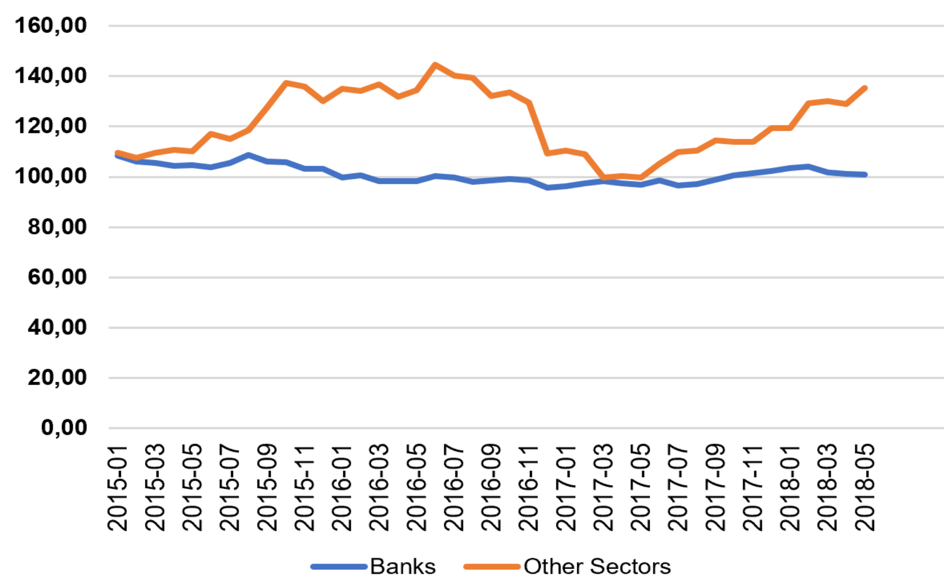


Figure 1.9 External Debt Roll-over Ratios of Banks and Other Sectors

Source: Author's own calculations

CHAPTER 2
LITERATURE REVIEW

2.1 Oil Prices and Exchange Rates Relationship

The stream of studies investigating the nexus among oil prices and exchange rates tend to concentrate on the bidirectional causality and the intensity of the link between them. Although there are some conflicting results; overall findings support that oil importing countries' currencies tend to depreciate whereas oil exporters' currencies tend to appreciate as a result of international oil price increases. Furthermore, empirical analyses in the literature shows that compared to pre-crisis period, intense of the link among oil prices and exchange rates is stronger after post-global financial crisis period.

Earlier research conducted by Lizardo and Mollick (2010) concluded that an upsurge in real oil prices leads US dollar and oil importers' currencies to depreciate relative to net oil exporting countries currencies, by employing panel vector autoregression (VAR), OLS and DOLS-based regressions. Ghosh (2011) examined oil price and nominal exchange rate nexus for a oil importing country India and noted that positive oil price shock has permanent negative impact on exchange rate fluctuations, by employing generalized autoregressive conditional heteroscedasticity (GARCH) methods. Turhan et al. (2013) examined the oil prices and nominal exchange rate nexus for 13 emerging countries, including Turkey, and concluded that oil price hike induces currencies of emerging countries to depreciate in the post-global financial crisis period, utilizing VAR. Tiwari, Mutascu and Albulescu (2013) assessed this nexus for oil exporting country Romania with real effective exchange rate variable and concluded that an upsurge in oil prices have significant positive affect on exchange rate in both short and long term, by using discrete wavelet transform framework. Another empirical study conducted by Turhan, Sensoy and Hacihasanoglu (2014) investigated this dynamic nexus for G20 members by employing cDCC model. Scholars concluded that there is a strengthening negative correlation after the global financial crisis. Brahmasrene, Huang and Sissoko (2014) examined dynamic relationship among US oil import prices from Mexico, Canada, Colombia, UK, Venezuela and bilateral exchange rates by using VAR and concluded that a shock to exchange rate negatively affects oil prices in short run, whilst a shock to oil prices negatively affects exchange rates in long run. Another empirical research conducted by Bouoiyour et al. (2015) investigated the link between oil prices and real exchange rate for Russia and found that bi-directional long run conditionality exists upon the controlled macroeconomic variables via unconditional versus conditional analysis.

Later research conducted by Tiwari and Albulescu (2016) studied the nexus between oil prices and nominal exchange rates for India and concluded that causality runs from oil price to exchange rate in the long run, whilst causality runs from exchange rate to oil prices in the short run, by utilizing wavelet analysis and Granger causality tests. Basher, Haug and Sadorsky (2016), on the other hand, investigated the nexus between oil prices and real exchange rates of both oil importers and oil exporters and concluded that an increase in demand for oil positively affects real exchange rates of oil exporters' currencies, however an increase in oil supply does not have any significant impact on real exchange rates, by utilizing Markov-switching model. Chen et al (2016) also examined the dynamic link between oil prices and nominal exchange rates of 16 OECD countries including Turkey, and noted that innovations in oil prices explain higher proportion of exchange rate fluctuations in the post-global financial crisis period, by using structural VAR. Furthermore, author noted that an increase in the global demand for oil negatively impacts US - OECD exchange rate.

Among the recent studies, Mensah et al. (2017) examined this nexus among imported oil as well as oil export dependent economies exchange rates relative to US dolar and found a long run stregthening negative relationship in the post-global financial crisis period. Sakaki (2018) studied this nexus for a sample of 14 countries that consists oil exporters, importers and neither exporters nor importers and confirmed negative dynamic conditional correlation between oil prices and nominal exchange rates of these countries relative to US dollar, by using dynamic conditional correlation GARCH model.

In the case of oil-exporter country Nigeria only; Ayodeji (2017) investigated the relationship among oil price and Naira – US exchange rate and found that a decrease in oil price puts further pressure on Naira exchange rate dynamics during the period of depreciation, by using Markov-switching regression model. Similarly, Alley (2018) and Raji et al. (2018) concluded that an increase in oil price appreciates Nigerian currency relative to US dollar, whilst decrease in oil price depreciates it by using VAR models and GARCH models respectively.

2.2 External Debts and Exchange Rates Relationship

Overall findings of both theoretical and empirical literature support the negative link between foreign currency denominated external debt and exchange rate. In particular, depreciation of the exchange rate leads value of the foreing currency denominated external debt of the countries to increase in nominal terms. Consequently, exchange rate misalignments increase the sovereign default risk.

Among the theoretical research conducted by Dornbusch (1984) noted that deterioration in the current account accompanied with exchange rate volatility were central reasons of debt crisis in Latin American countries. Similarly, theoretical study conducted by Hausmann (1999) examined the link between devaluation and default risk in Latin American countries and concluded that if there are currency mismatches in particular sectors of an economy, a significant devaluation in exchange rates induces greater default risk. Later theoretical research conducted by Benigno and Missale (2004) noted that external debt increases the likelihood of currency crisis. Similarly, Jahjah and Mantiel (2007) concluded that devaluation of the exchange rate could trigger a debt crisis especially if the currency devaluation is not likely to benefit to a country such as an increase in export competitiveness.

Among the earlier empirical research conducted by Reinhart (2002) investigated the interaction between sovereign credit ratings, currency crisis and defaults among developed and emerging markets by using ‘signals’ approach developed by Kaminsky and Reinhart (1999). Author concluded that currency crisis in emerging markets increases the likelihood of sovereign default and the credit downgrade, moreover its magnitude is significantly higher compared to developed markets. Iliopulos and Miller (2007) examined debt dynamics in an open economy, United Kingdom, and concluded that in response to a rise in aggregate demand, exchange rate dynamics follows a path by a short run appreciation and a depreciation afterwards leading to accumulation of external debt, thereby net worth of a country deteriorates.

Later empirical research conducted by Harms and Hoffman (2011) assumed that fluctuations in exchange rates would not cause harm in the economy if all the external debt borrowed by the government. OLS estimation results revealed that if the private sector debt constitutes a larger share in total external debt, exchange rate fluctuations are likely to lead debt crisis. Forslund et al. (2011) examined the sources of debt in a sample of 104 developing economies using regression analysis and concluded that cumulated debt accompanied with depreciation in real exchange rate results a significant increase in both external and domestic debt. Aizenman and Hutchison (2012) found that emerging countries with high external liabilities to GDP ratio are associated with larger exchange market pressure by using panel regression. Fida, Khan and Sohail (2012) investigated the nexus among nominal and effective real exchange rates and external debt for Pakistan by using NATREX model and ARDL approach. The resuts of empirical analysis confirmed long run negative relationship among examined variables. The empirical research conducted by Towbin and Weber (2013) examined the role of flexible versus fixed exchange rates in insulating output from real shocks in a sample of 101 countries, using Panel VAR. Scholars concluded that, flexible exchange rates may not insulate economy if the country has high external debt. Sung et al. (2014) analyzed the main determinants of foreign exchange rate volatility of Korea, using two-stage least square estimation and concluded that large share of private short term debt in total external debt induces high volatility in exchange rate. Different from other studies, research conducted by Bunescu (2014) tried to develop an econometric model of exchange rate relative to euro by using components of external debt in case of Romania. The result of Granger causality test indicated no bi-directional relationship among variables examined and the result of the regression analysis revealed that Romanian leu relative to euro (RON/EUR) cannot be predicted by considering the evolution of private and public external debt.

Later research conducted by Couharde et al. (2016) examined this nexus with real exchange rate and concluded that high external indebtedbess of the Europen countries have generated adverse pressures on real exchange rate dynamics in the euro area by employing natural real exchange rate (NATREX) approach. Similarly, Asonuma (2016) investigated this nexus for Argentina using regression analysis. Author noted that prior to default, real exchange rate depreciation associated with the sovereign's large share of foreign currency debt, trigger defaults. Following sovereign default, increase in output costs and loss of access to market lead to further exchange rate depreciation. Another empirical research conducted by Adusei and Gyapang (2017) investigated the this nexus for a large oil and gold exporter country Ghana and found that an increase in total external debt increases annual output growth rate and leads to an appreciation of domestic currency relative to US dollar. Galstyan and Velic (2017) studied this nexus for emerging market economies by sampling countries according to their external debt levels and found that high external debt leads to disequilibriums in real exchange rate dynamics compared to countries with lower external debt, by employing panel cointegration and error cointegration models.

The recent study conducted by Palić et al. (2018) concluded that nominal effective exchange rate depreciation of Croatian Kuna increases the external indebtedness in foreign currency in the long run by using Johansen cointegration approach. Another empirical study conducted by Ghulam and Derber (2018) examined the major sovereign defaults of 70 countries from 1970 to 2010 and concluded that higher central government debt to GDP, current account deficit and exchange rate volatility would make it difficult for countries to come out of default, by using an advanced duration analysis method. Insukindro (2018) analyzed the behavior of fiscal sustainability in Indonesia and concluded that primary deficit is the major reason for high external indebtedness by employing VECM. Furthermore, empirical analysis revealed that high exchange rate volatility leads to an increase in external debt. The empirical study conducted by Nwanne (2018) found that an increase in external public debt servicing induces real exchange rate depreciation in Nigeria, using OLS regression. Lastly, Kouladoum (2018) analyzed this nexus for Chad, and concluded that an increase in external debt leads to appreciaiton of real exchange rate, by using GMM approach.

2.3 Oil Prices and External Debts Relationship

Among the sizeable literature investigating the relationship between oil prices and external debt agrees to a large extent that an upsurge in international oil prices leads external debt of oil importing countries to increase. In contrast, a decline in international oil prices leads to an increase in external debt burden of oil exporting countries.

Among the theoretical research conducted by Reddy et al. (1992) investigated the debt – energy nexus of India by examining balance of payment positions of a country between the period of 1980s to 1990s. Scholars noted that India’s large oil import dependence is the main factor of growth of its external debt.

Among the empirical research conducted by Kretzmann and Nouruddin (2005) is the first study that rigorously examined the nexus among oil and debt level of countries. Authors found that when oil production hence oil exports increase, external debt burdens of both developed and emerging oil export depended economies increase, by utilizing general method of moments (GMM) and least square dummy variable approaches. Futhermore, empirical analysis revealed that an increase in oil exports enhances oil exporters ability to service their debt payments. In addition, authors noted that the relationship between oil and debt stems from oil fueled fiscal decisions and oil market volatility. Similarly, Lopez-Murphy and Villafuerte (2010) noted that adverse movements in oil prices generate external financing needs in oil producing countries by, using linear panel regression approach. Another empirical research conducted by Arezki and Brückner (2012) found that an increase in exported commodity prices, including oil, leads to significant reduction in external debt in developing and emerging oil-exporting democracies by using panel regression.

Later research conducted by Hallwood and Sinclair (2017) found that an increase in oil prices worsens developing non-oil exporting countries' balance of payment and increases their international indebtedness. The empirical research conducted by Adamu and Rasiah (2016) examined the sources of external debt of Nigeria and found that if oil prices increases, the external debt burden of the country decreases, whereas an increase in external debt servicing, increases the external debt burden. Furthemore, lower rate of domestic savings and fiscal deficits worsens external debt position. Another empirical research conducted by Waheed (2017) found that oil price hikes and an increase in foreign exchange reserves reduce the external debt burden of oil exporting countries, by using panel least square method. Hasanli and Ismayilova (2017) examined the oil revenue and external debt nexus in global level and concluded that an upsurge in oil prices accelerate the growth of countrys' external debt around the world, by using OLS.

The recent study conducted by Rasaki and Malikane (2018) found that sovereign wealth funds can reduce exchange rate volatility thereby stabilize the external debt of oil-exporting African countries by utilizing dynamic stochastic general equilibrium model.

2.4 Oil Prices, Exchange Rates and Macroeconomic Variables Relationship

In the literature, there are three main streams of studies exist investigating the relationship between oil price, exchange rate and macroeconomic dynamics of countries.

The first stream of literature concentrates on the relationship between oil price, exchange rates and economic growth of countries. For instance, Rautava (2004) investigated the impact of oil price fluctuations and exchange rate volatility on Russian' economy and found that an increase in oil price positively impacts GDP, whereas the exchange rate appreciation negatively impacts GDP of the country. Later empirical research conducted by Farzanegan and Markwardt (2009) found that a decrease in oil price induces real exchange depreciation and lowers the GDP level of Iranian economy, which is an oil exporter country, by utilizing VAR modelling.

Later research conducted by Liu et al. (2015) concluded that an oil price hike positively impacts GDP whilst appreciation of exchange rate negatively impacts GDP of France, by using cointegration techniques. The empirical research conducted by Mantai and Alom (2016) found that an upsurge in oil price positively effects GDP of Malaysia, however exchange rate and inflation do not significantly impact GDP of the country, using VECM framework. Dikkaya and Doyar (2017) found unidirectional causalities among exchange rates, oil prices and GDP of Kazakhstan and Azerbaijan, using VAR model and Toda-Yamamoto causality test.

The recent empirical research conducted by Aloui et al. (2018) found that pegged exchange rate and oil price volatility negatively impact the economic growth of Saudi Arabia, by utilizing wavelet methods. Another empirical study conducted by Wesseh and Lin (2018) investigated the dynamic interactions between exchange rate fluctuations, oil price volatility and economic growth of Liberia, using VAR modelling. Authors concluded that an increase in oil price positively impacts GDP whilst the depreciation of Liberian dollar causes real GDP to fall. However, appreciation of the currency has no impact on the real GDP.

