Hacettepe University Graduate School of Social Sciences

Faculty of Economics and Administrative Sciences

Department of Economics

NONLINEAR EFFECT OF GLOBAL LIQUIDITY ON SOVEREIGN BOND SPREAD: CASE OF TURKEY

Murat SÖZBİR

Master's Thesis

Ankara, 2018

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ACCEPTANCE AND APPROVAL

The jury finds that Murat SÖZBIR has on date of June 11, 2018 successfully passed the defense examination and approves his Master's Thesis titled "Nonlinear Effect of Global Liquidity on Sovereign Bond Spread: Case of Turkey"

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Bu çalışmadaki bütün bilgi ve belgeleri akademik kurallar çerçevesinde elde ettiğimi, görsel, işitsel ve yazılı tüm bilgi ve sonuçları bilimsel ahlak kurallarına uygun olarak sunduğumu, kullandığım verilerde herhangi bir tahrifat yapmadığımı, yararlandığım kaynaklara bilimsel normlara uygun olarak atıfta bulunduğumu, tezimin kaynak gösterilen durumlar dışında özgün olduğunu, Doç. Dr. Ayşe Yasemin YALTA danışmanlığında tarafımdan üretildiğini ve Hacettepe Üniversitesi Sosyal Bilimler Enstitüsü Tez Yazım Yönergesine göre yazıldığını beyan ederim.

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DEDICATION

I want to dedicate this thesis to my family. I owe the greatest thanks and appreciation to them because of their infinite support in every period of my life.

ÖZET

SÖZBİR, Murat, *Global Likiditenin Tahvil Getiri Farkı Üzerindeki Doğrusal Olmayan Etkisi*: Türkiye Örneği, Yüksek Lisans Tezi, Ankara, 2018

Son yıllarda, Amerikan Merkez Bankası (FED) ve Avrupa Merkez Bankası gibi önde gelen Merkez bankaları para politikalarında normalleşmeye gitmeyi ve genişleyici para politikalarına son vermeyi tartışmaktadırlar. Merkez bankalarının bu tutumları sonucu global likiditede meydana gelebilecek azalmanın Türkiye gibi gelişen ülkelerin borç yükü, risk primi ve tahvil getiri farkları üzerinde uzun dönemde olumsuz etkisi olması olasıdır. Bu çalışma, 2003-2017 yılları arasında global likidite ile Türkiye'nin tahvil getiri farkı üzerindeki doğrusal ve doğrusal olmayan ilişkiyi 2001 yılında Paseran tarafından geliştirilen "ARDL sınır testi yaklaşımı" ile 2014 yılında Shin tarafından öne sürülen "NARDL Yaklaşımı" yarıdımıyla test etmiştir. Çalışma literature iki yönden katkı sağlamıştır. Öncelikle literatürdeki çoğu çalışmanın panel veri analizinden yararlanarak global likidite ile ülke tahvil getiri farkı arasındaki ilişkiyi açıklamaya çalıştığı; global likiditenin tahvil getiri farkı üzerindeki önemini ülke bazlı inceleyen çok az çalışma olduğu görülmektedir. İkincisi, bildiğimiz kadarıyla global likidite ile ülke tahvil getiri farkı arasındaki doğrusal olmayan ilişkinin çok fazla incelenmediği, söz konusu ilişkinin NARDL modeli yardımıyla ise daha önce analiz edilmediği görülmektedir. Bu çalışma, global likidite ile ülke tahvil getiri farkı arasındaki doğrusal olmayan ilişkiyi göstererek literaturdeki bu boşluğu doldurmayı amaçlamaktadır. Model sonuçları, global likidite ile Türkiye tahvil getiri farkı arasında bir ilişki olduğunu ve global likiditenin ülke riski üzerinde asimetrik bir etkisi olduğunu göstermiştir.

Anahtar Sözcükler: Global likidite, eşbütünleşme, ARDL sınır testi yaklaşımı, NARDL, tahvil getiri farkı, ülke riski, asimetri

ABSTRACT

SÖZBİR, Murat, *Nonlinear Effect of Global Liquidity on Sovereign Bond Spread: Case of Turkey*, Master's Thesis, Ankara, 2018

The leading central banks such as the Federal Reserve (FED) and European Central Bank (ECB) have been discussing normalization of their monetary policy actions and ending accommodative monetary policies in recent years. Such actions of the central banks and the reversal of the global liquidity can bring about a detrimental impact on the external debt burden, the risk premium and the sovereign bond spread of emerging markets including Turkey in the long run. This study investigates the relation between global liquidity and the sovereign bond spread of Turkey via employing both autoregressive distributed lag (ARDL) proposed by Pesaran et al (2001) and nonlinear autoregressive distributed lag (NARDL) model developed by Shin et al (2014). Our study contributes to the literature in two different ways. First, most of the existing studies use panel data analysis and there are only few studies considering individual country cases to show the importance of global liquidity on sovereign bond spread. Second, to the best of our knowledge, the relation between global liquidity and sovereign bond spread has not been examined using nonlinear autoregressive distributed lag (NARDL) cointegration model. Thus, the aim of this study is to fill the gap in the existing literature by presenting the nonlinear relation between global liquidity and sovereign bond spread of Turkey. While the results of the study provide evidence for the cointegration between global liquidity and sovereign bond spread, they also identify the asymmetric impact of global liquidity on the country risk of Turkey.

Keywords: Global liquidity, cointegration, ARDL bounds testing approach, NARDL, sovereign bond spread, country risk, asymmetry

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LIST OF ABBREVIATIONS

ARDL: Autoregressive Distributed Lag Model

BIS: Bank for International Settlements

BOJ: Bank of Japan

CGFS: Committee on the Global Financial System

CUSUM: Cumulative Sum

CUSUMQ: Cumulative Sum of Square

ECB: European Central Bank

EMBIG: Emerging Market Bond Index Global

FED: The Federal Reserve

LSAP: Large Scale Asset Purchase

NARDL: Nonlinear Autoregressive Distributed Lag Model

QE: Quantitative Easing

SDR: Special Drawing Rights

U.S: United States

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INTRODUCTION

Monetary and capital markets have showed significant transformations after the last decades of the 20th century. In this period, emerging markets have issued considerable amount of international bonds and these bonds have become the leading instruments for funding their investments. Moreover, multilateral corporations have also pumped this financial system and funded developing economies. As international bond issues of developing countries increased, sovereign bond spreads as generally defined by the difference between the yield on a country's emerging market debt securities and the U.S. 10-year bond yield, have become an important metric for evaluating a country's creditworthiness. Because sovereign bond spreads influence the cost of foreign public debt and repayment capacity of countries, it is important to understand which factors are significant determinants of sovereign bond spreads.

Several studies have examined the role of country specific fundamentals as well as global factors on sovereign bond spreads. One of the prominent global factors affecting sovereign bond spread is global liquidity, which has various effects on financial markets and domestic economic conditions. After 2008, leading central banks such as The Federal Reserve (FED), European Central Bank (ECB), Bank of England and Bank of Japan came to the fore and increased the global liquidity level in the world financial markets via decreasing policy rate and implementing Quantitative Easing (QE) policy to recover and stimulate the economic activity in the world. These attitudes of leading central banks helped the ease of financing and led to a decline in the sovereign bond spreads. However, FED announced that its quantitative easing policy ended in October 2014. In addition, it has begun to increase the federal funds target rate since the last month of 2015 and it has given some signals about reducing its balance sheet in recent years. Furthermore, the European Central Bank (ECB) is also discussing tapering quantitative easing (QE). It is also expected that accommodative monetary policies of the other leading central banks such as The Bank of

England and Bank of Japan (BOJ) will also be ended eventually and all of them normalize their monetary policy in the near future.

Such actions of leading central banks have caused a decrease in the global liquidity in world financial markets in recent years. Hence, it is likely that the cost of borrowing in the world financial markets can significantly increase and obstruct the accessibility of funds. As a result, developing countries' debt burden can be negatively affected and sovereign bond spreads may widen. Thus, changes in global liquidity affects the sovereign bond spread along with the other possible negative effects. Therefore, it is important to analyze the determinants of sovereign bond spreads in general, and the effect of global liquidity in particular.

Turkey has been one of the emerging market economies increasing bond issues since the 1990s. However, as in many emerging markets, Turkey has become more fragile to global liquidity conditions since the 1990s. In 2013, US Investment Bank Morgan Stanley defined the top five fragile countries and Brazil, India, Indonesia, Turkey and South Africa were selected as the most fragile economies in the world because of their currency volatility of FED's announcements and their external finance problem. In 2016, Morgan Stanley revised its fragile five countries to include Indonesia, Turkey, South Africa, Colombia and Mexico. Recently, Standard &Poors global, one of the most prominent credit rating agencies, suggested that Turkey, Argentina, Pakistan, Egypt, and Qatar are the new "fragile five" and Turkey was selected again as the most fragile country according to this agency. Considering the external debt to GDP ratio of Turkey which realized as 53.3% in 2017 and taking into account its large current account deficit, Turkey can be affected severely from quantity tightening periods much more than other emerging countries.

It is observed during the global financial crisis that as global liquidity level decreased dramatically, sovereign bond spreads of Turkey reached high levels in the same period. However, as it is also experienced in the global financial crisis, the negative impact of the decrease in global liquidity on sovereign bond spreads is seen to be more destructive than

the increase of global liquidity for Turkey in the long term. In other words, global liquidity can affect the sovereign bond spread of Turkey asymmetrically. Thus, it will be crucial to identify whether there is any nonlinear relationship between global liquidity and sovereign bond spread of Turkey for suggesting some policy implications to reduce the possible effects of global liquidity fluctuations.

This study aims to show the linear and nonlinear relation between global liquidity and sovereign bond spread of Turkey and present some policy implications about possible impacts of global monetary conditions on country risk of Turkey. Two different approaches are used to evaluate the existence of cointegration between global liquidity and sovereign bond spread. First, to check for the existence of cointegration between global liquidity and sovereign bond spread of Turkey, autoregressive distributed lag (ARDL) bounds testing approach proposed by Pesaran et al (2001) is implemented. Then, to investigate the asymmetric relation between global liquidity and sovereign bond spread of Turkey, nonlinear autoregressive distributed lag (NARDL) model developed by Shin et al (2014) is employed. When compared to the other commonly used cointegration methods such as Johansen (1988, 1991) and Engle and Granger (1987), these two cointegration methods present us several advantages. First, our sample covers 60 quarters and the robustness of ARDL model is proven even for small sample sizes. Moreover, NARDL model is an appropriate methodology for our study to show the asymmetric impacts of global liquidity on sovereign spread of Turkey since our NARDL model includes both I(0) and I(1) variables and NARDL Model is implemented regardless of whether the variables under study are stationary in I(0), I(1) or mutually cointegrated. Moreover, both ARDL bounds testing approach and NARDL model make it possible to show the behavior of variables in the long term and the short term simultaneously.

To sum up, this study investigates the relation between global liquidity and sovereign bond spread of Turkey. The study is organized as follows. Chapter 1 presents the multidimensional concept of global liquidity. Chapter 2 provides the literature review and the theoretical background of the relationship between global liquidity and the sovereign

bond spread of Turkey. Chapter 3 demonstrates the econometric methodology and empirical results of ARDL bounds testing approach and NARDL model. Finally, concluding remarks and policy implications are presented in the last section.

CHAPTER 1: GLOBAL LIQUIDITY CONCEPT AND THE MEASUREMENT

Global liquidity has become popular in international economic policy debates since 1990s with increasing financial integration and it has shown an essential impact on domestic conditions by affecting financial markets and macroeconomic factors such as the real GDP and the foreign debt stock of countries.

Even though global liquidity significantly influences many areas of the world economy, it is a multidimensional and sophisticated phenomenon and it has not a coherent conceptual framework. Thus, global liquidity can be defined and measured in several ways. Therefore, the first section of this thesis discusses the concept and measurement issues of global liquidity.

1.1. GLOBAL LIQUIDITY CONCEPT

Despite the increased attention of researchers, there is not any exact definition and framework about global liquidity. However, the main logic behind the concept of global liquidity should be “ease of financing” (Caruana, 2013).

Global liquidity can be identified with two different ways as “monetary liquidity and financial market liquidity” (Montgomery, 1999; BIS, 1999). While “monetary liquidity” describes the ease of exchanging monetary assets into services and goods, “financial market liquidity” makes it possible to trade the large volumes of financial securities without incurring transaction costs.

In addition, alternative definitions of global liquidity have emerged to broadly explain the global liquidity in recent years as a result of the increasing and diversified credit conditions and the emergence of derivatives and new instruments in financial markets. In this framework, two new definition have been introduced, “Official liquidity” that contains the

money of central banks and their foreign reserves, and “Private liquidity” which is created by private sector (CGFS, 2011).

Therefore, it will be useful to examine both perspectives of global liquidity to understand the general logic of the concept.

1.1.1. Monetary and Financial Market Liquidity

Monetary liquidity is described as the ease of exchanging monetary assets into goods and services both domestically and internationally. Generally, monetary liquidity contains liquid assets of residents and portfolio investments of non-residents. However, we can also determine the liquidity level of some assets by comparing their substitutability degree with money. Because money is principally an asset that can be converted to goods or services without bearing on any transaction costs, money can be seen as the most liquid asset in the world economy.

Financial market liquidity, on the other hand, can be basically considered as trading assets without bearing on transaction costs. However, it is difficult to reach the perfect financial market liquidity conditions because of asymmetric information problem. For example, the cost of accessing information on financial markets and the existence of a brokerage fees disrupt the perfect financial market liquidity. However, any efforts to reach perfect financial market liquidity conditions will contribute investors to realize mutually beneficial trade in world financial system.

Monetary and financial market liquidity is highly related between each other. In general term, money is a financial asset which can be converted easily into goods and services without any transaction cost both domestically and across borders. In other words, money is an asset with high financial market liquidity. Therefore when defining an asset as money, we should examine their substitutability level between money and asset. If financial market liquidity of an asset is in high level, it can be considered as a specific measure of money.

On the other hand, we can also show negative interaction between financial market and monetary market liquidity especially in high volatile periods in financial markets. For instance, increasing volatility in financial markets can bring uncertainty about the values of assets and economic agents may cease trading in financial markets. As a result, financial market liquidity of assets can diminish and this may increase the spread between financial market and monetary liquidity.

1.1.2. Official and Private Liquidity

Official liquidity is defined as "the funding that is unconditionally available to settle claims through monetary authorities" (CGFS, 2011). It has an exogenous character and the level of official liquidity does not depend on the availability of funding in financial system. Central bank forms official liquidity with domestic currency through monetary operations and, in the stress periods, via "emergency liquidity assistance (ELA)" (Domanski et al, 2011). Moreover, treasuries or state - owned commercial banks have a role to create liquidity.

Central Banks abilities to create official liquidity rely on the domestic monetary policy framework. Exchange rate regime choice can restrict domestic money creation process of national authorities. An external anchor, for example, may limit the official liquidity. On the other hand, in the pure fiat money system, central bank may issue official liquidity without any restriction.

Official liquidity can be calculated with variety of ways. The most well-known form is foreign exchange reserves of central banks. Swap lines of central banks is another method to access official liquidity. We can also consider Special Drawing Rights (SDR) as an instrument to reach the official liquidity. However, it is important to note that SDR has a limited quantity and thus it may not be an appropriate instrument for liquidity creation even if it can be used as a vehicle to mobilize official liquidity (Bose, 2014).

On the other hand, today, global liquidity includes private liquidity as well because countries and financial market participants join international financial markets to a large extent. Thus, funding conditions depend on the attitudes of world financial institutions and their appetite to provide cross-border financing (Landau, 2013). Financial institutions can improve the market liquidity of securities by market-making activity and provide funding liquidity via interbank lending. For instance, before the global financial crisis in 2008, mortgage-backed securities were seen as highly liquid. In turn, financial markets began to employ these securities as collateral in repo transactions and that helped to increase the funding liquidity of these securities.

Private liquidity level is largely determined by the behavior of private institutions. For instance, appetite to take risk in private institutions and improvement in financial services of these agencies can surge private liquidity. It is hardly surprising that, these developments in private liquidity can induce easier credit conditions and asset prices begin to rise in financial markets. Rising asset prices, then, also can encourage investors to take risk and with the integration and innovation in financial sector, global liquidity can begin to rise over time. However, when the cycle reverses, global liquidity creation process of financial sector will be interrupted (Adrian and Shin, 2009). Uncertainty about viability of financial institutions in this period may lead to a reduction of private funding and this can result in a decline of private liquidity in the end.

It is important to understand the logic behind the relation between official and private liquidity. For example, official sector can trigger the private liquidity via expansionary monetary policies. Quantitative easing policies of leading central banks such as FED or ECB can increase the volume of global liquidity in the world financial market. While the funding cost decreases in financial markets with the help of leading central banks' actions , risk appetite of investors begins to rise. In turn, this ease of financing condition triggers asset prices and brings about substantial credit growth. Thus, global liquidity is determined by both official and private sectors in this period. Although private sector opinions about the availability of official liquidity increase the risk appetite and result in a significant

credit growth, a perception about the support of central bank can also cause moral hazard in private institutions and this can increase the volatility in financial markets. In turn, private liquidity can tend to vanish and global liquidity can be determined by individual banks' access to official sector funding.

1.2. THE MEASUREMENT OF GLOBAL LIQUIDITY

Since global liquidity is multidimensional and has an elusive nature, different measurement methods have been employed to identify and analyze the global liquidity.

1.2.1. Monetary and Financial Stability Perspective

As it is mentioned above, the global liquidity can be measured by a variety of ways. But, which measurement method will be employed is determined by the focus of the studies. For instance, if analyses focus on the risk of monetary spillover and its impact on aggregate demand, it will be useful to employ some aggregation of indicators of monetary conditions for individual currency areas. On the other hand, when the main concern is financial stability, it will be better to use global liquidity indicators that show the degree of financial vulnerability (CGFS, 2011). The amount of global credits, for example, is seen important instruments to show the "ease of financing" and also better indicator as an early warning indicator (Alessi and Detken, 2009). Moreover, they also make possible to show broad international coverage. Particularly, cross-border positions in interbank markets are essential to show how global liquidity conditions are internationally transmitted and affect the domestic financial stability (Bruno and Shin, 2013).

1.2.2. Price Based and Quantity Based Indicators

Global liquidity can be better captured by considering both price and quantity measurements. While price based approach gives information about how liquidity is

provided, quantity measurement methods explain how far such conditions translate into the build-up of risks (Domanski et al, 2011).

In the early literature, quantity based definitions of global liquidity generally include the base, narrow or broad money supplies of advanced economies such as G5 and G7 countries and these definitions are calculated via different ways. For example, converting national currencies of advanced economies into US dollars with market exchange rates (Baks and Kramer, 1999), converting national currencies to single currency via purchasing power parity (Sousa and Zaghini,2004) and the GDP-weighted global money growth rate[1] can be ranked as prominent examples for reaching global liquidity.

However, these traditional forms of quantity based approaches are not convenient today because of the financial integration and financial innovations in the world financial market. That is, with the financial integration, while cross border financial flows have been widened, new financial markets such as derivatives markets and new instruments such as mortgage based securities have been emerged and these are also triggered global liquidity in the international financial markets. Therefore, it will be useful to employ alternative measurement methods to understand the global liquidity level in the world financial market. For example, Bank for International settlements (BIS) creates global liquidity via utilizing the operations of international banks and global credit level in the world financial system. "Banks' international claims on all sectors" formed by BIS is one of the measurement method to reach global liquidity. Sectors can be considered as bank and non-bank (nonfinancial corporations, general government, households and nonfinancial institutions) institutions. In addition, banks' international claims contain their financial assets which are loans, derivatives, holdings and equity securities and other financial instruments (BIS, 2017). Such measurement methods help us to reach more comprehensive global liquidity definition.

1 See Becker (2009)

In addition, global monetary conditions can also be captured by price based indicators which cover interest rate. For example, thanks to major policy rates or 10 year U.S. bond yield, we can form an opinion about the global monetary conditions in the world financial market. Moreover it can also be measured by non-interest rate terms. The tightness of collateral provisions and bid-ask spreads can also be ranked the non-interest terms. In addition, global liquidity can be measured by some indirect measures such as risk appetite of investors in world financial markets or risk perception and volatility in stock markets. These indicators also play an essential role on money creation in financial markets (Agrippino and Rey, 2012).

In this context, some economic researches have preferred to employ some combinations of broad money aggregates as a proxy for global liquidity (Baks and Kramer, 1999; Giese and Tuxen, 2007; D'Agostino and Sorico, 2007; Becker, 2007; Belke et al, 2009, Matsumoto, 2011; Ratti and Vespignani, 2013).

In early studies, Baks and Kramer (1999) consider G-7 money growth as a proxy for global liquidity. They employ three methods to compute G-7 money growth. Each method is implemented for both narrow and broad money definitions. First, weighted growth rate series are created in the study. That is, money growth for each G-7 countries is weighted by respective country's GDP in U.S. dollars. Second, they construct simple sum of U.S. dollar (USD) aggregates, dividing domestic-currency aggregates by market exchange rates. Third, they use Divisia indices of global money growth. Sousa and Zaghini (2004), on the other hand, analyze the global liquidity with broad monetary aggregates of euro area, the US, the UK, Japan and Canada via converting national currencies to common currency by utilizing purchasing power parity. Rüffer and Stracca (2006) also measure the global liquidity with broad monetary aggregates of G-5 countries as utilizing Sousa and Zaghini (2004). They use M4 for the U.K., M3 for Italy and France, and M2 for all other countries. Moreover, Becker (2007) also creates two global liquidity measurement methods. While first one contains narrow money, second definition of global liquidity is based on broad money

supply. Both narrow and broad money supply definitions comprise G-5 countries (the US, Japan, Canada, the UK and Euro Area).