The second stream of literature examines the nexus among oil prices, exchange rates and stock market. For instance, the empirical research conducted by Basher et al. (2012) investigated this nexus in emerging market economies and found that an oil price hike decreases stock prices and leads to a depreciation of nominal exchange rates relative to US dollar.

Later research conducted by Aloui and Aïssa (2016) also found an empirical evidence that an upsurge in oil price induces exchane rate depreciation and leads to an appreciation of stock market prices, using GARCH method. By using the similar methodology, Kayalar et al. (2017) concluded that oil exporter countries' stock markets and exchange rate dynamics are more vulnerable to fluctuations in the oil market compared to oil importer countries. Diaz et al. (2016) concluded that oil price hikes results a decrease in stock prices of G7 countries, by emloying VAR analysis.

The recent empirical research conducted by Delgado et al. (2018) investigated this dynamic relationship for Mexico, which is an oil-exporter country, by utilizing panel VAR modelling. Scholars concluded that an upsurge in oil prices and exchange rate appreciation increases stock market prices. Bai and Koong (2018) found negative relationship among oil prices,Chinese stock market and trade – weighted US dollar index, employing BEKK model and dynamic impulse response functions.

Lastly, the third stream of literature concentrates on the nexus among oil price, exchange rates and trade balances. Bodenstein et al. (2011) found that an oil price hike reduces wealth of oil importers. Consequently their consumption decreases and their real exchange rate depreciates accompanied with current account deterioration. Insel and Kayikçi (2013) examined the empirical linkage among current account deficit and broad set of macroeconomic variables in Turkey, employing ARDL approach. The main findings of the study are; inflation positively affects the current account balance whilst growth, oil prices and real exchange rate appreciation induces deterioration in the current account. Another empirical research conducted by Qurat-ul-Ain and Tufail (2013) explored this nexus for D-8 countries, using panel VAR analysis. Overall empirical findings supported that an upsurge in oil prices reduces the value of oil importers' domestic currencies and puts pressures on their current account balances. Furthermore, upsurge in oil prices also deteriorates current account balances of oil exporters. Le and Chang (2013) examined this nexus in three Asian countries namely; Malaysia, Singapore and Japan. The empirical results from net oil exporter country Malaysia suggested that high dependency on oil revenues increases economic vulnerability to oil shocks. The empiral results from net oil importing country Japan suggested that high dependency on imported oil increases the vulnerability of trade balance to adverse movements in international oil prices.

Later research conducted by Basarir and Erçakar (2016) studied this nexus for Turkey and found unidirectional causality among oil prices and current account balances. Empirical study conducted by Rafiq, Sgro and Apergies (2016) found an evidence that a decrease in oil price increases demand for oil imports hence leads to deterioration of total trade balances of oil importing countries. The empirical results of oil exporter countries revealed that a decrease in oil price do not deteriorate current account balances. Another empirical research conducted by Gnimassoun et al. (2017) investigated this nexus for Canada and found that an increase in oil demand leads to surplus in current account balance whereas an increase in oil supply does not have the similar impact, using VAR analysis. The recent study conducted by Longe, Adelokun and Omitogun (2018) found that an upsurge in oil prices leads to deterioration in current account balance of Nigeria in the long run, by using ARDL approach.

Based on the extant literature review, it can be clearly seen that there is no other research, except the current research investigating dynamic interactions among oil prices, exchange rates and external debt. Furthermore, literature investigating the oil price and external debt tend to concentrate mainly on oil exporter perspective. To this respect, the current study fills an inherent gap and adds value to the current literature by investigating the dynamic relationship between aforementioned variables in case of a net oil importer, developing country Turkey.

2.5 Summary of Literature Review

Table 2.1 Summary of Oil prices and Exchange rates Relationship

Authors	Variables	Country	Method	Results
Lizardo and Mollick (2010)	WTI crude oil price deflated with CPI, USD per unit of foreign currency	US	VAR, OLS and DOLS	Oil price hike depreciates US dollar against net oil exporter countries
Ghosh (2011)	Brent crude oil price, India-US exchange rate	India	GARCH	Oil price shock has negative impact on exchange rate
Turhan et al. (2013)	Nominal exchange rates, Brent crude oil price	9 countries	Panel VAR	Oil price hike depreciates domestic currencies
Tiwari, Mutascu and Albulescu (2013)	Real effective exchange rate, WTI crude oil price	Romania	Wavalet transform framework	Increase in oil price appreciates real effective exchange rate
Turhan, Sensoy and Hacihasanoglu (2014)	Nominal exchange rates, Brent crude oil price	G20 countries	cDCC model	Negative correlation exist between oil prices and exchange rates
Brahmasrene et al. (2014)	Nominal exchange rates, imported oil costs of US	US	VAR, Causality	Oil price hikes negatively impacts exchange rates.
Bouoiyour et al. (2015)	Real effective exchange rate, WTI oil price deflated by CPI	Romania	Unconditional versus conditional analysis	Bi-directional long run conditionality exists upon the controlled variables

Tiwari and Albulescu (2016)	India – US exchange rate; Brent, Dubai and WTI crude oil prices	India	Continuous wavelet, Granger causality test	Causality runs from oil to exchange rate in the short run
Chen et al. (2016)	Nominal exchange rates, WTI crude oil price deflated by US CPI.	OECD countries	Structural VAR	Innovations in oil prices explain great portion of exchangre rate volatility
Basher, Haug and Sadorsky (2016)	Oil prices, real effective exchange rates	14 countries	Markow-switching	Upsurge in oil induces real exchange rates of oil exporters to appreciate
Mensah et al. (2017)	Nominal exchange rates,WTI crude oil price	US, Russia, South Africa, Ghana, Nigeria	VECM, Granger Causality	Negative relationship between oil price and exchange rates
Ayodeji (2017)	Real effective exchange rate, Brent crude oil price deflated by CPI.	Nigeria	Markow-switching	An oil price hike induces Naira appreciation
Alley (2018)	Nigeria-US exchange rate, Nigerian crude oil price	Nigeria	ARDL, VAR	An oil price decrease induces Naira depreciation
Raji et al. (2018)	Nigeria-US exchange rate, Nigerian crude oil price	Nigeria	VAR-GARCH	An oil price hike induces Naira appreciation
Sakaki (2018)	WTI crude oil prices, nominal exchange rates	8 countries	DCC-GARCH	Negative correlation among oil prices and exchange rates.

Table 2.2 Summary of External Debts and Exchange Rates Relationship

Authors	Variables	Country	Method	Results
Reinhart (1999)	Sovereign credit ratings	62 countries	Signals approach	Currency crisis increases the likelihood of sovereign default.
Iliopulos and Miller (2007)	Real interest rate, real exchange rate, external debt	UK	OLS	A rise in aggregate demand leads depreciation hence; accumulation of external debt
Harms and Hoffman (2011)	Private debt (%GDP), exchange rate regime dummies, total external debt	167 countries	Panel Least Square	Higher share of the private sector debt triggers exchange rate fluctuations
Forslund, Lima and Panizza (2011)	Exernal debt (%GDP), real exchange rate	104 countries	Panel Least Square	Depreciation results an increase in external debt
Aizenman and Hutchison (2012)	External debt (%GDP), real effective exchange rate, reserves (%GDP)	OECD countries	Panel Least Square	High external liabilities induce larger exchange market pressure
Fida, Khan and Sohail (2012)	Real effective exchange rate, external debt	Pakistan	NATREX, ARDL	Long run negative relationship between variables
Towbin and Weber (2013)	Real interest rate,real GDP, real investment, external debt, exchange rate dummy	101 countries	Panel VAR	Flexible exchange rate may not insulate economy in high external indebtedness

Bunescu (2014)	Nominal exchange rate, external debt	Romania	Granger Causality	No bi-directional relationship
Couharde et al. (2016)	Real exchange rate, gross and net external debt	European countries	NATREX, VECM	Hight external debt generates adverse pressures on exchange rate dynamics
Asonuma (2016)	Real exchange rate, credit ratings on sovereign debt, debt service (%GDP)	Argentina	2-step GMM estimation	Depreciation accompanied with large share of foreign curreny debt, trigger defaults
Adusei and Gyapang (2017)	Nominal exchange rate, gross external debt	Ghana	PLS-SEM	Total external debt leads to appreciation of demostic currency
Galstyan and Velic (2017)	Gross and net external debt (%GDP), real effective exchange rate	10 countries	Panel cointegration	High external debt leads disequilibriums in real exchange rate dynamics
Palić et al. (2018)	Nominal and real effective exchange rate, gross external debt	Croatia	Cointegration	depreciation Increases the external indebtedness in foreign currency
Ghulam and Derber (2018)	Central government debt (%GDP), real exchange rate, default transition dummy	70 countries	Duration analysis	High debt levels and exchange rate volatility make it difficult for countries to come out of default

Insukindro (2018)	Nominal exchange rate, primary deficit, external debt	Indonesia	VECM	High exchange rate volatility increases external debt.
Nwanne (2018)	External public debt servicing and receipts, real exchange rate	Nigeria	OLS	Increase in external public debt servicing induces exchange rate depreciation
Kouladoum (2018)	Real exchange rate, external debt and servicing	Chad	GMM	Increase in external debt leads to appreciation of exchange rate

Table 2.3 Summary of Oil Prices and External Debts Relationship

Authors	Variables	Country	Method	Results
Kretzmann and Nouruddin (2005)	External debt oil production, trade openness	Nigeria, Ecuador, Congo-Brazzaville	GMM, OLS	When oil production and exports increase, external debt increases
Lopez-Murphy and Villafuerte (2010)	Oil revenue, oil GDP, oil production, income	31 oil producing countries	Panel Least Square	Adverse movements in oil prices generate external financing needs
Arezki and Brucker (2012)	Total external debt, commodity export price index	30 oil exporting countries	Panel Least Square	An increase in oil prices, reduces external debt
Adamu and Rasiah (2016)	External (%GDP), oil price, debt service (%GDP)	Nigeria	ARDL	An upsurge in oil price decreases the external debt burden

Waheed (2017)	External debt (%GDP), oil price, current account balance (%GDP)	24 countries	Panel Least Square	Oil price hikes worsens external debt positions
Hasanli and Ismaliyova (2017)	Brent crude oil, total world GDP, global external debt	Global	OLS	An oil price hike accelerate the growth of countrys' external debt
Rasaki and Malikane (2018)	Oil revenue, real effective exchange rate, sovereign wealth funds	Egypt, Nigeria, Tunisia	Dynamic stochastic general equilibrium model	Sovereign wealth funds may reduce exchange rate volatility thereby it can stabilize the external debt

Table 2.4 Summary of Oil Prices, Exchange Rates and Economic Growth Relationship

Authors	Variables	Country	Method	Results
Rautava (2004)	GDP, real exchange rate, North Sea Brent oil price	Russia	VECM	Increase in oil price positively impacts GDP, exchange rate appreciation negatively impacts GDP
Farzanegan and Markwardt (2009)	Real GDP, real effective exchange rates, real oil price	Iran	VAR	Decrease in oil price induces real exchange rate depreciation and lowers the GDP growth

Liu et al. (2015)	World oil prices, real effective exchange rate, GDP	France	Cointegration	Oil price hikes positively impacts GDP, appreciation negatively impacts GDP
Mantai and Alom (2016)	Nominal exchange rate, GDP, CPI, Arabian oil price	Malaysia	VECM	An upsurge in oil price positively impacts GDP, exchange rate do not have any impact
Dikkaya and Doyar (2017)	Nominal exchange rate, Brent crude oil prices, GDP	Azerbaijan and Kazakhstan	VAR, Toda-Yamamoto Causality	Unidirectional causality exist among variables
Aloui et al. (2018)	Saudi-US exchange rate, real GDP, OPEC crude oil	Saudi Arabia	Morlet wavelet methods	Pegged exchange rate and oil price volatility negatively impacts GDP
Wesseh and Lin (2018)	Nominal exchange rate, real GDP, trade balance, oil price	Liberia	VAR	Oil price hike positively impacts GDP, depreciation of Liberian dollar causes real GDP to fall

Table 2.5 Summary of Oil prices, Exchange rates and Stock Market Relationship

Authors	Variables	Country	Method	Results
Basher, Haug and Sadorsky (2012)	Nominal exchange rate, real oil price, stock prices	9 emerging countries	Markov-switching Toda-Yamamoto Casuality	An oil price hike decreases stock prices

Aloui and Aissa (2016)	WTI oil price, Dow Jones average stock prices, trade weighted US dolar index	Global	GARCH	An upsurge in oil prices induces depreciation and leads stock prices to increase
Kayalar et al. (2017)	Nominal exchange rates, WTI futures contract prices, stock prices	4 oil exporter and 6 oil importer countries	ARIMA, GARCH,	Oil exporter countries' stock and exchange rate markets are more vulnerable to oil fluctuations
Diaz et al. (2016)	Nominal exchange rates, stock returns, oil prices	G7	Panel VAR	Oil price hikes decreases stock prices
Delgado (2018)	Nominal exchange rate, Mexican Mayan crude oil, Mexican stock market index	Mexico	VAR	Upsurge in oil prices and exchange rate appreciation increases stock prices
Bai and Koong (2018)	Dollar index, global oil prices, stock market indices	China and US	BEKK model	Negative relationship among oil prices, stock prices and dolar index

Table 2.6 Summary of Oil prices, Exchange rates and Trade balance Reationship

Authors	**Variables**	**Country**	**Method**	**Results**
Bodenstein, Erceg and Guerrieri (2011)	Real exchange rate, real oil price, trade balance	US	DSGE model	Oil price hikes leads depreciation and current account deterioration

Insel and Kayikçı (2013)	Real effective exchange rate, current account to GDP,Brent oil prices	Turkey	ARDL	Oil price hikes and appreciation induces deterioration in the current account
Qurat-ul-Ain and Tufail (2013)	Real exchange rate, current account balance, oil price	D-8 countries	Panel VAR	Oil price hikes induces exchange rate depreciation and current account deterioration
Le and Chang (2013)	Nominal exchange rate, Dubai oil price, trade balances	Malaysia, Singapore, Japan	Cointegration, Toda-Yamamoto Causality	High dependency on imported oil increases the vulnerability of trade balances to external shocks
Basarir and Erçakar (2016)	Nominal exchange rate, Brent oil price, current account balance	Turkey	VECM, Granger causality	Unidirectional causality exists among oil prices and current account balance
Gnimassoun et al. (2017)	Real commodity price index, current account (%GDP)	Canada	VAR	An increase in oil demand enhances current account balance
Longe, Adekolun and Omitogun (2018)	Current account to GDP, Brent oil price, trade to GDP, GDP growth rate	Nigeria	ARDL	An uprsurge in oil prices leads to deterioration in current account balance

CHAPTER 3
METHODOLOGY AND DATA

This thesis aims at investigating the dynamic interactions among oil prices, exchange rates and external debt for Turkey. Since there is no distinction made between variables as independent and dependent, we utilized unrestricted VAR model in our empirical analysis.