Giese and Tuxen (2007) employ broad money stock of Italy, Japan, UK, France, US and Germany. They use M3 money stock for Italy, France, US, Germany, M4 for United Kingdom and M2 plus cash deposits for Japan. In addition, D'Agostino and Sorico (2007) construct global liquidity using the broad money growth for G-7 countries. Morover, Belke et al (2009) also use broad monetary aggregates of major OECD countries (U.S., the euro area, Australia, UK, Canada, Denmark, Switzerland, Sweden, Norway, South Korea and Japan. While the study generally employs M3 for observed countries, they also use M2 for the US, M2 plus cash deposits for Japan, and M4 for the UK. Moreover, Matsumoto (2011) use the changes in worldwide international reserves plus U.S. money supply (M0), both measured in U.S. dollars, as a proxy of global liquidity. Ratti and Vespignani (2013) also form global liquidity by aggregating M2 in U.S. dollars of the Eurozone, Japan, China and United States.

Furthermore, Adrian and Shin (2009) use balance sheets data of U.S. financial institutions as for reaching global liquidity. They suggest that primary dealer repos and financial commercial paper as a fraction of M2 shows the current credit crunch beyond just the traditional notion of broad money. Bruno and Shin (2013) develop the global liquidity in terms of the aggregate cross-border lending through the banking sector.

On the other hand, some studies have preferred to employ price based measures as a proxy for global liquidity. In early studies, Arora and Cerisola (2001) create global liquidity as utilizing federal funds target rate. Also, Peiris (2010) measures global liquidity by the long-run U.S. Treasury yields. Furthermore, Dell'Erba et al (2011) employ three-month Fed Funds futures as a proxy for global liquidity and aim to capture expectations of future short-term rates of market in United States. In addition, Csontó (2014) employs the U.S. Fed funds rate for measuring global liquidity level. Csontó assumes that low level of FED funds rate can be related by high liquidity.

1.2.3. General Overview of the Global Liquidity Indicators

Global liquidity can be better captured by considering both price and quantity measurements. After introducing both price and quantity based approaches, it will be useful to view the general path of global liquidity via graphical analysis covering 2003:Q1-2017:Q4 period. While Figure 1 and Figure 2 illustrate the quantity measure, figure 3 and figure 4 demonstrate the price measure examples of global liquidity.

In Figure 1, simple sum of M2 money supplies of G-7 countries which comprise Canada, United Kingdom, France, Germany, Italy, Japan and United States are employed as a proxy for global liquidity (Baks and Kramer, 1999). Since M2 money supplies of countries are measured by domestic currency in their balance sheets, these are transformed to dollar denominated data by dividing to nominal market exchange rate. On the other hand, Figure 2 which is another proxy for global liquidity, represents international claims on all sectors which is defined as "banks' cross-border claims denominated in all currencies plus their local claims denominated in foreign currencies" (BIS,2017).

As it is seen in Figure 1 and in Figure 2, both M2 Money supply of G-7 countries and international claims on all sectors surged dramatically in 2003 and this increasing trend sustained until 2008. Between the first quarter of 2003 and first quarter of 2008, while M2 Money supply of G-7 countries increased 52%, international claims of all sectors to GDP ratio reached to the highest level and surged to 67.2%. However, these conditions totally changed and global liquidity began to decline after 2008. It is seen in Figure 1 that international claims on all sectors to GDP ratio began to decline after the first half of 2008. As it is seen in figure 2, broad money growth also decreased in the same period.

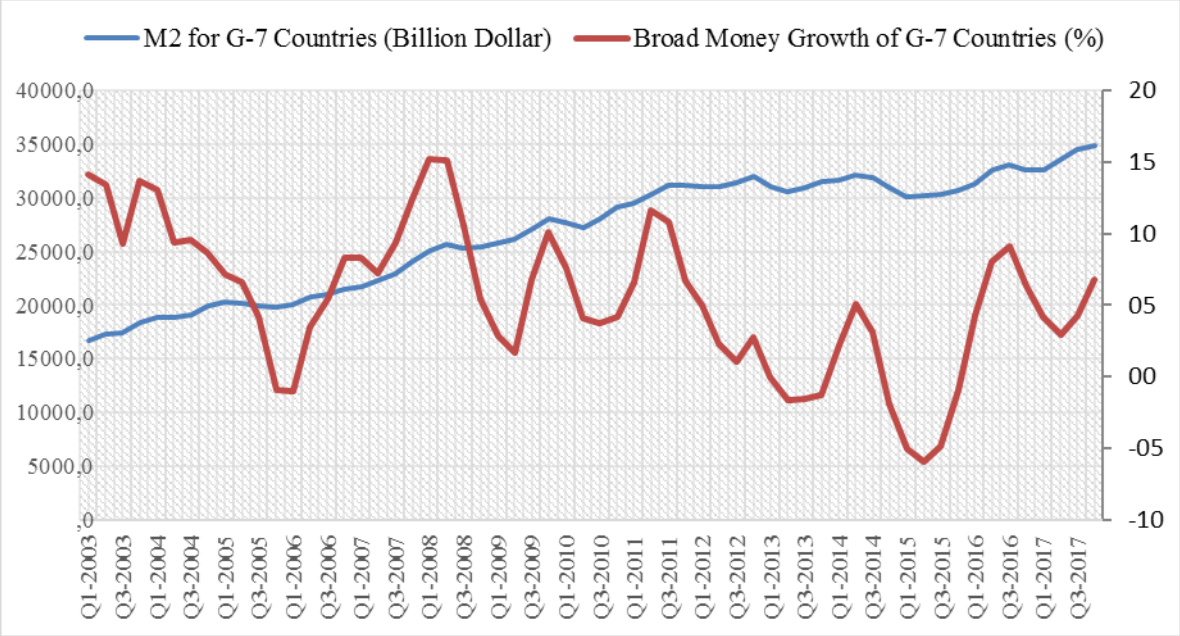

Figure 1 M2 Money Supply of G-7 Countries (Billion Dollar, Annual Rate of Change)

Source: *The Economist Intelligence Unit, Bloomberg Database*

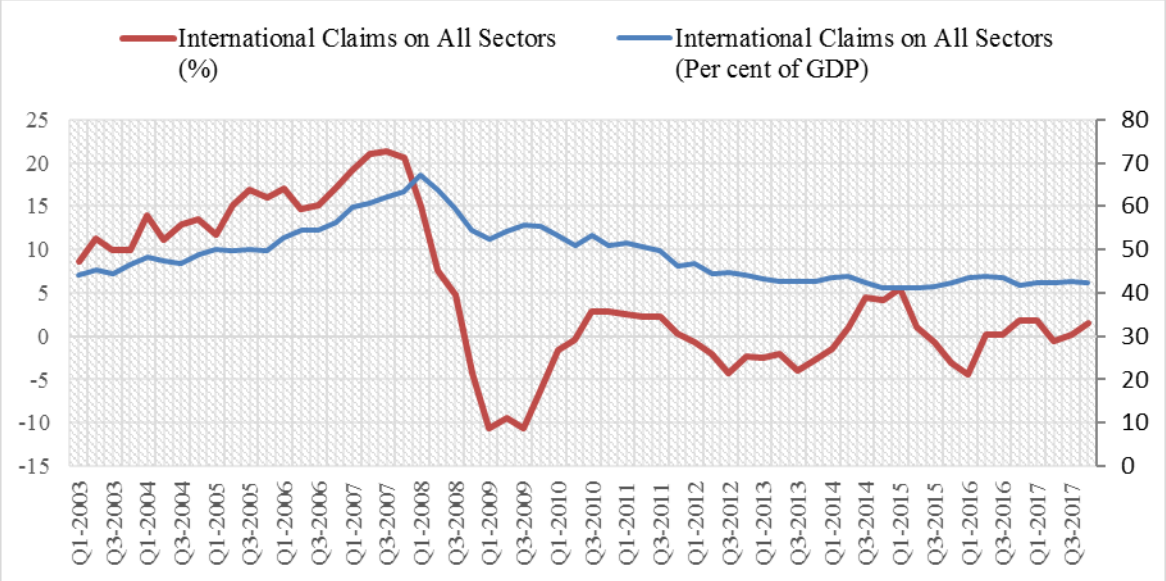

Figure 2 International Claims on All Sectors, Percent of GDP (%), Annual Rate ıf Change (%)

Source: *Bank for International Settlements (BIS)*

After 2008, focusing also on the price based measures can be favored because leading central banks such as Federal Reserve (FED) and European Central Bank (ECB) tried to recover the world economy via both expansionary monetary policy and also decreasing funds rate. Figure 3 and Figure 4 represent price based measurement methods of global liquidity. While figure 3 demonstrates the US Federal Funds Rate, Figure 4 displays long term bond yields of United States. Actually, to mitigate the effects of global financial crisis, the United States aggressively reduced its policy rates in the third quarter of 2007 (Figure 3) followed by the United Kingdom in December so as to alleviate the crisis period.

Afterwards, leading central banks such as FED and ECB began to purchase considerable amount of asset from world financial markets. Such Large Scale Asset Purchases (LSAP) programs were launched because of reviving the economic activity in the world. These attitudes also stimulated the global liquidity. However, FED announced that its quantitative easing policy ended in October 2014.

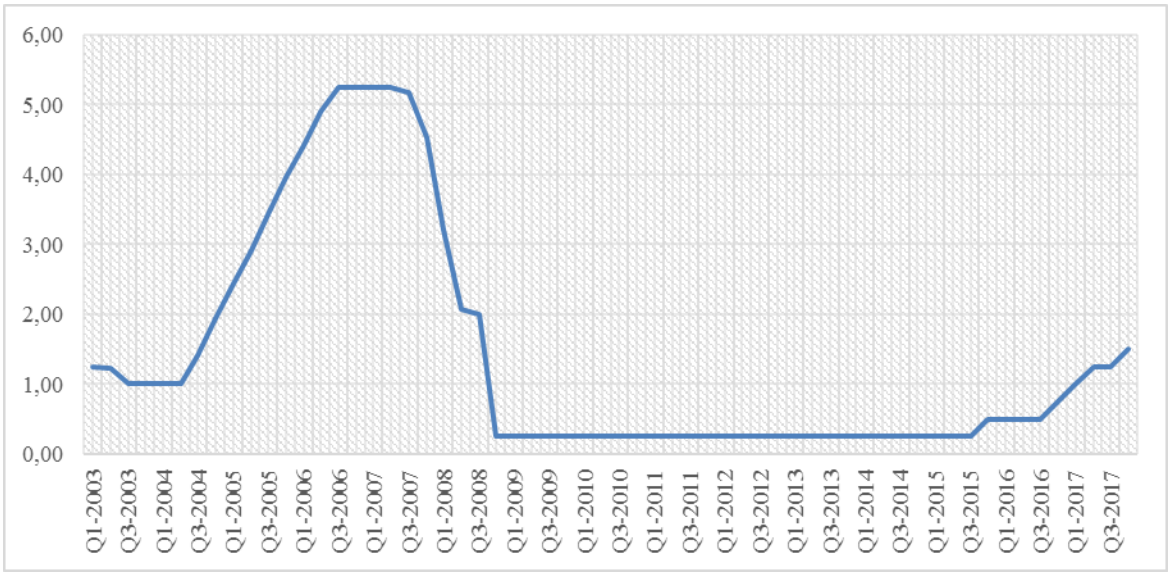

Figure 3 US Federal Funds Rate (%)