Since all variables in the VAR model have to be the same order of integration, we utilized two unit root tests to determine the order of integration of the variables. This constitutes two steps. In addition to unit root test that do not allow for structural break namely Ng-Perron test; Zivot and Andrews (1992) unit root test is employed to allow for exogenously determined one structural break for robustness. Next, we employed Johansen Cointegration test to check whether there is a long run relationship among examined variables. After that, estimation of unrestricted VAR model follows if there is no cointegration found among examined variables. In the existence of cointegration, the valid approach is estimating VECM not a VAR model.

The appropriate number of lag length is determined by using information criterions and several diagnostic tests on selected VAR model in order to ensure that residuals do not have econometric problems such as autocorrelation and heteroscedasticity. Next, we employed Toda Yamamoto causality test which allows to test mutual causality among variables even if the processes are nonstationary. In the last step, GIRFs and GFEVDs are utilized with an aim to explore the short run dynamics of examined variables.

3.1 Johansen Cointegration Test

Prior to estimation of a VAR model, it's vital to check the existence of cointegrating relationship among the examined variables. In general, a linear combination of nonstationary series is also nonstationary. However, stationarity could exists in the linear combination of random nonstationary variables in the long run. The cointegration test is used to test this probability. If there is a cointegrating relationship, appropriate approach is to use of VECM not the VAR model. Thus, the existence of cointegration cannot be neglected since it has implication of what technique we shall use.

Three of the most popular tests are; Engle - Granger, Phillips – Ouliaris and Johansen. One of the first test of cointegration was formulated by Engle and Granger (1987). This method is based on two-step estimation procedure that constructs the residuals by OLS estimation of level and differenced variables and then tests whether they are stationary by utilizing ADF or similar tests. If estimated disturbances are stationary, series said to be cointegrated. However, according to Armstrong (2001) this test may produce biased results upon the choice of dependent variable. Moreover, since this method is based on a single equation, identification of the multiple cointegrating vectors among more than two variables is not possible.

Phillips and Ouliaris (1990) developed a residual based test for cointegration as an improvement of Engle – Granger (1987) approach. This method tests the stationary of the residuals of cointegrating regressions by ADF and the Z_α and Z_t (Phillips, 1987) unit root tests. Two more new tests; the variance ratio and the multivariate trace statistics are also introduced. The multivariate trace statistics is invariant to the normalization of dependent variable. However, this method also can only estimate single cointegration relationship.

The remedy of stated limitations above is to use Johansen coingtegration test developed by Johansen's (1991, 1995) sequential empirical studies. This method assumes the presence of I (1) process underlying the time series variables and it can detect more than one cointegrating relationship. There must be exists at least one cointegrating relationship for a possible cointegration. Concurrently, if there are ‘n’ number of I (1) variables, there can be maximum ‘n – 1’ number of cointegrating relationship.

3.2 Vector Autoregression Analysis

In the 1970s, macroeconomic analyses were conducted via large scale models, single equation models featuring fewer observations and univariate time series models consist of one variable. These simultaneous equation models were essentially restricted vector autoregressions. Sims raised questions about reliability of these traditional macroeconomic models when he introduced the unrestricted vector autoregressive methodology (VAR) in 1980. He stated that in case of identification; restrictions imposed in the model estimates and the decisions about the exogeneity of the variables were made without fully developed economic arguments. In other words, identification was done arbitrarily thus none of traditional approaches appeared especially trustworthy.

Sims’s basic idea was to treat all variables as endogenous since it’s not precise how to differentiate the variables as exogenous or as endogenous (Sims, 1980). Thus, no prior knowledge is needed except to decide which economically relevant variables should enter the system. A linear multivariate VAR models features multiple variables and each endogenous variable entered to the system is a function of past lags of all other endogenous variables including itself. They are commonly used to assess the impact of residuals on the variables in the VAR system and to forecast systems of interrelated time series. There is no simultaneity problem since past lags of all variables are entered on the right hand side of the estimated model equations along with an error term.

First, reduced form of VAR model is obtained by OLS estimation. However, reduced- form error terms are typically serially correlated thus interpretation cannot be done as structural shocks. Therefore, reduced form VARs do not reveal any information about the structure of the economy. In order to perform accurate analysis, the structural representation, i.e. orthogonal shocks (serially uncorrelated and independent shocks) with economic meaning is needed. The structural shocks are identified by assuming each variable contemporaneously affects all variables ordered afterwards. The variable placed first is assumed to be the most independent variable in the VAR, i.e. it is affected only by a shock to itself but has impacts on all variables below it. The second variable affected only by a shock from the first variable and it can affect the variable below it but it does not have any effect to the first variable. In other words, contemporaneous interactions among variables are assumed to be recursive by imposing a certain order. This identification is also known as Cholesky identification or recursive identification or zero short- run restrictions. However, the order of the variables matters with this identification (Lütkepohl, 1991); different arrangement yields different impulse responses to shocks and forecast error variance decompositions. Moreover, omitting important variables can lead to major distortions on the dynamics analyses. Consequently, if ordering of examined variables is not precisely determined and if any important variable is omitted, or an irrelevant variable added to the analysis, the test results and conclusions drawing from these analyses will be biased and incorrect.

3.3 Generalized Impulse Response Functions

There are many alternative approaches, aside from Cholesky identification, to compute orthogonalized impulse responses but there is no clear guidance as to which one of these possible approaches should be used. To circumstance the problem, Pesaran and Shin (1998) proposed an alternative approach to construct an orthogonal impulse response functions that are invariant to variable ordering in the system by building on Koop et al. (1996). The proposed generalized impulse response functions (GIRFs) are unique and past sequences of correlations among different one standard error disturbances are fully taken account. Moreover, they can also be used to compute order-invariant forecast error variance decompositions and they are applicable for both linear and nonlinear multivariate models.

This study employs an unrestricted VAR model that brings no limitations to the structural model and reveals the dynamic relations between variables. Afterwards, generalized forecast error variance decomposition and generalized impulse response function techniques developed by Pesaran and Shin (1998) are utilized to explore short run dynamics.

First, consider a reduced form VAR model in matrix form;

$$Y_t = \sum_{i=1}^{p} \sigma_i Y_{t-i} + \psi w_t + \varepsilon_t \qquad t = 1, 2, \dots, T, \qquad (3.1)$$

where Y_t denoted as (3x1) vector of all variables entered in the VAR system, w_t denoted as (3x1) vector of deterministic variables and $(\sigma_i = 1,2,\dots,p)$ and ψ are matrices of coefficients.

In impulse response analysis, the moving average representation (MA) of the reduced form is particularly convenient, since coefficients of MA form represent the responses of variables contained in y_t to impulses. Thus, the reduced form of VAR is coverted into its infinite MA form to calculate system of variables' responses to innovations as follows;

$$Y_t = \sum_{i=0}^{\infty} C_i \, \varepsilon_{t-i} + \sum_{i=0}^{\infty} G_i \, w_{t-i} \qquad t = 1, 2, \dots, T, \qquad (3.2)$$

where C_i denoted as a matrix of coefficients and it is gathered by utilizing the recursive relations indicated in Equation 3.3;

$$C_i = \sigma_1 C_{i-1} + \sigma_2 C_{i-2} + \cdots + \sigma_p C_{i-p} \qquad i = 1, 2, \dots, \qquad (3.3)$$

where $(e_t, e_t') = \Sigma$ with $C_0 = I_m$ and $C_i = 0$ for $i < 0$ and $G_{\mathrm{i}} = C_i \psi$.

Under the assumption of normality, following Pesaran and Shin (1998) GIRFS can be defined and calculated as follows respectively;

$$GI_y = \left(n, \delta_j, \Omega_{t-1}\right) = E\left(y_{t+n} | \varepsilon_{jt} = \delta_j, \Omega_{t-1}\right) - E(y_{t+n} | \Omega_{t-1})$$

$$\psi_j^g(n) = \upsilon_{jj}^{-1/2} C_n \Sigma e_j \quad n = 0, 1, 2, \ldots, \tag{3.4}$$

An impulse response analysis in a dynamic system describes the reaction of endogenous variables in the system to the effects innovations as function of time. In equation 3.4; δ denotes size of shocks; $\delta = (\delta_1, \ldots, \delta_m)'$, Ω_{t-1} denotes non-decreasing information set and $t-1$ denotes the state of the economy before being shocked. Equation 3.4 represents GIRF function that quantifies the impact of one SE innovation to the jth equation. Instead of shocking all the elements of e_t, (j, j) element of Cholesky decomposition denoted by $\upsilon_{jj}^{-1/2}$ used to obtain scaled GIRFs which are invariant to the composition of shocks defined by δ. The graphical representation of generalized impulse response functions is a functional way to investigate response of a variable to generalized shocks by the other variables in the autoregression, immediately or with various lags (Papapetrou, 2001).

3.4 Generalized Forecast Error Variance Decomposition

The computation of generalized forecast error variance decompositions (GFEVDs) also helps the interpretation of the VAR once it has been fitted. GFEVDs provides information with regards to the percentage of forecast error in endogenous variables in the system attributed to its own innovations vs innovations from other variables in an autoregression. Therefore, it’s also able to identify the relative importance of variables in explaining the variability of other variables in the VAR. As in the case of GIRFs, GFEVDs are also unique and order invariant.

Generalized impulse response function derived in Equation 3.4 is then utilized in the computation of the GFEVDs (Pesaran and Shin, 1998). This function indicates the percentage amount of the future forecast error variance of a variable 'i' is explained by one SE innovation to other variable 'j' in the system of autoregression. Denoting GFEVDS by $\varphi_{ij}^{g}(n)$ for $n = 0, 1, 2, \ldots$;

$$\varphi_{ij}^{g} = \frac{\upsilon_{jj}^{-1} \sum_{l=0}^{n} (e_i' C_l \Sigma e_j)^2}{\sum_{l=0}^{n} e_i' C_l \Sigma C_l' e_i} \quad , i, j = 1, 2, \ldots, m \qquad (3.5)$$

where $\sum_{j=1}^{m} \upsilon_{jj}^{g}(n) \neq 1$ on the occasion of the correlation among non orthogonal shocks.

3.5 Toda-Yamamoto Causality Analysis

By definition, correlation measures the size and direction of the connection among examined variables. Causation, on the other hand, implies that one variable movement is the effect of another variable movement. Although explicit distinction of the definitions is defined, the economic graveyard debated correlations in an unmeaningful sense. In order to overcome this problem, Granger (1969) introduced the Granger (non-) Causality Test. Although it has been received criticisms from economists, it remains a popular method due its computational ease and simplicity.

The Granger Causality test aims at investigating if one variable granger cause another variable in the system and vice versa. This information is particularly useful in predicting examined time series. To clarify, the test measures information content and precedence of one variable in another variable. Thus, for example, if causality runs from variable 'x' to variable 'z', then one may conclude that 'z' variable can be better forecasted by using the historical values of both 'z' and 'x'. The null hypothesis of this test is non-causation, for instance, 'x variable does not granger cause z variable' or vice versa. Testing for causality with level variables in a VAR model is simply testing some linear restrictions on the parameters of an autoregression analysis. But, if examined series are integrated, cointegrated or trend stationary the test statistics may fall from its ordinary asymptotic distribution. For instance, if examined variables are precisely known that they become stationary after first difference with no cointegration, then conventional asymptotic theory is valid thus, one can conduct the test with VAR in levels.

There are many tests aim at investigating the order of integration process, however identification power of these tests is known to be very low against trend stationary alternative hypothesis. Consequently, the application of Granger Causality test is subject to some pretest biases such as incorrect identification based on the nature of connection among time series such as cointegration. To this respect, Toda and Yamamoto (1995) presents how we can estimate VAR's formulated in levels even if the processes are nonstationary. There are number of studies that utilized Toda and Yamamoto approach in the context of our research (see, for example, Basher et al., 2012; Jain and Gosh, 2013; Dikkaya and Doyar, 2017; Kisswani et al., 2018).

There are three steps to consider while applying Toda and Yamamoto procedure. The order of integration process, first, must be identified by unit root tests, say 'n' order of integration is found. Next, appropriate number of lag, say 'p' lags, must be determined so that VAR model would be well-specified, that is there must be no autocorrelation and heteroscedasticity in the residuals. Thus, in addition to information criterions, number of diagnostic tests on the VAR system must be performed. As a third step, VAR model must be estimated in levels, regardless of the order of integration process. Lastly, well-specified VAR model must be estimated with additional 'n' lags. It's essential not to include extra 'n' lags while performing Granger Causality test. That is, the addition of the number of lags (n) must not go beyond the accurate lag length of VAR model. Consequently, test statistic will follow asymptotic distribution with 'p' degree of freedom irrespective of whether or not autoregression system is trend stationary or cointegrated in an arbitrary order.

3.6 Data Description

This empirical analysis utilizes quarterly data spanning from 2003:Q1 to 2018:Q1 for Turkey. Real effective exchange rate data are found to be available after 2003:Q1 thus restricting the sample period from 2003:Q1 to 2018:Q1. The variables that constitute the data set of the study are;

GED: Gross external debt variable is indicated in millions of US dollar and it includes both public and private external debt.

REER**:** Real effective exchange rate (CPI, 2003=100) measured as weighted geometric mean of Turkey's exchange rate relative to its major trading partners currencies, adjusted for the effects of inflation. An increase in real effective exchange rate indicates a real appreciation of Turkish Lira.

ROIL: Real oil price variable is indicated as WTI crude oil price deflated by US Consumer Price Index (CPI, 2010=100). Consequently, changes in real terms exclude the effect of inflation.

The choice of the variables is important in order to obtain robust results and to draw conclusions from obtained results that are close to reality. Since Turkey has long been facing with high chronic inflation, we found plausible to control the effect of inflation in our empirical analysis. For this reason, real exchange rate data and real oil price data are employed. On the other hand, the reason of employing West Taxes Intermediate crude oil data is the fact that, it is widely used as a benchmark for global crude oil markets as suggested by Reboredo et al. (2014) and Chen et al. (2016).

The variables that constitute the data set of the study are retrieved from 2 main resources. Gross external debt and real effective exchange rate data are retrieved from Central Bank of the Republic of Turkey. WTI crude oil spot price and U.S consumer price index data are taken from Federal Reserve Bank of St. Louis.

All variables are employed in logarithms (LGED, LREER, LROIL) to reduce heteroscedasticity and to minimize fluctuations in the data series (Tiwari et al., 2013).

CHAPTER 4

EMPIRICAL RESULTS AND DISCUSSION

Descriptive statistics, stationarity tests, diagnostic tests on VAR model, Johansen Cointegration test, Toda-Yamamoto causality tests and GIRFs are computed by using E-views 10 software. On the other hand, GFEVDs are calculated by using MicroFit 5 software developed by Pesaran and Pesaran (2010).

4.1 Descriptive Statistics

Descriptive statistic reports variability measures namely, minimum and maximum of observations in the data set, standard deviation, skewness and kurtosis of data and central tendency measures namely, mean, median and mode and lastly the Jarque - Bera normality test. This statistical information helps us to understand the meaning of the analyzed data.

Most statistical tests rely upon the assumption of normality; thus, it is important to know the normality of observations. Jarque – Bera (JB) test statistic investigates if the sample data is normal or non-normal (deviated from normality) distributed. The test measures the difference of two statistical properties of normal distribution; namely skewness and kurtosis. JB statistic test the null hypothesis of ‘the data is normally distributed’ against the alternative hypothesis of ‘the data is not normally distributed’. Descriptive statistics of each variable are presented in Table 4.1.

Table 4.1 Descriptive Statistics

	LGED	LREER	LROIL
Observation	61	61	61
Mean	12.52811	4.665763	-0.441368
Median	12.58354	4.681946	-0.377430
Maximum	13.05335	4.851405	0.226430
Minimum	11.78251	4.429029	-1.190005
Std. Deviation	0.378689	0.096726	0.352272
Skewness	-0.496409	-0.353906	-0.242099
Kurtosis	2.009981	2.643711	1.931090
Jarque - Bera	4.996475	1.596013	3.499915
Probability	0.08223*	0.45023**	0.17378**
Sum	764.2148	284.6116	-26.92343
Sum Sq. Deviations	8.604343	0.561356	7.445726

Note: (*) and (**) manuscripts represent %5 and %10 significance respectively.

In the reported test results, mean indicates the average value of observations corresponding to examined variables. Median specifies middle value of observations in the data set and this measure is less sensitive to outliers in the data compared to mean. Furthermore, Maximum shows the maximum value whilst minimum shows the minimum value of the observations in the data set. Standard (Std.) deviation measures the dispersion in the examined series. Computed skewness indicates that the distribution of the three variables' data has a long-left tail. Computed kurtosis reveals that none of the data distribution picked relative to normal distribution, that is they are not greater than 3 (three). However, they are flatter relative to normal distribution since they are lower than 3 (three).

The reported probability of Jarque - Bera test result suggest that the are normally distributed, since reported probabilities are greater than 5 percent and 10 percent significance levels leading to acceptance of the normality null hypothesis.

4.2 Ng – Perron Unit Root Test

Stationarity is a foremost property of a variable. In the stationary time series probability distribution function (pdf) and the three momentum of data generating process is time-independent, namely; mean, variance and covariance. If these four conditions are satisfied, time series is covariance stationary (weak form of the stationary). If one of these conditions is dissatisfied, time series is nonstationary. Use of nonstationary time series in econometric analysis cause several consequences. If a variable is not stationary shocks will not die out; that is the effect of a shock will be permanent. Furthermore, test statistics will have non-normal distribution leading to biased conclusions. Therefore, stationary properties of the data needs be clarified before conducting any econometric analysis.

Among the popular stationarity tests namely, Augmented Dickey Fuller (ADF) and Phillips- Perron (PP) tests are known to have low power in rejecting the null hypothesis of unit root against the alternate hypothesis of stationarity and they suffer severe sample size problems. Due to these reasons Ng - Perron unit root test is employed in this empirical study. In particular, Ng and Perron (1995, 2001) built on detrending procedure of ADF-GLS test of Elliott, Rothenberg and Stock (1996) to offer a remedy for the stated problems above and proposed an effective modification of PP test. This testing procedure ensures that acceptance of the null hypothesis of a unit root is not due to size distortions and the probability of committing a type II error on the hypothesis testing.

Ng-Perron test for the null hypothesis of ‘a variable has a unit root’ against the alternate hypothesis of stationarity. Practically, the null hypothesis of a unit root is rejected when the computed test statistics is smaller than the critical values. Furthermore, a variable is integrated of order one I (1), if it becomes stationary at its first difference. Ng-Perron test results are presented in Table 4.2 and Table 4.3. Based on the reported results, one can conclude that all examined variables have a unit root at their log levels, yet they become stationary at their first differences so they are integrated of order one.

Table 4.2 Ng-Perron Unit Root Test Results with Intercept

Variables					
Log Level	Lag	$\mathbf{MZ_{\alpha}}$	$\mathbf{MZ_{t}}$	**MSB**	$\mathbf{MP_{t}}$
LGED	1	-1.06067	-1.12242	1.05822	7.81132
LREER	0	-4.98849	-1.48202	0.29709	5.14704
LROIL	1	-5.22990	-1.61693	0.30917	4.68500
First-Log Difference					
DLGED	0	-26.2371	-3.62194	0.13805	0.93384
DLREER	1	-25.4875	-4.48935	0.14917	1.10714
DLROIL	0	-26.1778	-3.57979	0.13675	1.06040
Critical Values	%1	-13.8000	-2.58000	0.17400	1.78000
	%5	-8.10000	-1.98000	0.23300	3.17000
	%10	-5.70000	-1.62000	0.27500	4.45000

Notes: (1) Asymptotic critical values are retrieved from Table 1 of Ng and Perron (2001). (2) Lags are selected according to Spectral GLS-detrended AR based on Akaike Information Criterion.

Table 4.3 Ng-Perron Unit Root Test Results with Intercept and Trend

Variables					
Log Level	Lag	$\mathbf{MZ_{\alpha}}$	$\mathbf{MZ_{t}}$	**MSB**	$\mathbf{MP_{t}}$
LGED	1	-4.95153	-1.47429	0.29774	17.8979
LREER	0	-7.78732	-1.79902	0.23102	12.1339
LROIL	1	-8.78505	-2.07452	0.23614	10.4514
First – Log Difference					
DLGED	0	-27.3447	-3.68915	0.12491	2.38242
DLREER	1	-26.4823	-4.98124	0.13501	3.58970
DLROIL	0	-27.3321	-3.68964	0.12499	3.37608
Critical Values	%1	-23.8000	-3.42000	0.14300	4.03000
	%5	-17.3000	-2.91000	0.16800	5.48000
	%10	-14.2000	-2.62000	0.18500	6.67000

Notes: (1) Asymptotic critical values are retrieved from Table 1 of Ng and Perron (2001). (2) Lags are selected according to Spectral GLS-detrended AR based on Akaike Information Criterion.

4.3 Zivot and Andrews Unit Root Test

Since standard unit root tests do not allow for possible structural breaks in data, they are biased if series are trend stationary with structural break (Perron, 1989). Given the fact that structural change and unit root are related, identifying stationary process with or without structural break is vital as there might be structural breaks that make data look nonstationary. The importance of structural breaks in the asessment of the stationarity process was first emphasized by Perron (1989) who incorporated Great Depression (1929) and first oil crisis (1973) as exogenous structural changes to the series and tested whether the unit root is present in the variable. Thus prior to unit root tests; particular date of the possible structural changes were assumed to be known by Perron. Dummy variables were incorporated in the estimated regression. However, Zivot and Andrews (1992) argued that selecting a date of structural break prior to identification of the stationarity process may cause to a spurious rejection of unit root null hypothesis. Moreover, exogenization of structural breaks could result model misspecification. Zivot and Andrews (1992) proposed an extended version of Perron's original test which assumes a particular date of possible structural break is unknown. Zivot and Andrew (1992) proposed three models based on Perron's structural break characterization without the dummy variable;

Model A with Intercept

$$y_t=\tilde{\mu}^A+\tilde{\theta}^A DU_t(\tilde{\lambda})+\tilde{\beta}^A t+\tilde{\alpha}^A y_{t-1}+\sum_{j=1}^{k}\check{c}_j^A \Delta y_{t-j}+\tilde{e}_t \tag{4.1}$$

Model B with Trend

$$y_t=\tilde{\mu}^B+\tilde{\beta}^B t+\tilde{\gamma}^B DT_t^*(\tilde{\lambda})+\tilde{\alpha}^B y_{t-1}+\sum_{j=1}^{k}\tilde{c}_j^B \Delta y_{t-j}+\tilde{e}_t \tag{4.2}$$

Model C with both Intercept and Trend

$$y_t=\tilde{\mu}^C+\tilde{\theta}^C DU_t(\tilde{\lambda})+\tilde{\beta}_t^C+\tilde{\gamma}^C DT_t^*(\tilde{\lambda})+\tilde{\alpha}^C y_{t-1}+\sum_{j=1}^{k}\tilde{c}_j^C \Delta y_{t-j}+\tilde{e}_j \tag{4.3}$$

Evaluation is done by respective miminum t-statistics of three identifications. Although Perron (1989) suggests that Model A and Model C can be used to model any econometric time series; according to Sen (2003) model C is superior in case of the characterization of unknown structural break. If the examined series contains a trend and the model is estimated without a trend (Model A), test could lead to incorrect decisions since it alters the power of min t statistics. There is also loss in power in min t-statistics by using Model C if the structural change exists according to other models. However, this loss in power is negligible compared to opposite case. Due to these reasons, Model C is processed in the identification of a unit root process. The model tests a null hypothesis of a random walk process without any structural change against the alternate hypothesis of stationary around a trend with unknown one structural change. Table 4.4 presents the Zivot – Andrews test results.

Table 4.4 Zivot - Andrews Test Results

	Logarithmic Level Data			**First - Log Difference**		
	Lag	Min T- stat	Critical value at %5	Lag	Min T- stat	Critical value at %5
LGED	1	-3.667057	-5.08	0	7.040821*	-5.08
LREER	0	-5,053673	-5.08	4	5.996577*	-5.08
LROIL	1	-4.199758	-5.08	1	6.712608*	-5.08

Note: (1) * shows %5 significance level.

Results of Zivot – Andrews test also confirms that all variables are I (1); since the computed t-values are lower than critical values at %5 level, we cannot reject the null hypothesis of random walk process for these logarithmic level series. In other words, none of the variables are trend stationary with a structural change. To conclude that all variables are non-stationary at level but become stationary at their first differences.

4.4 Johansen Cointegration Test

Cointegration procedure consists of two tests namely, the trace test and the maximum eigenvalue test for a number of independent cointegration vector denoted as ‘r’. Although both of the tests are intended to detect the presence of cointegration, that is long run relationship among variables, the tests differ in terms of their alternate hypothesis. Especially in small samples, it is empirically supported that the identification power of trace tests is greater than of eigenvalues (Lüutkepohl et al. 2001). The trace test approaches to null hypothesis of ‘the rank is r_0’ against the alternate hypothesis of ‘the rank is strictly greater than r_0’ or at most equals to maximum number of possible cointegrating vectors (n). Test statistics’ null hypothesis starts from ‘not cointegrated’ and it formulated as Equation 5.4 shows;

$$\zeta trace = LR(r_0, n) = -T \sum_{i=r_0+1}^{n} \ln(1 - \lambda_i). \qquad (4.4)$$

The maximum eigenvalue test approaches a null hypothesis of ‘the rank is r_0’ against the alternate hypothesis of ‘the rank is $r_0 + 1$’. Test statistics’ null hypothesis also starts from ‘not cointegrated’. The test statistic can be formulated as follows;

$$\zeta max = LR(r_0, r_0 + 1) = -Tln(1 - \lambda_{r_0+1}). \qquad (4.5)$$

In this study Johansen’s approach of vector autoregressive based cointegration test is employed by using a VAR object. Following Pindyck and Rubinfeld (1991) suggestion, we tested the existence of cointegrating relationship among examined variables with different lag lenghts to be sure that obtained results are not vulnerable to the choice of lag length. Thus, in addition to the optimum lag order, VAR (1), which is determined by Akaike Information Criterion, alternative lag orders were tested.

Table 4.5 Johansen Cointegration Test Results

	Model 3		Model 4	
	Trace Statistics	Max-Eigen	Trace Statistics	Max-Eigen
VAR Lag: 1				
H_0: r = 0	26.89288	17.04636	36.92696	19.42399
H_0: r ≤ 1	9.846518	8.087068	17.50297	10.40926
H_0: r ≤ 2	1.759450	1.759450	7.093716	7.093716
VAR Lag: 2				
H_0: r = 0	20.19150	12.28975	37.41329	20.48177
H_0: r ≤ 1	7.901751	6.230353	16.93152	10.70448
H_0: r ≤ 2	1.671398	1.671398	6.227037	6.227037
VAR Lag: 3				
H_0: r = 0	23.23566	15.05841	38.77354	23.71477
H_0: r ≤ 1	8.177249	7.372484	15.05877	7.698440
H_0: r ≤ 2	0.804766	0.804766	7.3600327	7.360327

Notes: (1) Model 3 allows for an intercept in CE and test VAR. (2) Model 4 allows for an intercept and a trend in CE and no intercept in VAR.

Table 4.6 Johansen Cointegration Test Critical Values

	Model 3		Model 4	
	Trace Statistics	Max-Eigen	Trace Statistics	Max-Eigen
H_0: r = 0	29.79707	21.13162	42.91525	25.82321
H_0: r ≤ 1	15.49471	14.26460	25.87211	19.38704
H_0: r ≤ 2	3.841466	3.841466	12.51798	12.51798

Notes: (1) Model 3 allows for an intercept in CE and test VAR. (2) Model 4 allows for an intercept and a trend in CE and no intercept in VAR.

The test outcomes presented in Table 4.5 suggest that there is no long run relationship among examined variables since test statistics are not greater than the critical values. Thus, we cannot reject null hypothesis of no cointegration in three different estimated lag orders. Since there is no cointegration, estimation of unrestricted VAR model follows to investigate trilateral short run dynamics.

4.5 Diagnostics Tests on VAR Model

The order of the series must be specified before a VAR model estimated. The principle of parsimony implies selecting a model that minimizes selected information criteria over a range of model orders. Parsimonous models have a small number of predictor variables needed to explain the data. Although model with many parameters satisfies the goodness of fit condition, they have low estimation power. There are mainly three information criterias namely; Schwarz Information Criterion (SC), Akaike Information Criterion (AIC), and Hannan – Quinn Information Criterion (HQ). AIC is utilized in this study since it is more suitable in small sample sizes (Liew, 2004; Lütkepohl, 2005). AIC indicates 1 (one) lag for the empirical VAR model (Appendix 3). However, the information criterias are indicators of lag length but not determinants. Once a VAR model estimated, it is necessary to perform diagnostic tests to check if selected VAR model satisfies stability condition and error terms do not have econometric problems. There should be no serial correlation, no heteroscedasticity and the error process should be normally distributed in the selected VAR model. In line with the principle of parsimonous, starting from order 1 (one) possible orders subjected to diagnostic tests. Results of diagnostic tests on VAR indicates that VAR model with 3 (three) lags satisfies the stationary requirement and the model assumptions (Table 4.7). Thus VAR (3) is employed in the rest of this analysis.

Table 4.7 Results of Diagnostic Tests on VAR

Models	Serial Correlation LM Test	White Heteroscedasticity Test	Jarque - Bera	Stability Condition
VAR (1)	0.0538	0.0035*	0.1569	Satisfies
VAR (2)	0.0240**	0.1957	0.2985	Satisfies
VAR (3)	0.4522	0.2891	0.1747	Satisfies

Notes: (1) Numbers in the table indicate probability values of respective tests. (2) Stability condition checked via roots of characteristics polynomial, see Appendix 4

In addition to basic diagnostic tests, structural stability of the parameters throughout the sample is investigated by utilizing CUSUM and CUSUMSQ tests. CUSUM (Cumulative sum) and CUSUMSQ (Cumulative sum of squares) establishes two 5 percent significance lines and a cumulative sum of recursive disturbances. Tests suggest parameter instability when the cumulative sum cross over the 5 percent significance lines.

Figure 4.1 and Figure 4.2 plot the test results and they clearly illustrate stability in an estimated equation during the sample period.