Source: *Federal Reserve Bank of St. Louis Economic Data*

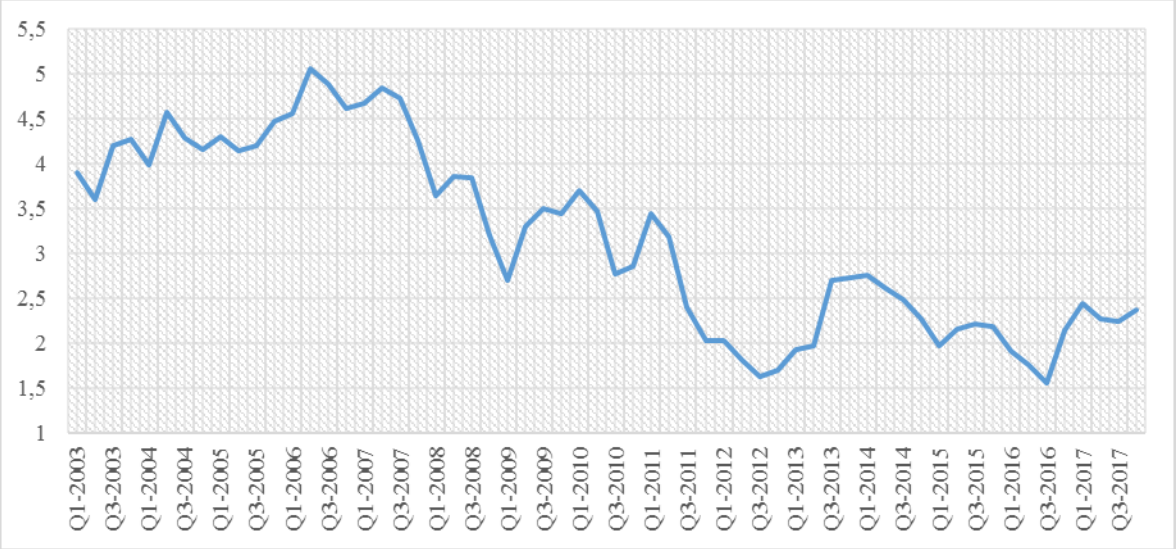

Figure 4 U.S. 10 Year Bond Yield Ratio (%)

Source: *Federal Reserve Bank of St. Louis Economic Data*

Furthermore, it has gradually begun to increase federal funds target rate since December 2015. Moreover, FED has given some signals about reducing its balance sheet in recent years. Therefore, it is hardly surprising that these situations will negatively affect the global liquidity volume in future period.

In addition, we can get some information about global liquidity level in financial markets by analyzing the risk perception of investors. “Chicago Board Options Exchange Volatility Index (VIX)”, for example, is the most prominent index to measure the market’s expectation of future volatility and risk perception of investors. This index is calculated by options in S&P 500 and seen as the significant indicator of stock market in the U.S. This is also considered as fear gauge of investors. As we consider both price and quantity measures of global liquidity together, we can conclude that periods of strong money growth corresponds to the same periods of low volatility and increase in risk appetite (figure 5), while reduction in money and credit growth periods corresponds to high volatility and decrease the risk appetite of investors.

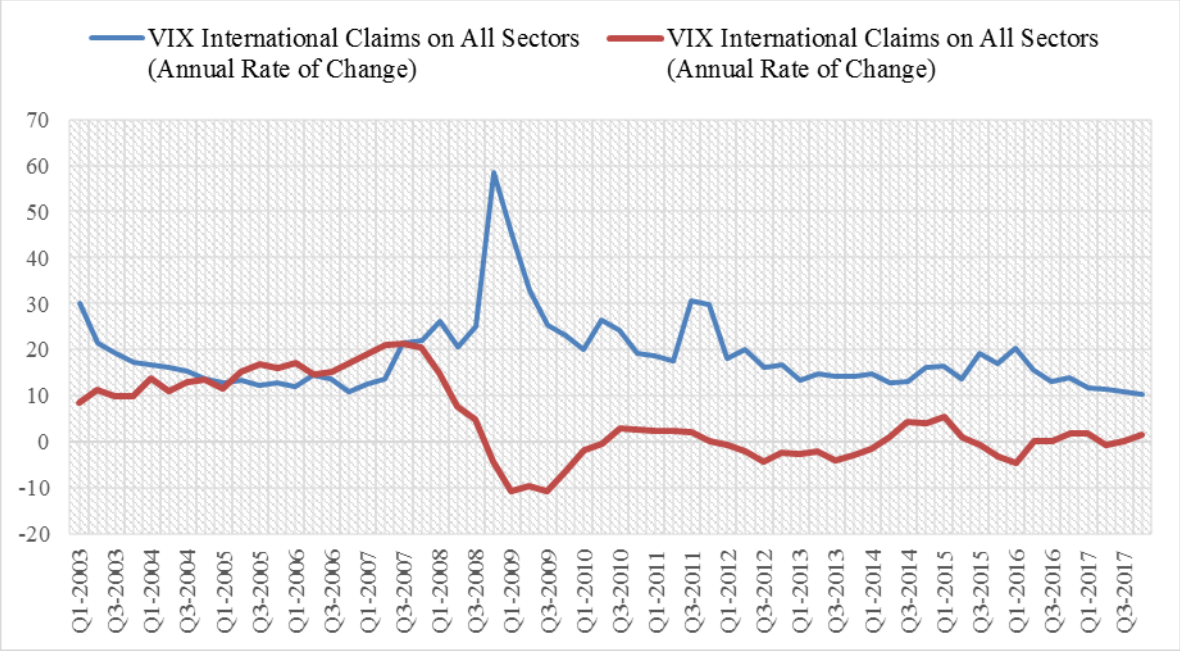

Figure 5 VIX (Chicago Board Options Exchange Volatility) Index and Global Liquidity Growth (%)

Source: *Bank for International Settlements, Bloomberg Database*

As it is shown in both previous and current studies, although there is no single indicator capturing all global liquidity conditions, we can take into consideration several measurement methods to understand the impacts of international monetary conditions.

1.3. THE GLOBAL LIQUIDITY DRIVERS

Global liquidity conditions are driven by some significant factors. Macroeconomic factors, central bank liquidity actions, the attitudes of the authorities in the country, financial integration, financial innovation and risk appetite can be ranked as the main drivers of global liquidity condition.

1.3.1. Macroeconomic Factors

Macroeconomic policies have notable impact on global liquidity via affecting funding costs and investors' perceptions of risk level for world economy as a whole.

Monetary policy stance, for example, is an essential instrument for both money and credit growth. It has an important impact on domestic short run interest rates and it affects credit growth and overall market and funding liquidity. Furthermore, monetary policies have an endogenous nature that move in response to macroeconomic fundamentals (consumer price index or growth in gross domestic product) that can drive risk taking and global credit (ECB, 2012). Therefore, it is obvious that monetary policy stance of economies have a crucial influence on interest rates and this condition transmit to the other related areas of the economy such as both cross border banking flows and decisions of market participants.

Exchange rate regime choice is another key driver of global liquidity. The regime choice is vital for countries to cope with the possible outcomes of global liquidity cycles. In the literature, there are different perspectives about which exchange rate regime is reasonable for countries. However, as it shown in current global financial crisis, protection from spillover effects of external factors could not be ensured by floating exchange rate regime choice or fixed exchange rate. Thus, effects of global liquidity on borrower countries will depend not only on the exchange rate regime choice both also some other factors such as the financial structure of countries (CGFS, 2011).

1.3.2. The Role of Central Banks and the Authorities

Central banks' actions are main drivers of global liquidity and have an important impact on the availability of liquidity especially in crisis periods (Domanski et al, 2011). For instance, during the global financial crisis, private liquidity tended to vanish and global liquidity level was determined by individual banks' access to official sector funding. Leading central

banks implemented expansionary monetary policies in this period and tried to revive funding markets by quantitative easing policies and decreasing their target rates.

On the other hand, the attitudes of the authorities to make regulations for accessing cross border funding by establishing fundamental institutions and instruments, forming infrastructure system and legal framework have crucial roles on global liquidity creation. Moreover, coherent regulations and supervisions across countries are also vital. When multinational financial institutions encounter extraordinary bureaucratic barriers in some countries, they can withdraw from such markets and global liquidity creation process can be interrupted. For eliminating such problems, countries can create the legal framework of cross border financing.

1.3.3. Financial Integration, Financial Innovation and the Risk Appetite

Financial integration plays a crucial role for reaching financial instruments in different regions. Financial integration contributes to spillovers of domestic liquidity to different economies. Moreover, both international banks and multinational investment funds play an important role for financial integration by accessing the number of borrowers in world monetary system. As a result, these conditions of global liquidity trigger local activity in the crisis period (IMF, 2014).

Financial innovation is also essential for money creation and increases funding liquidity (ECB, 2012). Securitization is a good example for financial innovation that involves the transformation of illiquid assets into more liquid ones. Collateralized funding and derivatives markets can be considered as another financial innovations that contribute to global liquidity creation.

Last but not least, risk appetite of investors plays a key role for global liquidity creation. The readiness of market participants to provide liquidity depends on their risk perceptions

and assessment of them. Sudden shifts in risk appetite have a great power to determine the volume of global liquidity (Bose, 2014).

CHAPTER 2: THEORITICAL BACKGROUND AND THE LITERATURE REVIEW

2.1. THEORITICAL BACKGROUND

Researches related to the effects of the global liquidity on sovereign bond spreads have become prominent especially with the increasing pace of financial integration in the world economy (Calvo et al 1993; Kamin and Kleist, 1999; Arora and Cerisola, 2001, Alper and Cigerli, 2005; Dailami et al, 2005, Hartelius et al, 2008; Peiris, 2010; González-Rozada, M. and E. Levy-Yeyati, 2011; Jaramillo and Tejada, 2011, Comelli, 2012).

Financial markets have showed a significant revolution since the 1990s. In this period, emerging markets have issued considerable amount of international bonds and these bonds have become leading instrument for funding their investments. Moreover, multilateral cooperations have also pumped this financial system and funded to developing economies. Thanks to this positive atmosphere in the world financial market, emerging markets have undertaken their structural reforms and improved their economic conditions. However, emerging markets have also become more fragile to external conditions such as global liquidity.

Since global liquidity has a power to affect the cost of borrowing in the world financial markets and the accessibility of funds, global liquidity level in the global markets have become crucial for emerging markets (Arora and Cerisola, 2001). The global liquidity in international markets can affect the sovereign bond spread of emerging markets by effecting cost of borrowing, foreign debt repayment capacity and impacting the risk premium (Kamin and von Kleist, 1999). For instance, the abundance of global liquidity can stimulate the risk appetite of foreign investors, raise capital inflow to emerging markets and give way to decrease the borrowing cost in global markets. In this period, a decline in sovereign bond spread is expected with the help of “ease of financing”. On the other hand, as it is explained in figure 6, decrease in global liquidity reduces the volume of funds in the

world financial markets and can bring about a decrease of foreign investors' risk appetite to emerging markets and may lead them to withdraw from such risky assets. This condition can hamper emerging markets to access the international funds and thus tightening monetary conditions can cause an increase in external debt burden and raise doubt about the repayment capacity of emerging markets due to the increase of borrowing cost in global markets. Thus, risk perception of emerging markets may raise and the sovereign bond spread and also the macroeconomic vulnerability of developing economies can increase in the end (Calvo et al, 1993).