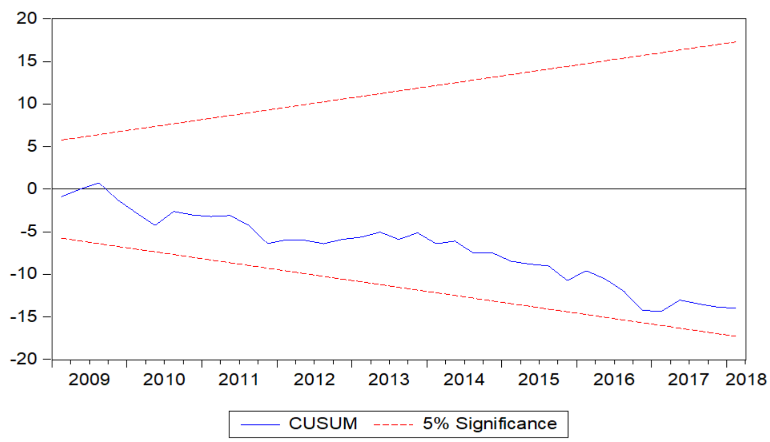


Figure 4.1 CUSUM Plot

Source: Author's own calculations using E-views 10

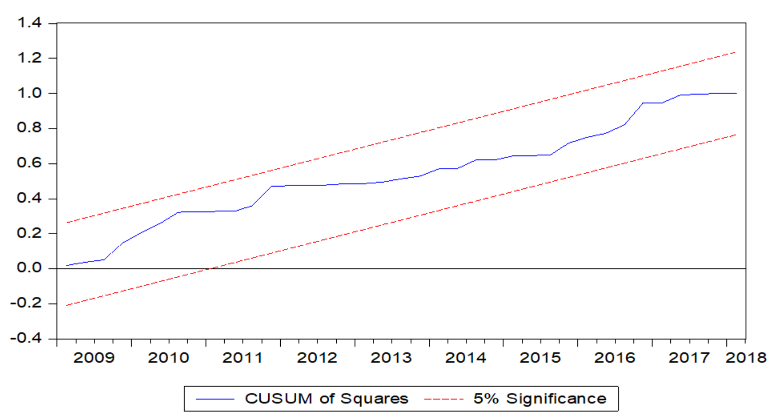


Figure 4.2 CUSUMSQ Plot

Source**:** Author's own calculations using E-views 10

4.6 Toda-Yamamoto Causality Test

Granger Causality test is utilized via Toda and Yamamoto (1995) approach. The appropriate lag number is 1, as indicated by AIC and other information criterions (Appendix 3). However, VAR model is not well-specified with lag 1, thus we have carried our analysis with 3 lags (Table 4.7). Consequently, additional number of orders of integration of the variables, which is 1, is not added to the VAR estimation. Table 4.8 represents results of Toda-Yamamoto causality test. Obtained results reveal that causality runs from external debt to real effective exchange rate but not vice versa. There is no causality relationship among other examined variables.

Table 4.8 Toda-Yamamoto Causality Test Results

A. Predictor Variable: LGED

Excluded	Chi-sq.	df	Prob.
LREER	1.6959	3	0.6378
LROIL	6.1593	3	0.1041
All	9.462148	6	0.1492

B. Predictor Variable: LREER

Excluded	Chi-sq.	df	Prob.
LGED	9.0798	3	0.0282*
LROIL	4.3294	3	0.2280
All	9.4739	6	0.1486

C. Predictor Variable: LROIL

Excluded	Chi-sq.	df	Prob.
LGED	1.7475	3	0.6264
LREER	5.6975	3	0.1273
All	9.2541	6	0.1598

Note: (*) subscript presents significance at %5 level.

4.7 Generalized Forecast Error Variance Decomposition Analysis

GFEVD outcomes of each variable are reported in Table 4.9. Designated numbers in the respective panels reveal the average of the forecast error in each variable that can be explained by innovations of other variables in an autoregression system by treating one variable as a predictor variable. Thus, unlike the orthononalized case values do not have to sum to 1.00 (Sari and Soytas, 2016). Since outcome values become stable in maximum 9 months, we did not expand the analysis period more than a 10 month.

Table 4.9 Generalized Forecast Error Varince Decomposition Results

A. Predictor Variable: DLDEBT

Period	DLDEBT	DLREER	DLROIL
0	1.0000	0.040308	0.10101
1	0.99153	0.074455	0.11857
2	0.98033	0.072443	0.082780
3	0.95907	0.10595	0.068294
4	0.94322	0.14104	0.072399
5	0.92722	0.17244	0.087361
10	0.81132	0.30581	0.19466

B. Predictor Variable: DLREER

Period	DLDEBT	DLREER	DLROIL
0	0.040308	1.0000	0.055134
1	0.028521	0.96506	0.10500
2	0.028745	0.90663	0.14270
3	0.029966	0.85529	0.17866
4	0.030010	0.81348	0.21093
5	0.0030261	0.78521	0.23215
10	0.037758	0.71804	0.26777

Table 4.9 continued

C. Predictor Variable: DLROIL

Period	DLGED	DLREER	DLROIL
0	0.10101	0.055134	1.0000
1	0.12676	0.044792	0.99466
2	0.12681	0.080558	0.98102
3	0.11729	0.16510	0.92190
4	0.10205	0.24582	0.86117
5	0.088687	0.28931	0.82583
10	0.059425	0.34703	0.74859

Panel A presents generalized variance decomposition of external debt variable. Reported numbers indicate that shocks to external debt explain the highest initial variability in itself at period zero. Real oil price explain %10.10 of variability in external debt, followed by real exchange rate which is %4.03 at period zero. In the first period, %99.15 of the variability in external debt can be attributed to innovations in itself, %11.86 of the variability can be attributed to shocks in real oil price and %7.44 of the variability can be attributed to shocks in real exchange rate. Although innovations in real oil price have higher impact until the second period, innovations in real exchange rate explain variability in external debt more than innovations in real oil price in the following periods.

Panel B results suggest that in the first period, %97 of real exchange rate changes can be attributed to innovations in itself followed by %10.5 to real oil price and %2.8 to external debt shocks. Real oil price innovations explain significant proportion of variability in real exchange rate relative to innovations in external debt throughout the chosen period.

Finally, Panel C suggest that at period zero, %10 of changes in real oil price comes from innovations in external debt followed by %5.6 in real exchange rates. In the first period %99 of the variability can be attributed to shocks in itsef and %4.5 of the variability attributed to innovations in real exchange rate whereas, approximately %13 variability can be explained by innovations in external debt.

4.8 Generalized Impulse Response Function Analysis

Figure 4.3 illustrates that an external debt shock negatively affects real effective exchange rate up to second period as predicted by theory. That is, a decrease in foreign exchange reserves, which are spent on paying foreign currency denominated debt, leads weaker domestic currency. The response becomes positive from the second period to third period and then turns out to be negative again. Finally, the effect of the shocks dissapears after sixth period. The graph also illustrates that external debt negatively impacts real oil prices up to third period, afterwards the response turns out to be positive. The effect of the shocks dissapears after sixth period.

Figure 4.4 suggests that although a real oil price innovation negatively affects external debt up to third period, the response turns out to be positive from third period to fourth period, afterward it turns out to be negative again. Turkey produces energy and it exported energy equivalent to 1 percent export share in total since 2009 until 2017, data retrieved from TURKSTAT showed (Appendix 5). Thus, it’s plausible to assume that an oil price hike could be beneficial for export revenues in hence trade balance of the country in a short period of time. Real oil price shock negatively impacts real effective exchange rate up to fourth period as predicted by theory. Due to wealth transfer effect oil importers’ currencies decline in value. After fourth period the response increases up to sixth period and then decreases again. The effect of the real oil price shock dissapears after seventh period.

Figure 4.5 illustrates that a real effective exchange rate shock negatively affects external debt up to third period. It is plausible to assume that, the foreign currency denominated debt decreases in nominal value as domestic currency appreciates. The real oil price also responds negatively to real effective exchange rate shock up to second period. It increases up to third period, then decreases up to sixth period. It eventually dissapears after nineth period. Initial adverse impact could be explained as an appreciation of real exchange rate would make oil prices cheaper in terms of the domestic currency.

Figure 4.3 Generalized Responses to one SE shock for the External Debt

Source: Author’s own calculations using E-views 10

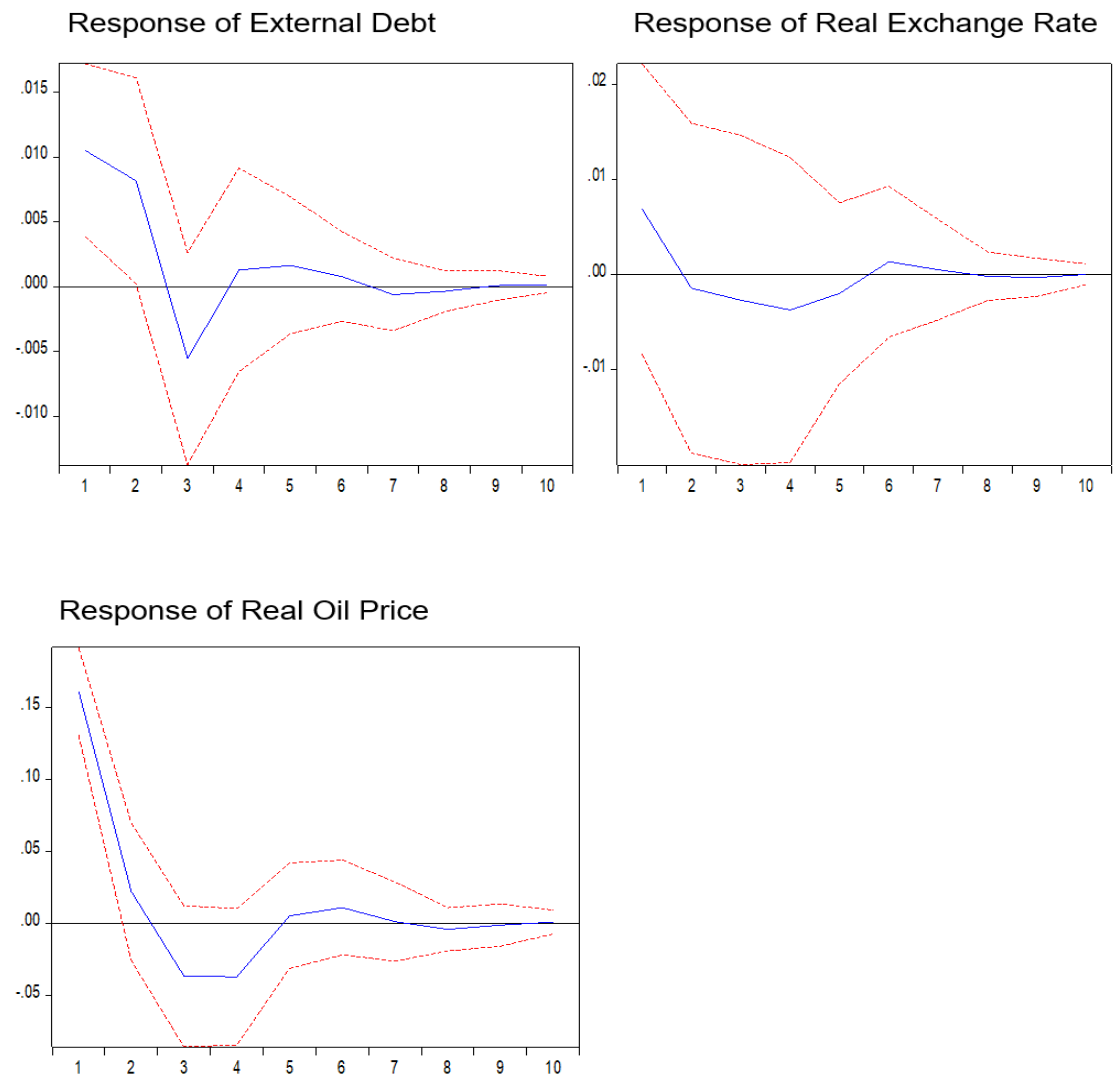


Figure 4.4 Generalized Responses to one SE shock for the Real Oil Price

Source: Author's own calculations using E-views 10

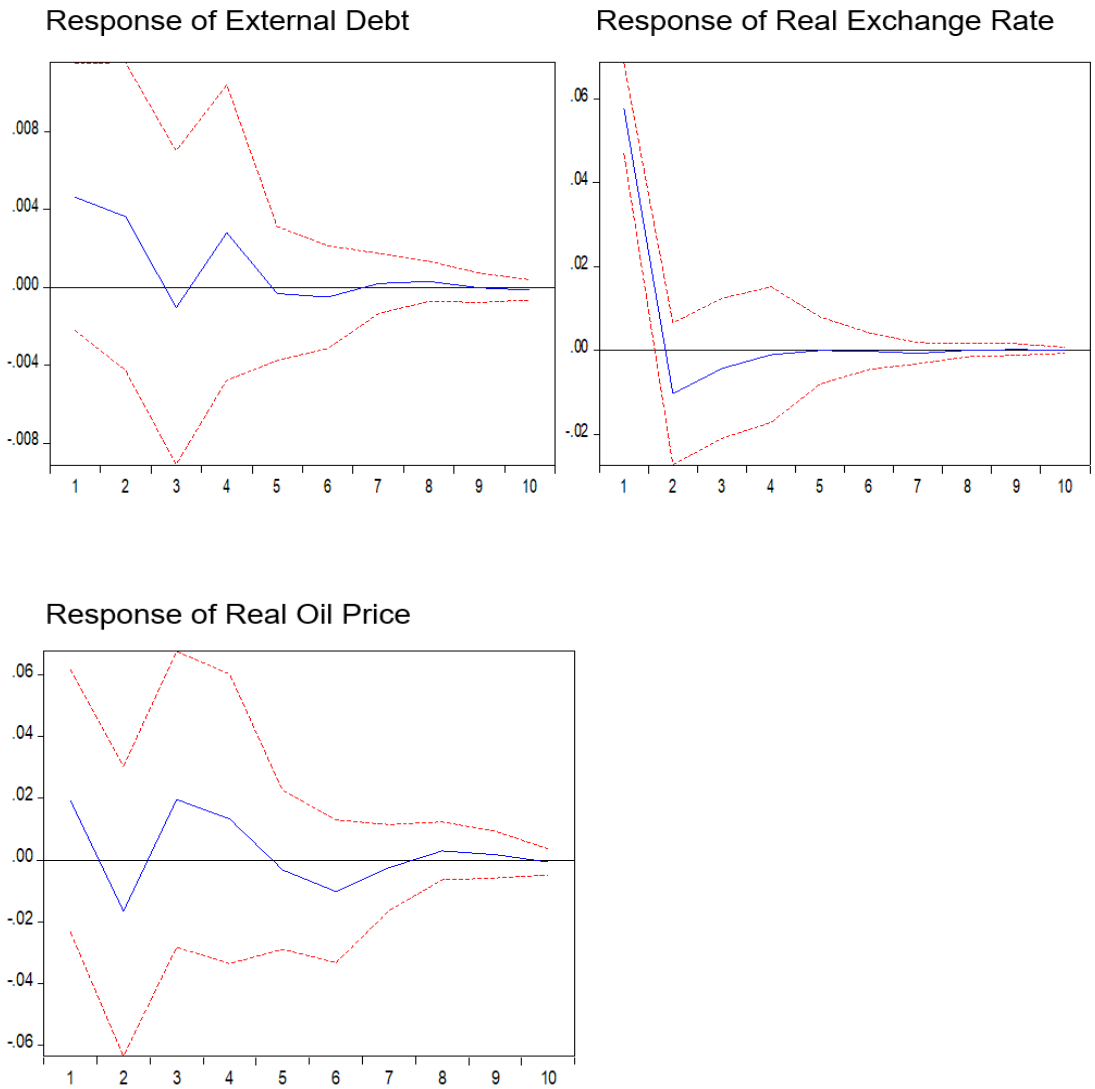


Figure 4.5 Generalized Responses to one SE shock for the Real Exchange Rate

Source: Author’s own calculations using E-views 10

CHAPTER 5
CONCLUSION AND RECOMMENDATIONS

5.1 Conclusion

Since 2008-2009 global financial crisis, Turkey has been experiencing vibrant growth compared to all other emerging countries. Due to its favorable external conditions and its large domestic market, Turkey was an attractive destination for foreign investment and business operations. However, Turkey's economic growth shrank for the first time since 2009 in 2016 due to failed coup attempt by members of the military which leads to regional instability and political uncertainty. Turkish government adopted expansionary fiscal policy, relaxed prudential norms in the banking sector and Central Bank lowered reserve requirements and decreased interbank overnight lending rate to avoid a substantial economic slowdown. Although growth rebounded sharply in 2017, Turkey's most significant economic problems continue to be related to external imbalances, most notably in its wider trade deficit and increased private and public external debt. Government policy interventions are in vain, including interest rate hikes to curb substantial depreciation of Turkish Lira.