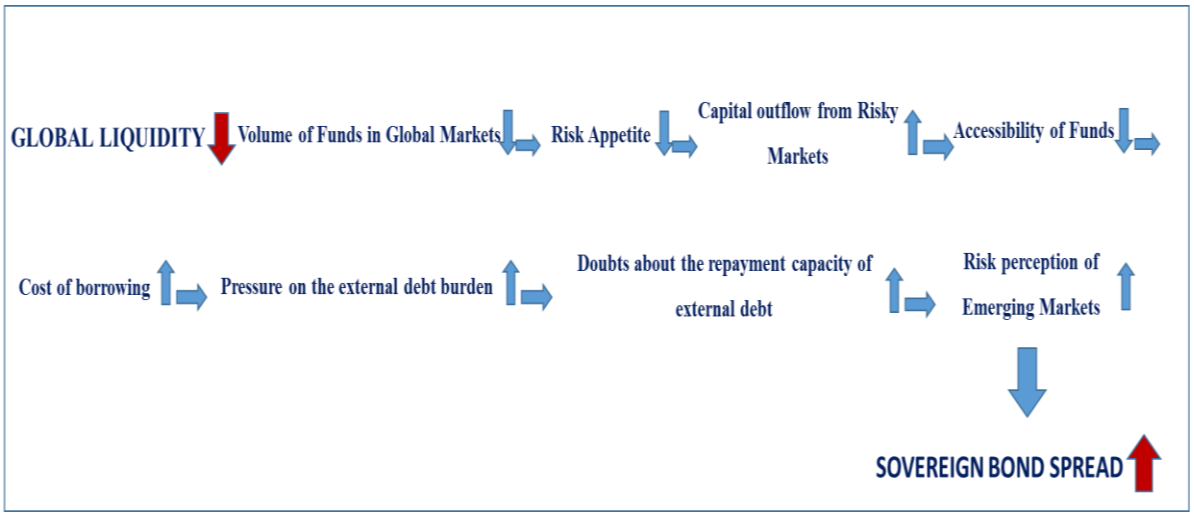

Figure 6 General Results of the Decrease in Global Liquidity on Sovereign Bond Spread of Emerging Markets

However, the impact of the fluctuations of global liquidity can be different from one country to another. For instance, if debt levels are moderate, credit spreads of emerging markets are less affected from monetary tightening periods. Otherwise, the decline in global liquidity can bring about a detrimental impact on sovereign spread level of these markets (Ozatay et al, 2007; Dailami et al, 2005). In other words, if the external debt level is high, doubts about the countries repayment capacity can surge in a large extent and capital outflow process can be more rapid. Moreover, if the economic activity is dependent on foreign investment (portfolio), economy can enter recession, the unemployment rate can

increase, the default risk of country may rise and the sovereign bond spread can be affected more from a decline of global liquidity when compared to other countries who have a moderate debt level.

As it is explained above, although global liquidity has a key role on sovereign bond spread, many factors can affect sovereign bond spreads through several channels. However, which factors are crucial on sovereign bond spread is still a prominent question among researchers in the recent literature. As seen in the literature, it is possible to categorize indicators affecting sovereign bond spread via two different ways. While the first one is defined as the pull (country specific) factors such as fiscal indicators, foreign debt stock, real GDP, current account deficit and real exchange rate, the other one represents the push (global) factors such as international liquidity and risk appetite. Although there are many factors affecting the risk perception of countries, there is no single formula that explains all countries' sovereign bond spread because of each country's own structures and mechanisms. But, even if the effects of variables on creditworthiness of countries differ from one country to another, we can obtain some information from the existing literature and shape our model considering the economic structure of studied countries.

2.2. LITERATURE REVIEW

In the literature, several empirical studies investigate the determinants of country risk of both advanced and developing countries. Researchers have tried to explain the fluctuations of sovereign bond spread via domestic fundamentals such as growth in gross domestic product, external debt and fiscal balance or/and by global factors like global liquidity and global risk aversion. Moreover, there is an existing literature that focuses on the impact of political factors such as public management, democratic system and political regime.

Country-specific factors have been employed as an important determinant of country risk in several studies. In an early study, Edwards (1985) examines the risk level of the least developed countries (LDCs) and show that the risk level of LDCs is a positive function of

external debt to GDP ratio and negative function of investment to GDP ratio. Moreover, Cantor and Packer (1996) broadly focus on the impact of the credit ratings and the country-specific factors to explain the country risk level. This study analyzes quantitatively and systematically the determinants of credit ratings. They employ eight indicators to determine the ratings of the 49 countries. Since some indicators are correlated, they construct a multiple regression to quantify their combined explanatory influence and show the role of variables on the credit ratings. Finally, they indicate that GDP per capita, growth in gross domestic product, foreign debt, development level, default history and inflation have an essential role on risk level of countries. They also indicate that sovereign ratings are correlated with country-specific factors and thus credit spreads of countries.

Alexopoulou et al (2009) show the significance of macroeconomic fundamentals on sovereign bond spread in new European Union (EU) countries. They use dynamic panel error correction method and indicate that foreign debt level, current account deficit, exchange rates, foreign trade volume to GDP ratio, inflation and short term interest rates have an essential role on sovereign bond spread of these countries. Ferreira (2010) also emphasizes the importance of country-specific factors and displays that current account, public debt and imports over foreign exchange reserves are key elements for the risk perception of Brazil.

Martinez et al (2013) examine the key indicators of country risk in Latin America and prove the contagion impact of these markets especially in 2008 crisis. They show that inflation, international reserves and foreign debt are essential on the risk level of Latin American countries. In addition, they display that EMBIG spreads of developing countries were affected significantly in the crises period. Moreover, Presbitero et al (2015) examine the sovereign bond spreads of least developed and developing countries. They show that strong external and fiscal factors, strong GDP growth and the effectiveness of governments play key roles for reducing sovereign bond spreads.

Furthermore, the impact of credit ratings has also been examined to explain the sovereign bond spread of countries. Teles and Leme (2010), for example, analyze the risk level indicators such as EMBI and Credit Rating Agencies (CRA's) and aim to detect whether these institutions truly reflect the market fundamentals or whether they don't have any tolerance for some countries. In addition, Jaramillo and Tejada (2011) indicate the importance of investment-grade ratings on EMBI Global spread for emerging markets. They use fixed effects panel regression with robust standard errors for 35 developing countries and reveal that investment grade plays a crucial role on financing costs and also affects market expectations and risk appetites of investors. Moreover, they reveal that while global liquidity has essential role on EMBI Global spreads, external debt level and economic growth help to reduce the sovereign bond spread.

On the other hand, some studies draw more attention to the importance of fiscal factors to explain the sovereign bond spread of countries. Akitoby and Stratmann (2006), for example, show the importance of fiscal policy on sovereign bond spread. They use panel data for emerging market economies and prove that reductions in public expenditure are crucial for decreasing the spread level of countries. They also prove that debt-financed current spending surge sovereign risk by more than tax-financed current spending.

Baldacci et al (2008) also investigate the determinants of country risk premiums by utilizing the panel for 30 developing countries. The study reveals that macroeconomic fundamentals and "financial health" are more remarkable than both global monetary conditions and appetite of risk on sovereign bond spread in emerging markets. Also, they indicate the importance of fiscal factors on capital inflow and cost of borrowing. They also show the impact of crisis on country risk might be more sizable especially if countries experience a crisis with fragile economic structure. Baldacci and Kumar (2010), on the other hand, focus on the impact of fiscal deficits on sovereign bond yield in 31 economies and find that in addition to institutional, structural and global financial conditions, huge fiscal debt has a crucial impact on long-term interest rates.

Political factors have also been employed to show the determinants of country risk in emerging economies. Rocha and Moreira (2010), for instance, focus on the country-specific fundamentals and examine policies that might decline the fragility of emerging markets. They support the importance of debt management, sustainable growth, liberalization in finance, and shows that these instruments have been crucial for economic recovery in emerging markets after global financial crisis.

Boubakri et al (2011) also investigate the effects of the political structures on country risk in emerging markets and display the remarkable effects of political elements on risk perception of developing economies. They assert that credibility of political institutes may support borrowers for reaching global markets without high level of cost. Yu (2016), on the other hand, investigate the significance of political factors on sovereign default and indicate that instability of political factors increase the probability of default. The study employs panel logit model and estimates the impact of political elements. It suggests that countries can face with sovereign default when their democratic systems are not strong enough or they have relatively younger political regimes. In addition, Tebaldi et al (2017) use generalized method of moment estimator to show the main drivers of risk level in observed developing markets. The results show that growth in gross domestic product, the real effective exchange rate and political liberation have significant effects on spreads.

On the other hand, global factors have been underlined as significant factor on the risk perception of emerging economies. For instance, Ferrucci (2003) employs pooled mean group estimator and demonstrates the long-term determinants of bond spreads in developing countries and his result shows that sovereign bond spread and global liquidity conditions are highly related with each other. Dailami et al (2005) also use the same method and show the existence of nonlinearity between global liquidity and the risk level of emerging markets. They prove that global liquidity, measured by US interest rate, is crucial for the solvency of emerging markets. However, they also stress that if debt levels are moderate, credit spreads of emerging markets are less affected from monetary tightening

periods. Otherwise, the decline in global liquidity can cause a sharp increase on sovereign spread level of these markets.

Herrero and Ortiz (2007) analyze the global risk aversion and its drivers such as the economic growth and long term interest rates of the U.S. to show the determinants of the country risk in Latin America. They find that, the impact of global risk aversion on sovereign bond spread of Latin American countries varies in this region. Moreover, they also examine the drivers of global risk aversions and find that both economic growth and long term interest rates of the U.S have a significant role on sovereign spread. Ebner (2009) shows that although impacts of macroeconomic fundamentals differ across countries, external risk aversion is the most important factor on sovereign bond spread for countries.

Bellas et al (2010), on the other hand, prove that global liquidity, measured by the VIX and the U.S. government securities yields, has a significant impact on EMBI index in the short term. However, they suggest that macroeconomic factors become more important on sovereign bond spreads in the long run. They also emphasize the importance of political risks and asymmetric information on EMBI of countries. Furthermore, Rozada and Yeyati (2011) emphasize the significance of global liquidity and risk appetite on sovereign bond spread via panel error correction model and assert that these variables are responsible for the large part of the long term cycles on emerging market spreads. In addition, Comelli (2012) suggests that effects of domestic and global factors on country risk differ over time. The stduy separates the time span to three different periods which are 1998:01–2011:12, ample global liquidity period that comprises 2003:01- 2007:07 and global financial crisis periods which covers 2007:08-2011:07. Afterwards, it forms three different panel regression models. His findings show that both domestic conditions and global factors such as U.S. monetary conditions and risk appetite of investors measured by VIX index have crucial impacts on sovereign bond spread in 1998:01–2011:12. However, he emphasizes that U.S. ten year bond yields is not effective on the sovereign bond spread of countries in both the ample global liquidity period and the global financial period.

Csontó (2014) shows that although both macroeconomic indicators and external conditions have significant roles on emerging markets' bond spread, global factors is more important than country-specific macroeconomic factors in the short run. However, the study also draws attention to the power of macroeconomic fundamentals since they can alleviate the possible negative impacts of global conditions.

Some researchers have focused on the predictability of FED decisions or U.S. economic policy actions to explain the sovereign spread level of countries. Arora and Cerisola (2001) investigate the possible effects of U.S. monetary strategy on country risk in developing countries and conclude that predictability of U.S. monetary plans has a positive impact on the risk level of the emerging markets. Moreover, Evrensel and Kutan (2008) show whether sovereign bond spread of Indonesia and Korea are effected by the IMF-related news and they suggest that their own news of Indonesia and Korea related to program negotiations or approval reduce the sovereign bond spread. Moreover, Hartelius et al (2008) investigate the determinants of risk level in emerging countries by considering both economic fundamentals and global liquidity conditions. They employ fixed effects panel regression model and their results show that while fundamentals are crucial on sovereign bond spread, expectations about U.S. monetary policies have remarkable impact on EMBIG.

Regional studies are also prevalent in the literature. Dumicic and Ridzak (2011) emphasize that while external debt indicators become effective on risk level of countries only during the crisis period, macroeconomic factors as well as global economic conditions are effective on sovereign bond spreads in the Central Eastern Europe (CEE) countries at all times. Izadi and Hassan (2017) analyze the effects of both global and country-specific factors on developed markets in Europe, Pacific Rim regions and North America. They emphasize that global factors are more critical than regional instruments on country risk. Moreover, they indicate that Eurozone is not affected from global factors as much as North America and Pacific Rim regions. Furthermore, they present the importance of inflation on sovereign bond spreads in observed regions. In addition, VIX index, employed as a risk aversion of market is founded significant on all observed countries in the study.

There is an existing literature analyzing the determinants of the sovereign bond spread in Turkey. Alper and Cigerli (2005), for example, focus on the U.S. monetary policies and show the essential role of “surprise" U.S. monetary policies” on sovereign bond spread of Turkey. Ozatay et al (2007) also investigate the effect of global liquidity, US macroeconomic news and country-specific elements on sovereign spread of developing markets such as Turkey. Using both conventional panel data estimation and panel mean group method, they show that sovereign bond spread is affected from global monetary conditions, US macroeconomic news and risk appetite of investors. Moreover, the study also indicates the importance of country-specific factors especially when the spreads are determined by external factors. In other words, if macroeconomic fundamentals are robust in emerging markets, they can absorb the negative impacts of external shocks on sovereign bond spread. Ozmen and Yasar (2016) examine the effects of sovereign credit ratings and global financial conditions on sovereign bond spread of emerging markets and show that both factors have remarkable impact on EMBIG spreads of countries.

As it is seen in the literature review, studies related to the possible outcome of monetary tightening periods on risk level of emerging markets and asymmetric impact of global liquidity on sovereign bond spread of developing economies are limited. Moreover, to examine whether there is a cointegration between sovereign bond spread and global liquidity, most of the studies employ panel data and there are only few studies considering individual country studies. Taking into account to the external debt to GDP ratio of Turkey which realized as 53.3% in 2017 and considering the Turkey’s position in fragile five, Turkey can be significantly affected from quantity tightening periods. Because of that, country based study will be helpful to show the impact of global liquidity conditions on sovereign risk of Turkey and present some policy implication for the country in future periods.

CHAPTER 3: THE EMPIRICAL METHODOLOGY

In this chapter, two different approaches are used to evaluate the long relation between global liquidity and sovereign bond spread of Turkey. First, to check for the existence of cointegration between global liquidity and the sovereign bond spread of Turkey, we use ARDL bounds testing approach pioneered by Pesaran et al (2001). Then, to identify whether there is an asymmetric relation between global liquidity and the sovereign bond spread of Turkey, NARDL model is employed proposed by Shin et al (2014).

3.1. DATA

In this section, the data are introduced by graphs with the aim of acquiring a general opinion about the path of the series. Since the global liquidity is deeply analyzed in chapter 2, it is not mentioned again in this section.

- **Emerging Markets Bond Index Global (EMBIG) of Turkey**

The dependent variable in this study is the "Emerging Market Bond Index Global (EMBIG)" spread of Turkey. It is used as a standard measure of sovereign default risk and also employed to show the borrowing cost of emerging countries in global financial markets. Furthermore, it is monitored by both investors and policymakers to evaluate the financial vulnerability of emerging markets.

We employ EMBIG spread of Turkey rather than the general definition of sovereign bond spread which is the difference between the yields on sovereign bonds of developing countries and bonds issued by risk free bonds of developed countries with same currency and maturity. Because, EMBIG spread includes "market-capitalization-weighted average of spreads on dollar denominated Brady bonds, Eurobonds and traded loans issued by sovereign and quasi-sovereign entities" (Csantó and Ivaschenko, 2013). In other words, this

index gives us more comprehensive and accurate information about the risk level of sovereign bonds and also gives opinion about country risk in emerging markets.

Initial EMBI was launched in 1992 covering so-called Brady bonds. These bonds were dollar denominated and issued by Latin Americans, but was later expanded to also dollar-denominated loans and Eurobonds. The principal and interest payments on these bonds are made in U.S. dollars rather than a foreign currency, which eliminates currency risks for bondholders. The EMBI+ was subsequently introduced to also track total returns for external debt instruments in emerging markets around the world. Shortly after, the EMBIG was launched as the final emerging market bond index introduced as an expanded version of the EMBI+, covering more eligible instruments than the EMBI+ by using less strict limits on secondary market trading liquidity. Many large emerging market bond funds now use the EMBIG spread as a benchmark to compare their performance relative to the market (Kuepper, 2017).

- **External Debt Stock to GDP Ratio**

Foreign debt stock is used as a remarkable indicator to gauge the creditworthiness and repayment probability of debtor countries as well as a general measure of risk. A country which has a considerable amount of foreign debt is shown highly vulnerable to external shocks and seen as on the edge of default. In other words, higher foreign indebtedness is considered as a high level fragility and raised doubts about the solvency power of borrowers. Edwards (1985), Bellas et al (2010), Jaramillo and Tejada (2011), Martinez et al (2013), Alexopoulou et al (2009) and Yu (2016) suggest that external debt plays a crucial role on sovereign bond spread.

For instance, foreign debt stock to GDP ratio of Turkey realized as 53.3% in the last quarter of 2017. That is, the nominal GDP of Turkey is highly dependent to foreign debt stock and external conditions. Therefore, any negative external shocks such as decrease in the global risk aversion or decline in global liquidity may bring about an increase in the borrowing

cost in the world financial markets and can increase the pressure on repayment capacity of Turkey. Moreover, any suspicion about the solvency problem of Turkey may increase the risk perception of foreign investors and this situation can cause capital outflow from Turkey in the end. As a result, it is hardly surprising that the increase of the risk perception is reflected in the sovereign bond spread of countries. Therefore, it is expected that the increase of foreign debt stock to GDP rate has an adverse effect on sovereign bond spread of Turkey.

- **The Real GDP**

The Real GDP can be seen as a total result of the improvements in different area of the economy from real to financial sector. Therefore, while real GDP is seen as a crucial driver to attract investors trustworthy to countries (Cantor and Pecker, 1996; Ferucci, 2003; Jaramillo and Tejada, 2011; Comelli,2012), it is also used as an explanatory variable to show the impact of domestic fundamentals on sovereign spread of countries (Calvo, 2003; Csanto, 2014, Yu, 2016; Nguyen and Zuluga, 2017).

The real GDP can be considered that the wheels are turning in the economy. Because of that, it is one of the key indicators for foreign investors to assess the general risk of the emerging markets. Therefore, we expect that increase of the real GDP rate has positive impact on sovereign bond spread of Turkey.

After the preliminary understanding the essential role of the explanatory variables in our model, it is useful to view the general path of the series via graphs which covers 2003:Q1-2017:Q4 period.

In 2001, Turkey launched the Strong Economy Transition Program with the aim of structural transformation, fiscal discipline, conservative fiscal policy, sustainable growth and inflation control. Thanks to decisive attitude of Turkey about making structural transformations in the economy, Turkey’s macroeconomic fundamentals began to recover

and this recovery also reflected positively to the risk perception of Turkey. The EMBIG spread of Turkey started to decline after the third quarter of 2002. Thanks to this proper condition, Turkey got its strength back and began to grow again after four long recession periods.

As it is shown in figure 7 and figure 8, until the last quarter of 2005, while the real GDP growth maintained decisively, external debt to GDP ratio of Turkey sustained its downward trend. This positive condition also reflected the sovereign bond spread of Turkey and the EMBIG spread gradually decreased in the same period.