Since 2000s, Turkey's external indebtedness has been high due to its persistent current account deficit and its high inflation. Although Turkey produces energy sources, limited domestic reserves make the country a total importer of oil. Due to its growing oil demand, energy import makes up the biggest portion of the current account deficit of Turkey. Turkey maintains its crude oil purchases amid the significant depreciation of Turkish Lira which increased the nominal cost of oil imports. Furthermore, severe devaluation of Turkish Lira has almost doubled nominal value of Turkey's foreign currency denominated external debt over the course of 2018.

This thesis adds value to literature by examining the dynamic short run relationship between oil prices, exchange rates and external debt of Turkey utilizing unrestricted VAR, Toda-Yamamoto Causality test, GFEVDs and GIRFs. Quarterly data spanning from 2003:Q1 to 2018:Q1 utilized for the empirical analysis. Ng-Perron unit root test and Zivot and Andrews unit root test result confirmed that all variables are integrated of orden one, I(1). The existence of cointegrating relationship among examined variables is tested by employing Johansen cointegration analysis. However, we could not find any proof of long run relationship. Furthermore, Toda-Yamamoto test results showed that unidirectional causality runs from external debt to real effective exchange rate. We could not find any causality among other examined variables.

The generalized impulse response graphics of the series revealed that impacts of one standard deviation shocks on examined variables disappear in short term, approximately after 8th period. An external debt shock negatively impacts real effective exchange rate and real oil prices. As supported by earlier studies of Benigno and Missale (2004), Aizenmann and Hutchison (2012) and later research of Couharde, Rey and Sallenave (2016), Sung et al. (2014), Galstyan and Velic (2017) who noted that high indebtedness positions put pressures on exchange rate dynamics. A real oil price shock has a negative impact on the external debt as predicted by theory. This is also supported by previous research studies of Hallwood and Sinclair (2017), Hasanli and Ismaliyova (2017) and Waheed (2017) who found that an increase in oil price leads to an increase in external debt of oil importing countries. A real oil price shock, on the other hand, negatively affects real exchange rate of Turkey as in line with previous findings of Ghosh (2011), Turhan et al. (2013), Sensoy and Hacihasanoglu (2014) and Sakaki (2018) who noted that an oil price hike induces depreciation of oil importers' currencies. Lastly, a real exchange rate shock negatively impacts real oil price and external debt of a country. Its plausible to assume that an appreciation of domestic currency, decreases nominal value of foreign currency denomiated external debt in terms of domestic currency as supported by previous research of Reinhart (2002), Jahjah and Montiel (2007), Lima and Panizza (2011) and recent research conducted by Insukindro (2018) and Palić et al. (2018).

The generalized variance decomposition analysis showed that the main source of initial volatility in external debt is attributed to shock itself and then real effective exchange rate and real oil prices respectively. Although, real oil price innovations have higher initial impact on external debt changes up to first period, real effective exchange rate explain higher proportion of variability in external debt in the following periods. Relative to their impact on external debt, substantial proportion of volatility in real exchange rate is attributed to innovations in real oil prices. On the other hand, innovations in real exchange rate explain higher proportion of the volatility in real oil prices relative to innovations in external debt. Eventhough we don’t expect from Turkey’s economy to have an influence upon the world oil prices, since it is a member of G20 and exports crude oil and natural gas as a 1 percent of total export share, it may have some impact on oil prices (Sari and Soytas, 2006).

Our findings reveal that adverse movements in real oil prices and real exchange rates increases external debt burden of Turkey. In addition, increase in external debt burden puts further pressures on exchange rate volatility and an increase in real oil price induces a real depreciation of Turkish Lira. Since the external debt of Turkey is denominated in foreign currency, it is plausible to assume that foreign exchange reserves are spent on paying out these debts which leads to weaker Turkish Lira. The reason of clear signs of economy’s overheating recently could be a reason of exchange rate fluctuations and high dependence on imported oil hence vulnerability to international oil price changes. Consequently, development of hedging strategies toward commoditiy and currency volatility and implication of redesigned energy and monetary policies are required to help sustain the country’s achievements of the past decade.

5.2 Policy Recommendations

In the light of this empirical study, many policy recommendations can be made. For instance, since an upsurge in oil prices induces a rapid depreciation and causes external debt burden to increase, it is highly recommended that Turkey should reduce its imported-oil dependency. Although Turkey's problem of high dependency on oil cannot be solved quickly, regulatory bodies need to search for oil substitutes and promote renewable sources of energy so as to become less oil dependent. In addition, Turkey's economy should become more energy-efficient and should promote well-functioning financial market to reduce its oil import costs and to be able to recover from oil price shocks without incurring significant economic damage. As suggested by Bodenstein, Erceg and Guerrieri (2011), real exchange rate dynamics are adversely affected by higher oil prices and this effect is generally more severe in oil importing countries with incomplete financial markets.

Given that oil price hikes induces real depreciation of Turkish Lira; portfolio managers and financial investors can benefit from diversification by holding negatively correlated oil and currency asset classes. Furthermore, depreciation of exchange rate induces imported inflation; price of imported goods increases in nominal value and leads to a deterioration in current account balance of a country. In order to curb with imported inflation, contractionary monetary policy tools can be effectively used by the Central Bank of Turkey. As suggested by Eijffinger and Goderis (2008), an increase in the policy interest rate is more influential in restoring exchange rates in countries with high external debt.

Our empirical findings also revealed that an increase in external debt burden induces a real depreciation of exchange rate. Thus, it's suggested that private sector spending should be under control, since it has been higher than public spending during the last decade. Furthermore, the CB of Turkey should continually increase the amount of its foreign exchange reserves to main its power to manipulate exchange rates and to support Lira. Since Turkey holds foreign currency denominated external debt, sovereign debt managers should drive the solutions for optimal currency allocation to counterbalance the exchange rate instability.

5.3 Limitations of the Study

Real effective exchange rate data used in the study are found to be available after the period of 2003:Q1 thus restricting the sample period from 2003:Q1 to 2018:Q1. Furthermore, the empirical results obtained in this study are depend on the accuracy and credibility of the data sources since governments' reporting bodies can manipulate the records to achieve several aims such as to gain investors' confidence and/or to influence society in political election times.

5.4 Future Research Recommendations

The current study utilized real oil price, real effective exchange rate and external debt variables in its empirical analysis. This is because our intent here is to explore dynamic interactions among aforementioned variables. Besides, influential studies conducted by Krugman (1983), Golub (1983) and Amano and Norden (1998) who provided theoretical demonstration on the relationship among real oil price and real effective exchange rate and influential studies conducted by Dornbusch (1984) and Calvo, Liderman and Reinhart (1993) who provided demonstration on the relationship among real exchange rate and external debt. Future studies may conducted to investigate the impact of other economically revelant variables, such as policy rate and money supply, on the interactions among oil prices, exchange rates and external debt. Considering the foreign currency denominated external indebtedness problem of developing countries, future research could also focus on the development of policy frameworks for the optimal choice of the currency structure of external debts. Furthermore, as this thesis adds value to the inherent literature as its first to explore dynamics among oil prices, exchange rates and external debt for Turkey, future studies could also investigate this established relationship in other countries.

REFERENCES

Adamu, I. M. and Rasiah, R. (2016). External Debt and Growth Dynamics in Nigeria. *African Development Review*, 28: 291-303. doi:10.1111/1467-8268.12206

Adusei, M., & Gyapong, E. Y. (2017). The impact of macroeconomic variables on exchange rate volatility in Ghana: The Partial Least Squares Structural Equation Modelling approach. *Research in International Business and Finance*, *42*, 1428-1444.

Aizenman, J., & Hutchison, M. M. (2012). Exchange market pressure and absorption by international reserves: Emerging markets and fear of reserve loss during the 2008–2009 crisis. *Journal of International Money and Finance*, *31*(5), 1076-1091.

Alley, I. (2018). Oil price and USD-Naira exchange rate crash: Can economic diversification save the Naira?. *Energy Policy*, *118*, 245-256.

Aloui, C., Hkiri, B., Hammoudeh, S., & Shahbaz, M. (2018). A Multiple and Partial Wavelet Analysis of the Oil Price, Inflation, Exchange Rate, and Economic Growth Nexus in Saudi Arabia. *Emerging Markets Finance and Trade*, *54*(4), 935-956.

Aloui, R., & Aïssa, M. S. B. (2016). Relationship between oil, stock prices and exchange rates: A vine copula based GARCH method. *The North American Journal of Economics and Finance*, *37*, 458-471.

Amano, R. A., & Van Norden, S. (1998). Oil prices and the rise and fall of the US real exchange rate. *Journal of international Money and finance*, *17*(2), 299-316.

Arezki, R., & Brückner, M. (2012). COMMODITY WINDFALLS, DEMOCRACY AND EXTERNAL DEBT. *The Economic Journal, 122(561),* 848-866. Retrieved from: http://www.jstor.org/stable/41494848

Armstrong, K. G. (2001). What impact does the choice of formula have on international comparisons?. *Canadian Journal of Economics/Revue canadienne d'économique*, *34*(3), 697-718.

Asonuma, M. T. (2016). *Sovereign defaults, external debt, and real exchange rate dynamics* (International Monetary Fund Working Paper No. 16/37).

Ayodeji, I. O. (2017). Oil and the Naira: A Markov Switching Perspective. *African Development Review*, *29*(4), 562-574.

Bai, S., & Koong, K. S. (2018). Oil prices, stock returns, and exchange rates: Empirical evidence from China and the United States. *The North American Journal of Economics and Finance*, *44*, 12-33.

Basarir, Ç., & Erçakar, M. E. (2016). An Analysis of the Relationship between Crude Oil Prices, Current Account Deficit and Exchange Rates: Turkish Experiment. *International Journal of Economics and Finance*, *8*(11), 48.

Basher, S. A., Haug, A. A., & Sadorsky, P. (2012). Oil prices, exchange rates and emerging stock markets. *Energy Economics*, *34*(1), 227-240.

Basher, S. A., Haug, A. A., & Sadorsky, P. (2016). The impact of oil shocks on exchange rates: a Markov-switching approach. *Energy Economics*, *54*, 11-23.

Beckmann, J., Czudaj, R., & Arora, V. (2017). The relationship between oil prices and exchange rates: theory and evidence. US Energy Information Administration working paper series, June 2017. Retrieved from: https://www.eia.gov/workingpapers/pdf/oil_exchangerates_61317.pdf

Benigno, P., & Missale, A. (2004). High public debt in currency crises: fundamentals versus signaling effects. *Journal of International Money and Finance*, *23*(2), 165-188.

Bloomberg, S.B., Harris, E.S. (1995). The Commodity–Consumer Price Connection: Fact or Fable? Federal Reserve Board of New York, Economic Policy Review. October, 21–38.

Bodenstein, M., Erceg, C. J., & Guerrieri, L. (2011). Oil shocks and external adjustment. *Journal of International Economics*, *83*(2), 168-184.

Bouoiyour, J., Selmi, R., Tiwari, A. K., & Shahbaz, M. (2015). The nexus between oil price and Russia's real exchange rate: Better paths via unconditional vs conditional analysis. *Energy Economics*, *51*, 54-66.

Brahmasrene, T., Huang, J. C., & Sissoko, Y. (2014). Crude oil prices and exchange rates: Causality, variance decomposition and impulse response. *Energy Economics*, *44*, 407-412.

Bunescu, L. (2014). The impact of external debt on exchange rate variation in Romania. *Economics & Sociology*, *7*(3), 104.

C. Rammanohar Reddy, Antonette D'Sa, & Amulya K. N. Reddy. (1992). The Debt-Energy Nexus: A Case Study of India. *Economic and Political Weekly, 27*(27), 1401-1415. Retrieved from http://www.jstor.org/stable/4398588

Calderón, C., & Kubota, M. (2018). Does higher openness cause more real exchange rate volatility?. *Journal of International Economics*, *110*, 176-204.

Calvo, G. A., Leiderman, L., & Reinhart, C. M. (1993). Capital inflows and real exchange rate appreciation in Latin America: the role of external factors. *Staff Papers*, *40*(1), 108-151.

Central Bank Republic of Turkey, (October 31, 2018). *Inflation Report 2018-IV (p.4).* Ankara: Central Bank of Republic of Turkey (CBRT). Retrieved from: http://www.tcmb.gov.tr/

Chen, H., Liu, L., Wang, Y., & Zhu, Y. (2016). Oil price shocks and US dollar exchange rates. *Energy*, *112*, 1036-1048.

Chen, S. S., & Chen, H. C. (2007). Oil prices and real exchange rates. *Energy Economics*, *29*(3), 390-404.

Couharde, C., Rey, S., & Sallenave, A. (2016). External debt and real exchange rates' adjustment in the euro area: New evidence from a nonlinear NATREX model. *Applied Economics*, *48*(11), 966-986.

Delgado, N. A. B., Delgado, E. B., & Saucedo, E. (2018). The relationship between oil prices, the stock market and the exchange rate: Evidence from Mexico. *The North American Journal of Economics and Finance*, *45(C),* 266-275. doi: 10.1016/j.najef.2018.03.006

Diaz, E. M., Molero, J. C., & de Gracia, F. P. (2016). Oil price volatility and stock returns in the G7 economies. *Energy Economics*, *54*, 417-430.

Dikkaya, M., & Doyar, B. V. (2017). Causality Among Oil Prices, GDP and Exchange Rate: Evidence from Azerbaijan and Kazakhstan. *Bilig*, *83*, 79-98.

Doğan, İ., & Bilgili, F. (2014). The non-linear impact of high and growing government external debt on economic growth: A Markov Regime-switching approach. *Economic Modelling*, *39*, 213-220.

Dornbusch, Rüdiger. (1984). *External Debt, Budget Deficits and Disequilibrium Exchange Rates* (Massachusetts Institute of Technology, Department of Economics Working Paper No.347) Retrieved from: https://EconPapers.repec.org/RePEc:mit:worpap:347.

Eijffinger, S. C., & Goderis, B. (2008). The effect of monetary policy on exchange rates during currency crises: the role of debt, institutions, and financial openness. *Review of International Economics*, *16*(3), 559-575.

Elliott, G., Rothenberg, T. and Stock, J. (1996). Efficient tests for an autoregressive unit root. *Econometrica, 64,* 813-836.

Engle, R. F., & Granger, C. W. (1987). Co-integration and error correction: representation, estimation, and testing. *Econometrica: journal of the Econometric Society*, 251-276.

Farzanegan, M. R., & Markwardt, G. (2009). The effects of oil price shocks on the Iranian economy. *Energy Economics*, *31*(1), 134-151.

Fida, B. A., Khan, M. M., & Sohail, M. K. (2012). Analysis of exchange rate fluctuations and external debt: empirical evidence from Pakistan. *African Journal of Business Management*, *6*(4), 1760-1768.

Forslund, K., Lima, L., & Panizza, U. (2011). The determinants of the composition of public debt in developing and emerging market countries. *Review of Development Finance*, *1*(3-4), 207-222.

Galstyan, V., & Velic, A. (2017). Debt thresholds and real exchange rates: An emerging markets perspective. *Journal of International Money and Finance*, *70*, 452-470.

Ghosh, S. (2011). Examining crude oil price–Exchange rate nexus for India during the period of extreme oil price volatility. *Applied Energy*, *88*(5), 1886-1889.

Ghulam, Y., & Derber, J. (2018). Determinants of sovereign defaults. *The Quarterly Review of Economics and Finance*, *69*, 43-55.

Gnimassoun, B., Joëts, M., & Razafindrabe, T. (2017). On the link between current account and oil price fluctuations in diversified economies: The case of Canada. *International Economics*, *152*, 63-78.

Golub, S. S. (1983). Oil prices and exchange rates. *The Economic Journal, 93(371),* 576-593

Granger, C. W. (1969). Investigating causal relations by econometric models and cross-spectral methods. *Econometrica: Journal of the Econometric Society*, 424-438.

Habib, M. M., Bützer, S., & Stracca, L. (2016). Global Exchange Rate Configurations: Do Oil Shocks Matter?. *IMF Economic Review*, *64*(3), 443-470.

Halicioglu, F. (2007). The J-curve dynamics of Turkish bilateral trade: a cointegration approach. *Journal of Economic Studies*, *34*(2), 103-119.

Hallwood, P. & Sinclair, S. (2017). *Oil, Debt and Development: OPEC in the Third World (*University of Connecticut, Department of Economics, Working Papers No. 2017-16). Retrieved from: https://EconPapers.repec.org/RePEc:uct:uconnp:2017-16.

Hameed, A., Ashraf, H., & Chaudhary, M. A. (2008). External debt and its impact on economic and business growth in Pakistan. *International Research Journal of Finance and Economics*, *20*(1), 132-140.

Harms, P., & Hoffmann, M. (2011). Deciding to peg the exchange rate in developing countries: the role of private-sector debt. *Open Economies Review*, *22*(5), 825-846.

Hasanli, Y., & Ismayilova, S. (2017). Econometric model of dependence between the oil prices, and the global external debt level and oil production. *Економічний часопис-XXI*, *166*(7-8), 11-15.

Hausmann, R. (1999). Should there be five currencies or one hundred and five?. *Foreign Policy*, 65-79.

http://priceofoil.org/content/uploads/2011/01/DrillingIntoDebt.pdf

Iliopulos, E., & Miller, M. (2007). UK external imbalances and the sterling: are they on a sustainable path?. *Open Economies Review*, *18*(5), 539-557.

Insel, A., & Kayikçi, F. (2013). Determinants of the current account balance in Turkey: an ARDL approach. *Economic research-Ekonomska istraživanja*, *26*(1), 1-16.

Insukindro. (2018). The effect of twin shock on fiscal sustainability in Indonesia. *Economics & Sociology, 11(1),* 75-84.

International Monetary Fund, Staff Report (April, 2018). *2018 Article IV Consultation-Press Release; Staff Report; and Statement by the Executive*

Director for Turkey (p.5). Washington, DC: International Monetary Fund (IMF). Retrieved From: https://www.imf.org

Jahjah, S., & Montiel, P. (2007). Devaluation, debt, and default in emerging economies. *Open Economies Review*, *18*(1), 77-93.

Jain, A., & Ghosh, S. (2013). Dynamics of global oil prices, exchange rate and precious metal prices in India. *Resources Policy*, *38*(1), 88-93.

Johansen, S. (1991). Estimation and hypothesis testing of cointegration vectors in Gaussian vector autoregressive models. *Econometrica: Journal of the Econometric Society*, 1551-1580.

Johansen, S. (1995), Likelihood-Based Inference in Cointegrated Vector Autoregressive Models. *Oxford University Press*. Retrieved from: https://EconPapers.repec.org/RePEc:oxp:obooks:9780198774501

Kahya, M. (2011) An Analysis of the Relationship between Foreign Trade and Economic Growth in Turkey over the Period 1980-2009. Unpublished Draft, School of Economics and Management, Lund University, Lund. Available at: http://www.ehl.lu.se

Kale, P. (2001). Turkey's trade balance in the short and the long run: error correction modeling and cointegration. *The International Trade Journal, 15(1),* 27-56

Kaminsky, G. L., & Reinhart, C. M. (1999). The twin crises: the causes of banking and balance-of-payments problems. *American economic review*, *89*(3), 473-500.

Karagol, E. (2012). The causality analysis of external debt service and GNP: The case of Turkey. *Central Bank Review*, *2*(1), 39-64.

Kayalar, D. E., Küçüközmen, C. C., & Selcuk-Kestel, A. S. (2017). The impact of crude oil prices on financial market indicators: copula approach. *Energy Economics*, *61*, 162-173.

Kisswani, K. M., Harraf, A., & Kisswani, A. M. (2018). Revisiting the effects of oil prices on exchange rate: asymmetric evidence from the ASEAN-5 countries. *Economic Change and Restructuring*, 1-22.

Koop, G., Pesaran, M. H., & Potter, S. M. (1996). Impulse response analysis in nonlinear multivariate models. *Journal of econometrics*, *74*(1), 119-147.

Kouladoum, J. C. (2018). *External debts and real exchange rates in developing countries: evidence from Chad* (MPRA Paper No. 88440). Retrieved from: https://mpra.ub.uni-muenchen.de/88440/

Kretzmann, S., & Nooruddin, I. (2005). Drilling into debt. *Oil Change International.* Retrieved from:

http://priceofoil.org/content/uploads/2011/01/DrillingIntoDebt.pdf

Krugman, Paul. (1980). *Oil and the Dollar* (NBER Working Papers No.0554) Retrieved from: National Bureau of Economic Research Inc. https://EconPapers.repec.org/RePEc:nbr:nberwo:0554.

Le, T. H., & Chang, Y. (2013). Oil price shocks and trade imbalances. *Energy Economics*, *36*, 78-96.

Liew, V. K. S. (2004). Which lag length selection criteria should we employ? *Economics Bulletin*, *3(33)*, 1-9.

Liu, H., Idrees, Z., Satti, J. A., & Nazeer, A. (2015). Exchange rate volatility and oil prices shocks. *International Journal of Academic Research in Business and Social Sciences*, *5*(1), 249.

Lizardo, R. A., & Mollick, A. V. (2010). Oil price fluctuations and US dollar exchange rates. *Energy Economics*, *32*(2), 399-408.

Longe, A. E., Adelokun, O. O., & Omitogun, O. (2018). The current account and oil price fluctuations nexus in Nigeria. *Journal of Competitiveness*, *10*(2), 118-131.

Lopez-Murphy, P., & Villafuerte, M. (2010). *Fiscal policy in oil producing countries during the recent oil price cycle* (IMF Working Paper No. 10/28). Retrieved from: https://pdfs.semanticscholar.org/6e08/879f07119b28030b1b553c05d4c445c73921.pdf

Lütkepohl H. (1991). *VAR Processes with Parameter Constraints. In: Introduction to Multiple Time Series Analysis*. Springer, Berlin, Heidelberg. Retrieved from: https://doi.org/10.1007/978-3-662-02691-5_5

Lütkepohl H. (2005) VAR Order Selection and Checking the Model Adequacy. In: New Introduction to Multiple Time Series Analysis. Springer, Berlin, Heidelberg. Retrieved from: https://doi.org/10.1007/978-3-540-27752-1_4

Lüutkepohl, H., Saikkonen, P., & Trenkler, C. (2001). Maximum eigenvalue versus trace tests for the cointegrating rank of a VAR process. *The Econometrics Journal*, *4*(2), 287-310.

Mantai, M. M., & Alom, F. (2016). Impacts of oil price, exchange rate and inflation on the economic activity of Malaysia. *OPEC Energy Review*, *40*(2), 180-191.

Mensah, L., Obi, P., & Bokpin, G. (2017). Cointegration test of oil price and us dollar exchange rates for some oil dependent economies. *Research in International Business and Finance*, *42*, 304-311.

Ng, S., & Perron, P. (2001). Lag length selection and the construction of unit root tests with good size and power. *Econometrica*, *69*(6), 1519-1554.

Ng, S., and Perron, P. (1995). Unit Root Tests in ARMA Models with Data Dependent Methodsfor the Selection of the Truncation Lag. *Journal of the American Statistical Association*, *90*, 268–281.

Nwanne, T. F. I. (2018). Assessing the effect of external debt servicing and receipt on exchange rate in Nigeria. *International Journal of Economics and Finance*, *7*(9), 278-286.

Palić, I., Banić, F., & Matić, L. (2018). The Analysis of the Impact of Depreciation on External Debt in Long Run: Evidence From Croatia. *Interdisciplinary Description of Complex Systems: INDECS*, *16*(1), 186-193.

Papapetrou, E. (2001). Oil price shocks, stock market, economic activity and employment in Greece. *Energy economics*, *23*(5), 511-532.

Perron, P. (1989) The Great Crash, the Oil Price Shock, and the Unit Root Hypothesis. *Econometrica*, 57, 1361-1402. Retrieved from: https://doi.org/10.2307/1913712

Pesaran, B., & Pesaran, M. H. (2010). *Time series econometrics using Microfit 5.0: A user's manual*. Oxford University Press, Inc..

Pesaran, H. H., & Shin, Y. (1998). Generalized impulse response analysis in linear multivariate models. *Economics letters*, *58*(1), 17-29.

Peter C. B. Phillips, & Perron, P. (1988). Testing for a Unit Root in Time Series Regression. *Biometrika, 75*(2), 335-346. doi:10.2307/2336182

Phillips, P. (1987). Time Series Regression with a Unit Root. *Econometrica, 55*(2), 277-301. doi:10.2307/1913237

Phillips, P., & Ouliaris, S. (1990). Asymptotic Properties of Residual Based Tests for Cointegration. *Econometrica, 58*(1), 165-193. doi:10.2307/2938339

Pindyck, R. S. and D. L. Rubinfeld, (1991). *Models and Economic Forecasts*, McGraw-Hill Inc.

Qurat-ul-Ain, S., & Tufail, S. (2013). The effect of oil price shocks on the dynamic relationship between current account and exchange rate: evidence from D-8 Countries. *The Pakistan Development Review*, 537-555.

Rafiq, S., Sgro, P., & Apergis, N. (2016). Asymmetric oil shocks and external balances of major oil exporting and importing countries. *Energy Economics*, *56*, 42-50.

Raji, J. O., Idowu Abdulkadir, R., & Badru, B. O. (2018). Dynamic relationship between Nigeria-US exchange rate and crude oil price. *African Journal of Economic and Management Studies*, *9*(2), 213-230.

Rao, S. (2018, August 29). *Turkey faces $179 billion external debt repayments until July 19, JPMorgan says.* Retrieved from: https://www.reuters.com/article/us-turkey-currency-debt-jpm/turkey-faces-179-billion-external-debt-repayments-until-july-2019-jpmorgan-says-idUSKCN1LE0WS.

Rasaki, M. G., & Malikane, C. (2018). Sovereign wealth funds and macroeconomic stability in oil-exporting African countries. *OPEC Energy Review*, *42*(2), 151-169.

Rautava, J. (2004). The role of oil prices and the real exchange rate in Russia's economy—a cointegration approach. *Journal of comparative economics*, *32*(2), 315-327.

Reboredo, J. C., Rivera-Castro, M. A., & Zebende, G. F. (2014). Oil and US dollar exchange rate dependence: A detrended cross-correlation approach. *Energy Economics*, *42*, 132-139.

Reinhart, C. M. (2002). Default, currency crises, and sovereign credit ratings. *World Bank Economic Review, 16(2),* 151-169

Saheed, Z. S., Sani, I. E., & Idakwoji, B. O. (2015). Impact of public external debt on exchange rate in Nigeria. *International Finance and Banking*, *2*(1), 15.

Sakaki, H. (2018). *The dynamic relationship between oil prices and exchange rates*. *Finance and Market, (2)*. doi: 10.18686/fm.v2.909.

Sari, R., & Soytas, U. (2006). The relationship between stock returns, crude oil prices, interest rates, and output: evidence from a developing economy. *The Empirical Economics Letters*, *5*(4), 205-220.

Sen, A. (2003). On unit-root tests when the alternative is a trend-break stationary process. *Journal of Business & Economic Statistics*, *21*(1), 174-184.

Sengül, E. (2018, February 2). *Turkey's energy import bill up by 37% in 2017.* Retrieved from: https://www.aa.com.tr/en/energy/finance/turkeys-energy-import-bill-up-by-37-in-2017/18644

Sims, C. A. (1980). Macroeconomics and reality. *Econometrica: Journal of the Econometric Society*, 1-48.

Sung, T., Park, D., & Park, K. Y. (2014). Short-Term External Debt and Foreign Exchange Rate Volatility in Emerging Economies: Evidence from the Korea Market. *Emerging Markets Finance and Trade*, *50*(sup6), 138-157.

Tiwari, A. K., & Albulescu, C. T. (2016). Oil price and exchange rate in India: Fresh evidence from continuous wavelet approach and asymmetric, multi-horizon Granger-causality tests. *Applied energy*, *179*, 272-283.

Tiwari, A. K., Mohnen, P., Palm, F. C., & Schim van der Loeff, S. (2013). *Microeconometric evidence of financing frictions and innovative activity - a revision*. (UNU-MERIT Working Papers No. 027). Maastricht: UNU-MERIT, Maastricht Economic and Social Research and Training Centre on Innovation and Technology.

Tiwari, A. K., Mutascu, M. I., & Albulescu, C. T. (2013). The influence of the international oil prices on the real effective exchange rate in Romania in a wavelet transform framework. *Energy Economics*, *40*, 714-733.

Toda, H. Y., & Yamamoto, T. (1995). Statistical inference in vector autoregressions with possibly integrated processes. *Journal of econometrics*, *66*(1-2), 225-250.