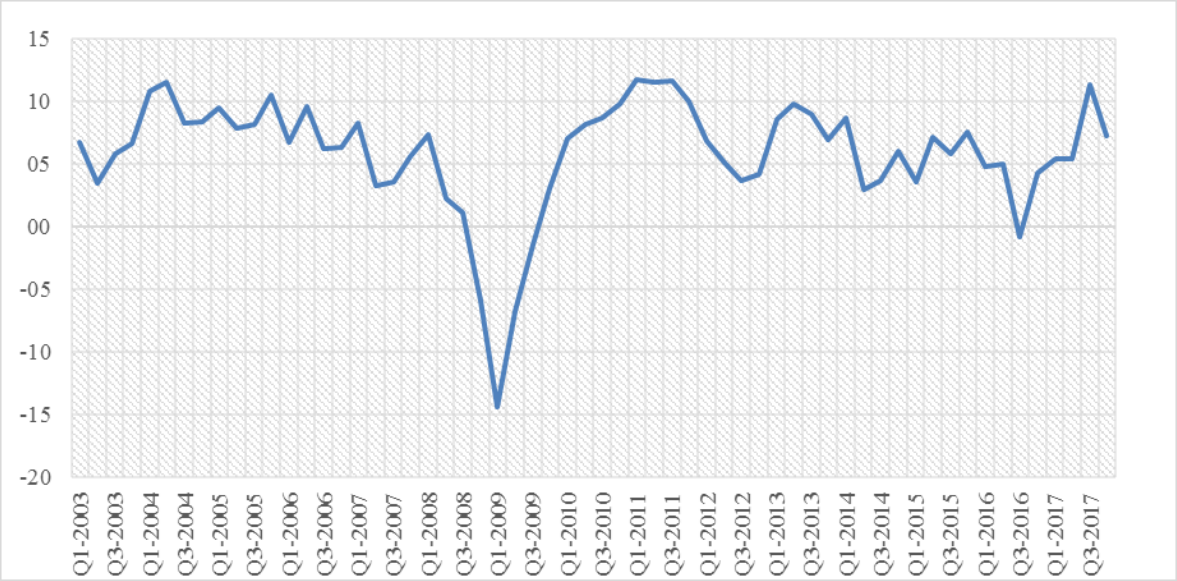

Figure 7 The Real GDP Growth of Turkey

Source: *Turkish Statistical Institute (TURKSTAT)*

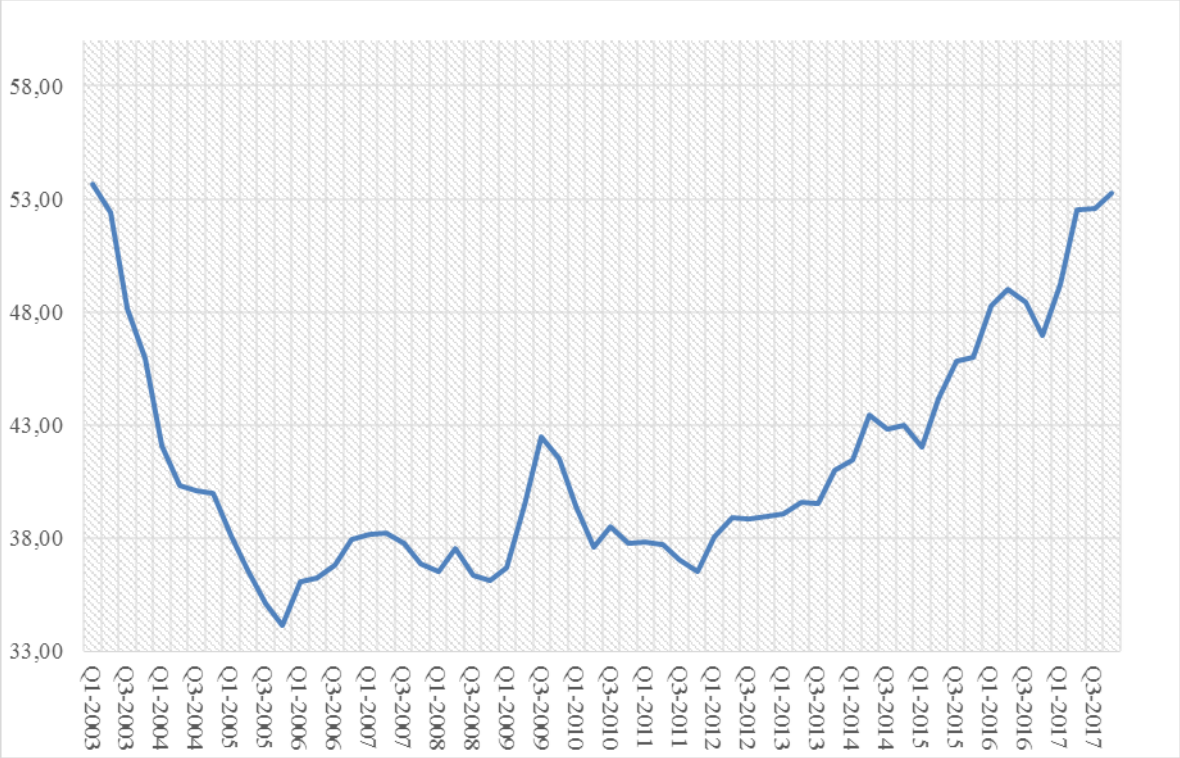

Figure 8 Foreign Public Debt Stock to GDP Ratio of Turkey (%)

Source: *Republic of Turkey Prime Ministry, Undersecretariat of Treasury*

However, conditions changed after the beginning of 2006. After this period, while the real GDP growth of Turkey continued to rise, the external debt stock to GDP ratio of Turkey also began to increase in this period despite the period between 2002:Q3 and 2005:Q4. Furthermore, global liquidity and the EMBIG spread of Turkey started to move upwards together, in spite of their almost negative relation before the second half of 2007. As a result, Turkey's growing history was over in the 3rd quarter of 2008 which corresponded to global financial crisis. As many developing countries, Turkey entered a recession period started in the last quarter of 2008 and lasted until the third quarter of 2009. In this period, while the external debt stock increased substantially, external debt stock to GDP ratio reached to 42.5%. Moreover, in the last quarter of 2008, sovereign bond spread of Turkey had reached the highest level between the third quarter of 2003 and the last part of 2008.

It is seen in Figure 7 and figure 9 that the economic recession periods of Turkey coincided with the shrink of the global liquidity. That is, while global liquidity shrunk between the fourth quarter of 2008 and the first half of 2010, real GDP contracted between fourth quarter of 2008 and the third quarter of 2009. We can also notice in figure 9 that the EMBIG spread reached the highest level among this period. Thus, these cases give some information about the effects of global liquidity on fundamentals and the risk level of the country.

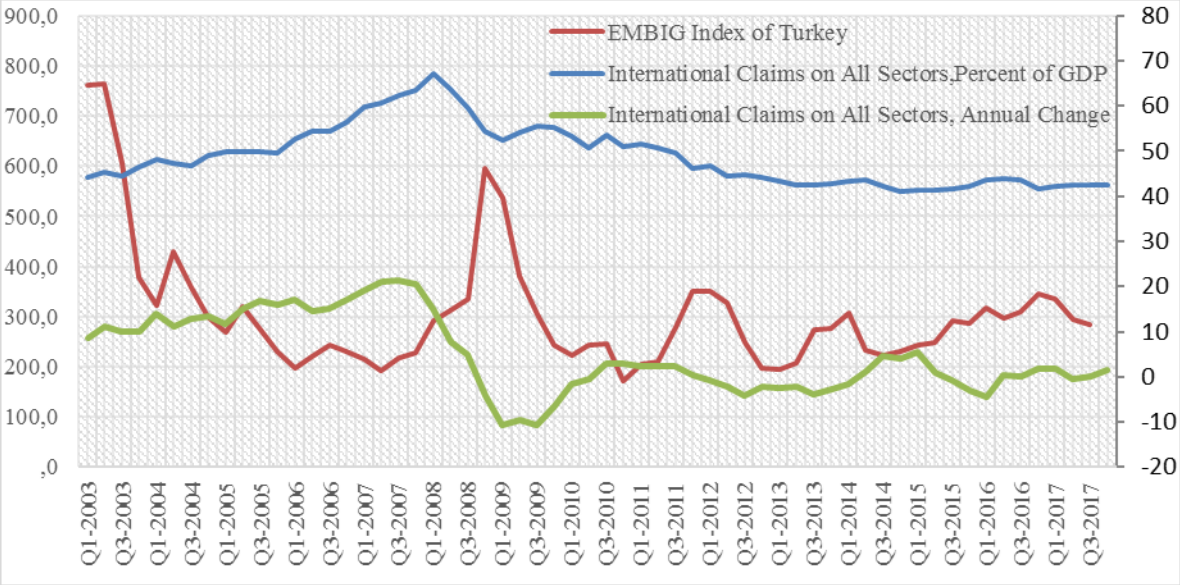

Figure 9 International Claims on All Sectors and the EMBIG Spread of Turkey

Source: *Bank for International Settlements, Bloomberg*

Especially after 2008, leading central banks came to the fore to recover and stimulate the economic activity in the world. To overcome the global recession, central banks employed their money creation tools. In response to the financial crisis, for instance, United States began to reduce drastically its policy interest rate followed by the United Kingdom. Afterwards, European Central Bank (ECB) and Bank of Japan (BOJ) launched the

Quantitative Easing (QE) to revive the economic activity in the world. These attitudes also stimulated the increase of global liquidity.

This attitude of leading central banks helped the ease of financing in international markets. Therefore, Turkey again directed to international markets especially through the private sector channel as a result of attractive atmosphere in global markets. Since Turkey applied a conservative fiscal policy and domestic saving rates were inadequate in the country, both financial and nonfinancial private institutions in Turkey directed to external savings for funding their investments. After the effects of the great recession diminished, economic activity began to rise and in the first quarter of 2011, Turkish economy displayed the fastest growth rate between 1998:Q1 and 2011:Q1. However, the external debt stock to GDP ratio also increased and current account deficit reached the highest level in this period.

As it is seen in figure 8, the external debt stock to GDP ratio of Turkey has shown an increasing trend since the last quarter of 2011. This situation is very crucial because external debt ratio shows the repayment probability, creditworthiness, fragility and the dependence to the external conditions of countries (Edwards, 1985; Bellas et al, 2010; and Martinez et al, 2013; Alexopoulou et al, 2009). In addition, FED announced that its quantitative easing policy ended in October 2014. Furthermore, it has begun to increase the federal funds target rate since the last month of 2015.Furthermore, it has given some signals about reducing its balance sheet in recent years. Moreover, The European Central Bank (ECB) is also discussing tapering quantitative easing (QE). These actions mean that central banks want to normalize their monetary policy in the long run.

These attitudes of leading central banks suggest a decline in global liquidity in the international financial markets and increase the cost of foreign borrowing, pressure on repayment of foreign debt, strengthen the power of main foreign currencies, pressure on inflation rates, capital outflow from emerging markets, hard conditions for funding investment, unemployment, economic recession and finally increasing risk perception of emerging markets and increase of sovereign bond spread in developing economies. These

consequences can also be ranked as the possible outcome of the decrease in global liquidity for emerging markets.

- **The Data Sources**

The empirical analysis utilizes quarterly data. The data of the EMBIG that is available from 6/28/1996 to 31/12/2017 are taken from the Bloomberg Database.

Global Liquidity indicator is obtained from Bank for International Settlements (BIS) Statistical Database. The data of banks international claims on all sectors is used as a proxy for global liquidity which covers 1980:Q4-2017:Q4 period (CGFS, 2011).

Gross external debt stock of Turkey is taken from Undersecretariat of Treasury. The external debt data is available quarterly for the period 1989:Q4:1-2017:Q4 and it is dollar denominated.

Nominal gross domestic product (GDP) of Turkey is obtained from Turkish Statistical Institute (TURKSTAT). It is a quarterly data which covers 1998:Q1 – 2017:Q4 period. Since Nominal1 GDP of Turkey is measured as a domestic currency, it is transformed to dollar denominated data by dividing to nominal USD/TRY exchange rate. Nominal USD/TRY is obtain from Central Bank of Republic of Turkey (CBRT). Real GDP is also obtained from TURKSTAT and covers the same period of Nominal GDP. Chain linked volume index is employed for real GDP in this study.

Since the study focuses on quarterly data and the EMBIG spread has a daily frequency, the EMBIG spread is converted to quarterly data by taking simple average of daily data.

3.2. THE EMPIRICAL ANALYSIS

In the next section, we investigate the linear and nonlinear relation between global liquidity and the sovereign bond spread of Turkey between 2003:Q1 and 2017:Q4 periods via

establishing Autoregressive Distributed Lag (ARDL) bounds-testing model developed by Pesaran et al (2001) and Nonlinear Autoregressive Distributed Lag (NARDL) model proposed by Shin et al (2014).

3.2.1. Descriptive Statistics

Before analyzing the models, it will be useful to know general information about the employed variables. In Table 1, we basically introduce the overall description of the series.

Table 1 Descriptive Statistics of Variables

Variables	Mean	Median	Maximum	Minimum	Standard Deviation	Skewness	Kurtosis
LogEMBIG	5.66	5.64	6.64	5.15	0.32	1.25	4.74
LogRealGDP	4.75	4.70	5.23	4.20	0.25	0.01	2.19
Foreign Debt Stock/ GDP (%)	41.39	39.44	53.67	34.16	5.20	0.96	2.81
Banks International Claims on all sectors (%)	48.90	47.03	67.15	41.17	6.68	0.85	2.87

3.2.2. The Econometric Methodology

This section shows the relation between global liquidity and the EMBIG spread of Turkey by accounting for some additional factors. Two different approaches have been used to evaluate the long relation between global liquidity and sovereign bond spread. First, to prove the existence of cointegration between global liquidity and sovereign bond spread of Turkey, we use (ARDL) bounds testing approach. Then, to identify whether there is an asymmetric relation between global liquidity and sovereign bond spread of Turkey, we employ NARDL model.