Towbin, P., & Weber, S. (2013). Limits of floating exchange rates: The role of foreign currency debt and import structure. *Journal of Development Economics*, *101*, 179-194.

Turhan, I., Hacihasanoglu, E., & Soytas, U. (2013). Oil prices and emerging market exchange rates. *Emerging Markets Finance and Trade*, *49*(sup1), 21-36.

Turhan, M. I., Sensoy, A., & Hacihasanoglu, E. (2014). A comparative analysis of the dynamic relationship between oil prices and exchange rates. *Journal of International Financial Markets, Institutions and Money*, *32*, 397-414.

U.S Energy Information Administration, Independent Statistics and Analysis (February, 2017). *Country Analysis Brief: Turkey (p.2).* Washington, DC: U.S Energy Information Administration. Retrieved from: http://www.iberglobal.com/files/2017/turquia_eia.pdf

Uysal, D., Hüseyin, Ö., & Mehmet, M. (2009). External debt and economic growth relationships: the case of Turkey (1965-2007). *Atatürk University the Faculty of Economics and Administrative Sciences' Journal*, *23*(4), 161-178.

Vural, B. M. T. (2016). Effect of Real Exchange Rate on Trade Balance: Commodity Level Evidence from Turkish Bilateral Trade Data1. *Procedia economics and finance*, *38*, 499-507.

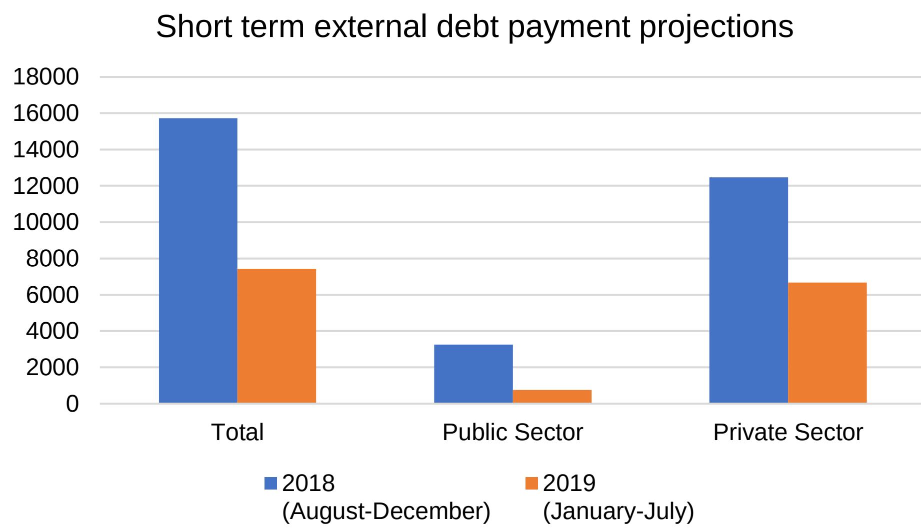
Waheed, A. (2017). Determinants of External Debt: A Panel Data Analysis for Oil & Gas Exporting and Importing Countries. *International Journal of Economics and Financial Issues*, *7*(1), 234-240.

Wesseh Jr, P. K., & Lin, B. (2018). Exchange rate fluctuations, oil price shocks and economic growth in a small net-importing economy. *Energy*, *151*, 402-407.

Zivot, E., & Donald W. K. Andrews. (1992). Further Evidence on the Great Crash, the Oil-Price Shock, and the Unit-Root Hypothesis. *Journal of Business & Economic Statistics, 10*(3), 251-270. doi:10.2307/1391541

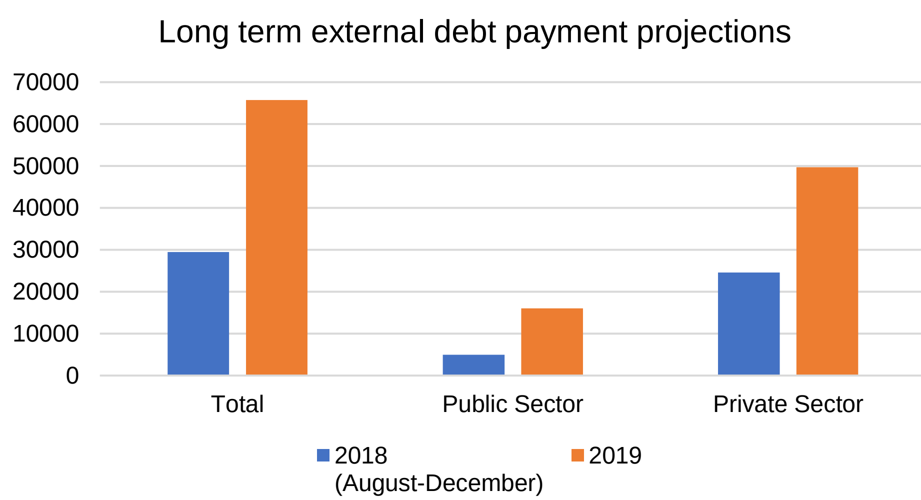
APPENDICES

Appendix 1. External Payment Projections of Turkey



Appendix 1. External Payment Projections of Turkey

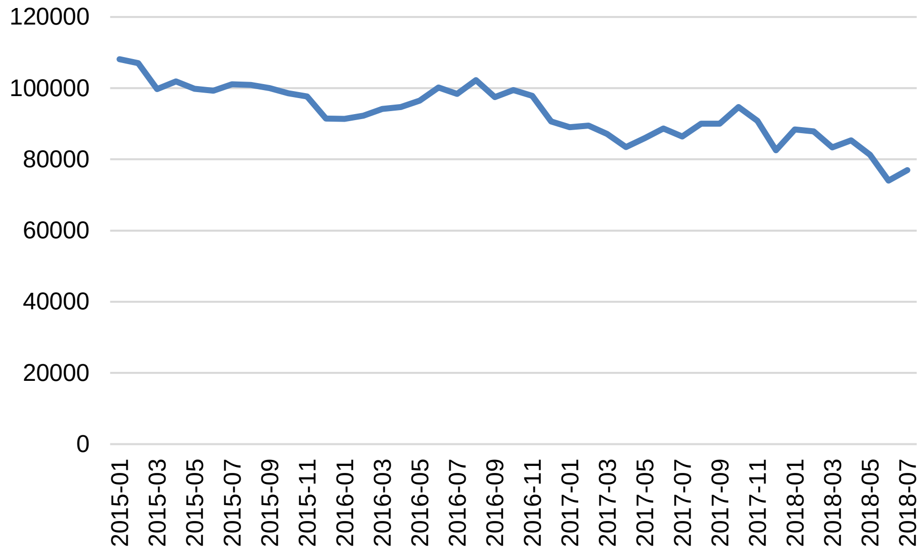
Source: Author’s own calculations



Appendix 1. External Payment Projections of Turkey

Source: Author’s own calculations

Appendix 2. Foreign Currency Reserves of Turkey



Appendix 2. Foreign Currency Reserves of Turkey

Source: Author’s own calculations

Appendix 3. VAR Lag Order Selection Criteria

Endogenous Variables: LGED LREER LROIL

Exogenous Variables: C

Sample: 2013Q1:2018Q2

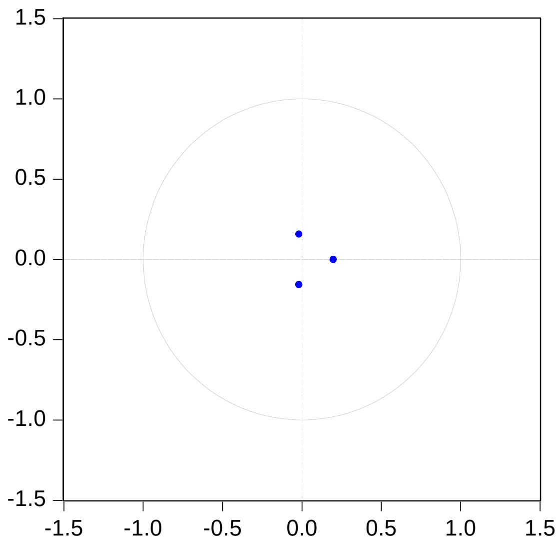
Included Observations: 53

Lag	LogL	LR	FPE	AIC	SC	HQ
0	47.81994	NA	3.70e-05	-1.691318	-1.579792	-1.648431
1	232.7334	341.9155*	4.85e-08*	-8.329563*	-7.883459*	-8.158013*
2	240.9472	14.25790	5.01e-08	-8.299895	-7.519213	-7.999682
3	243.5277	4.187241	6.44e-08	-8.057650	-6.942390	-7.628775
4	247.6716	6.254846	7.87e-08	-7.874398	-6.424561	-7.316861
5	250.9939	4.638739	1.00e-07	-7.660147	-5.875732	-6.973947
6	262.0960	14.24424	9.66e-08	-7.739472	-5.620479	-6.924610
7	274.3307	14.31229	9.07e-08	-7.861536	-5.407965	-6.918011
8	285.6801	11.99184	9.03e-08	-7.950194	-5.162045	-6.878006

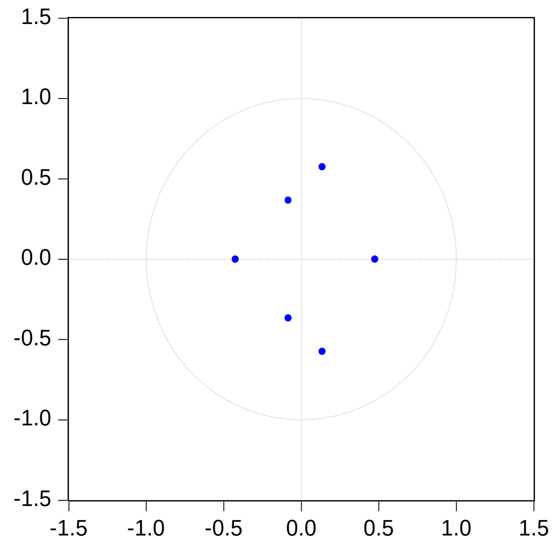
Note: (1) * indicates lag order selected by the criterion. (2) LR, FPE, AIC, SC, HQ, denotes sequential modified LR test statistic, Final prediction error, Akaike information criterion, Schwarz information criterion, and Hannan-Quinn information criterion respectively.

Appendix 4. Roots of AR Characteristic Polynomial

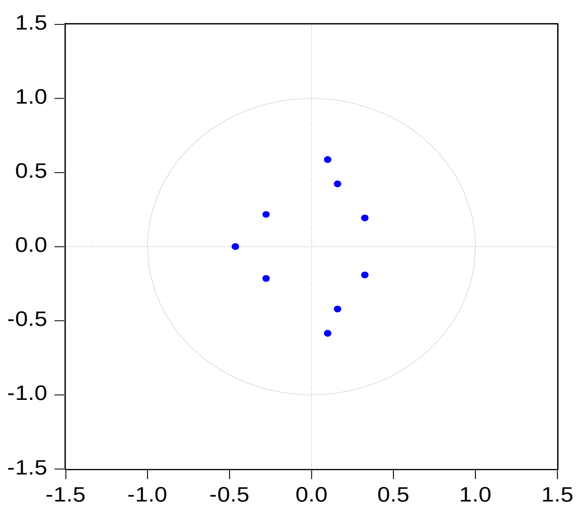
VAR (1)



VAR (2)

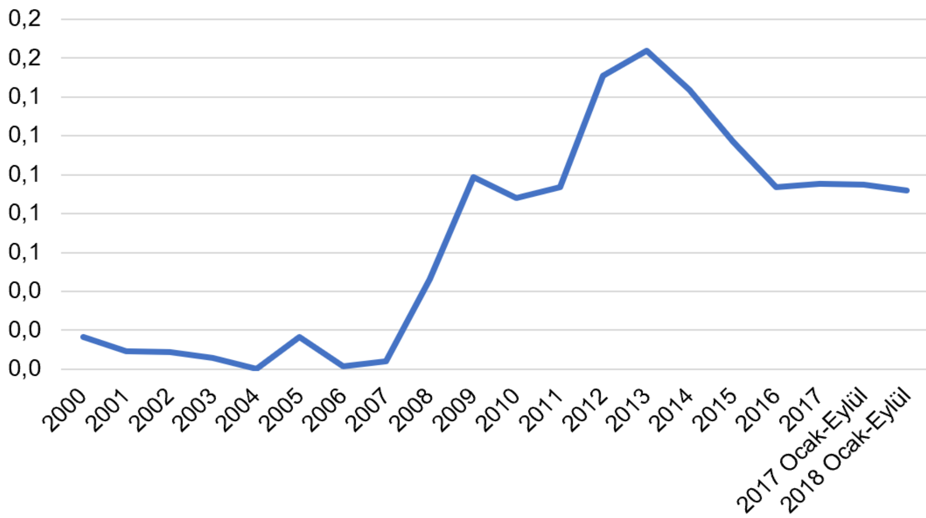


VAR (3)



Theoretically, autoregressive difference equation is stable if all roots of its characteristic polynomials are outside the unit circle or its inverse characteristic polynomials are inside the unit circle. E-views provides us the inverse roots of the characteristic polynomial. Thus, as it can be seen in the graphs VAR (1), VAR (2) and VAR (3) satisfies the stationary condition.

Appendix 5. Crude oil and natural gas exports of Turkey



Appendix 5. Crude oil and natural gas exports of Turkey

Source: Author's own calculations

PLAGIARISM REPORT

THE RELATIONSHIP BETWEEN OIL PRICES, EXCHANGE RATES AND EXTERNAL DEBT: EVIDENCE FROM TURKEY

ORIGINALITY REPORT

15%	10%	13%	3%
SIMILARITY INDEX	INTERNET SOURCES	PUBLICATIONS	STUDENT PAPERS

PRIMARY SOURCES

1	mpra.ub.uni-muenchen.de Internet Source	1%
2	www.emeraldinsight.com Internet Source	<1%
3	Presley K. Wesseh, Boqiang Lin. "Exchange rate fluctuations, oil price shocks and economic growth in a small net-importing economy", Energy, 2018 Publication	<1%
4	www.tandfonline.com Internet Source	<1%
5	Beirne, John(Hunter, J). "International exchange rate dynamics and purchasing power parity", Brunel University, 2010. Publication	<1%
6	Yaseen Ghulam, Julian Derber. "Determinants of sovereign defaults", The Quarterly Review of Economics and Finance, 2018 Publication	<1%

ETHICS COMMITEE APPROVAL

YAKIN DOĞU ÜNİVERSİTESİ

BİLİMSEL ARAŞTIRMALAR ETİK KURULU

29.11.2018

Dear Fulden Yeşiltepe

Your project "The Relationship Between Oil Prices, Exchange Rates And External Debt: Evidence From Turkey " has been evaluated. Since only secondary data will be used the project it does not need to go through the ethics committee. You can start your research on the condition that you will use only secondary data.

Assoc. Prof. Dr. Direnç Kanol

Rapporteur of the Scientific Research Ethics Committee

Direnc Kanol

Note: If you need to provide an official letter to an institution with the signature of the Head of NEU Scientific Research Ethics Committee, please apply to the secretariat of the ethics committee by showing this document.