While selecting the explanatory variables which may have an impact on sovereign bond spread of Turkey, we follow the existing literature. (Edwards, 1985; Bellas, 2010; Csonto, 2013; Baldacci, Gupta and Mati, 2008; Baldacci and Kumar, 2010; Rocha and Moreira, 2010; Ferreira 2010; Peiris, 2010; Hartelius et al, 2008; Comelli, 2012; Tebaldi, Nguyen and Zuluga, 2017 et al.).

Thus, the real GDP of Turkey, the foreign debt stock to GDP ratio of Turkey and the global liquidity are employed as determinants of the EMBIG spread of Turkey in our model. The long run model in question is as follows:

$$LogEMBIG_t = \vartheta_1 + \vartheta_2 \text{Log}Y_t + \vartheta_3 FDS_t + \vartheta_4 GL_t + \varepsilon_t \qquad (1)$$

Where the EMBIG spread is the emerging market bond index global spread and is the proxy of risk perception level of Turkey, Y is the real GDP and FDS is external debt to nominal GDP ratio of Turkey. Moreover, international claims on all sectors obtained from Bank for International Settlements (BIS) is employed as a proxy of global liquidity and it is shown by GL.

There is a general consensus that the real GDP has a positive contribution to risk perception of countries (Cantor and Pecker, 1996; Ferucci, 2003 Comelli, 2012). Thus, the EMBIG spread is expected to decrease when the real GDP increase in the country. On the other hand, external debt is another key determinant for countries to show their fragility to negative external shocks (Edwards, 1985; Bellas et al 2010; Martinez et al, 2013 and Alexopoulou et al, 2009). It is hardly surprising that if one country who has a significant dependency to external debt, it can be in danger of insolvency problem in the long run. By that logic, while estimate of real GDP is predicted to be negative, the coefficient of public debt stock to GDP ratio is expected to be positive in the long run. Finally, as it is mentioned in previous section, it is clear that global liquidity level is essential for Turkey because it has a contagion effect on nearly all financial and macroeconomic indicators of the country such as stock exchange, real effective exchange rate, current account, inflation rate,

national income and employment. Thus, estimates of global liquidity are expected to be negative at the first glance for Turkish economy.

After the general interpretation of the long run model, we can now start to introduce the ARDL bounds-testing approach and Nonlinear Autoregressive Distributed Lag (NARDL) model.

3.2.2.1.ARDL Bounds Testing Approach

ARDL bounds testing approach pioneered by Pesaran et al (2001) targets to show the existence of cointegration between variables. When compared to early cointegration methods, this test presents us many facilities. First, our sample covers 60 quarters and the robustness of ARDL model is proven even for small sample sizes. Second, ARDL bounds testing model makes it possible to show the behaviors of variables in the long and the short term simultaneously. Furthermore, many cointegration models adopted in the literature in previous years focus on variables which are stationary in the same order such as Engle and Granger (1987) cointegration test which works in bivariate cases and Johansen (1988, 1991) which is convenient in multivariate systems. However, ARDL bounds testing approach is implemented regardless of whether the variables under study are stationary in I(0), I(1) or mutually cointegrated.

Before beginning to analyze the ARDL and NARDL models, we should be sure that no I(2) variable is available in both models via consulting unit root test because of the structure of the Pesaran et al (2001)'s new tabulated variables.

3.2.2.1.1. Unit Root Tests

Unit root test is essential in many cointegration methods which consider the stationarity of variables. Even if these two approaches relax from investigating stationarity of the variables at same I(0) or I(1) level, we have to test stationarity levels of the variables to be

sure that no I(2) variable is available in our model. This is important since Pesaran et al (2001) have formed their new tabulated variables without considering I (2) which make the cointegration test invalid. In other words, the critical bounds' tabulated by Pesaran et al. (2001) are formulated only via considering I(0) as well as I(1). Therefore, we employ the Augmented Dickey Fuller (ADF) test to approve that there is not any nonstationary variable in our model. The results have been demonstrated in Table 2.

Table 2 ADF Test Results

Series	Levels		
	Intercept	**Trend and Intercept**	**No intercept no Trend**
LogEMBIG	-2.47	-2.89	-0.02
LogY	-0.02	-3.16	2.31
FDS	-2.00	-1.98	0.42
GL	-1.92	-0.80	0.99
Series	**First Differences**		
	Intercept	**Trend and Intercept**	**No intercept no Trend**
LogEMBIG	-7.47***	-7.42***	-7.52***
LOGY	-3.49**	-3.45*	-2.28**
FDS	-4.97***	-4.94***	-4.94***
GL	-10.14***	-10.29***	-10.02***

Notes: *, **, *** indicates 10%, %5, and %1 significance level, respectively.

As it is shown in Table 2, although emerging market bond index global spread, (LogEMBIG), Real GDP (logY), external debt to GDP ratio (FDS) of Turkey and global liquidity ratio (GL) are not stationary at levels (I (0)), all variables are stationary in I (1).

3.2.2.1.2. The Model

Taking into consideration the above explanations, we decide to pursue The Pesaran et al (2001) and rewrite the Equation 1 as an error-correction format. Our error- correction model in question is as follows;

$$\Delta \text{Log EMBIG}_t = \alpha + \sum_{k}^{p} \beta_k \, \Delta \text{Log EMBIG}_{t-k} + \sum_{k}^{p} \gamma_k \, \Delta \text{Log Y}_{t-k} + \sum_{k}^{p} \theta_k \, \Delta \text{FDS}_{t-k} +$$

$$\sum_{k}^{p} \delta_k \, \Delta \text{GL}_{t-k} + \lambda_1 \text{Log EMBIG}_{t-1} + \lambda_2 \text{Log Y}_{t-1} + \lambda_3 FDS_{t-1} + \lambda_4 GL_{t-1} + \varepsilon_t \qquad (2)$$

Where EMBIG is the emerging market bond index global spread, Y is the real GDP, FDS is a external debt to nominal GDP ratio of Turkey, GL is an international claims on all sectors ratio which employed as a proxy of global liquidity, p represent the order of lag, the parameters $\beta, \gamma, \theta, \delta$ are the short term coefficients, Δ symbolize the first difference of the variables and $\lambda_{1,2,3,4}$ are the long run multipliers and ε_t is the error term which is assumed to be serially uncorrelated.

Before reaching some consequences about short run and long run estimations of the variables, the existence of cointegration needs to be tested. In order to test the existence of cointegration, ARDL bounds testing approach propose a Wald test that requires Pesaran et al (2001)'s new tabulated critical bounds. Since ARDL model is valid even if variables are stationary in I(0) or I(1), Pesaran et al., (2001) form new critical upper and lower bounds for each confidence levels. Their study postulate that if Wald test F statistics exceed the upper bounds, this implies cointegration but, if Wald test results remains under the lower bounds, it is assumed that there is not any cointegration between lagged level variables. Finally, if the calculated F statistics realize between the two critical value bounds, this indicates an inconclusive situation (Gumustekin, 2012). While cointegration test formed as $H_0 = \lambda_1 = \lambda_2 = \lambda_3 = \lambda_4$ which indicates the lack of cointegration and the alternative hypothesis of $H_1 \neq \lambda_1 \neq \lambda_2 \neq \lambda_3 \neq \lambda_4$ which signifies cointegration. If the F test result

exceed the upper bound or at least signifies inconclusiveness, afterwards, the results of the estimated model can be interpreted.

In addition, Pesaran et al (2001) suggest to generate one period lagged error correction term to find some evidence about the adjustment process towards equilibrium. To create the error correction term, the long run lagged level variables in Equation 2 ($\lambda_1, \lambda_2, \lambda_3, \lambda_4,$) replace with one lagged error correction term and the model estimates once again with the same chosen lags. If this new error correction term has a negative and significant coefficient, adjustment towards equilibrium is approved. This term is also employed to strengthen the cointegration between the studied variables (Gumustekin, 2012).

Afterwards, we need to consult some additional diagnostic tests to check the autocorrelation and the stability of the short-term and long-term estimated coefficient. These are tested by Lagrange Multiplier (LM) test and CUSUM and CUSUMSQ square graphs in our model, respectively. In addition, we present R^2 to show how good the model fits the data.

3.2.2.1.3. The Results of the ARDL Bounds Testing Model

At first, linear ARDL model outlined by equations 2 has been estimated for Turkey employing quarterly data that covers 2003:Q1-2017:Q4. By utilizing Akaike's Information Criterion (AIC), we have decided to use maximum of four lags for each first differenced variables and also choose the optimum lags. The result of the ARDL is reported in Table 3. In this table, while Panel A shows the short-term estimation results, Panel B demonstrates the long-term estimated variables. Also, diagnostic statistics are presented by Panel C.

As expected, the estimates of the Real GDP negatively affect the sovereign bond spread of Turkey both in the long and the short run. In other words, a one percent increase in Real GDP causes to 0.40 and 0.77 percent decrease on sovereign bond spread in the short run and the long run, respectively, On the other hand, the foreign debt stock to GDP ratio has

not any significant impact on the sovereign bond spread of Turkey in the short run, although the estimate of it positively affects the EMBIG spread in the long run. In other words, while foreign debt stock is not found significant on country risk in the short run, it is shown that a one point increase in external debt to GDP ratio causes to 3 percent increase on sovereign bond spread in the long run. Moreover, even if global liquidity has a negative sign and significant effect on sovereign bond spread of Turkey in the short run, as it seen in Panel B, it has not any significant effect in the long run. In other words, while a one point increase in global liquidity causes to 3 percent decrease on sovereign bond spread in the short run, global liquidity is not significant on sovereign spread of Turkey in the long run.

Afterwards, we can test the existence of cointegration to examine whether the long-run relations between variables are valid. Wald test result realized as 7.20 is significant and that supports cointegration at the 1% level of significance[2]. Moreover, we also calculate the error correction term (ECT_{t-1}) which is an alternative technique to prove and strengthen the existence of cointegration in our model. For understanding the significance level of error correction term, just like the F test, Pesaran et al. (2001) suggest to consult new tabulated t test statistics that have an upper and lower bound critical values. [3] Looking at these critical values which are -3.78 (-4.37) at the 5% (1%) significance level, the error correction term is also found significant. This result also proves the long run relation between the variables.

Furthermore, diagnostics tests are demonstrated in Panel C. To evaluate serial correlation, we employ the Lagrange Multiplier (LM). When distributed as $\chi 2$ four degree of freedom, our reported statistics become insignificant that supports our model has autocorrelation free residuals. In addition, we present R^2 to show how good the model fits the data.

[2] See Pesaran et al (2001, p. 300, Table CI (iii), Case III)
[3] See Pesaran et al (2001, p. 303, Table CII (iii), Case III)

Table 3 Linear Model Estimations (ARDL)

Panel A: Short-run coefficient estimates

Lagorder	**0**	**1**	**2**	**3**	**4**
ΔlogEMBIG		0.46***	0.23*	0.19	
		(3.15)	(1.73)	(1.42)	
ΔGL	-0.03**	-0.03**			
	(-2.31)	(-2.36)			
ΔlogY	-0.40*				
	(-1.78)				
ΔFDS	0.01				
	(0.44)				

Panel B: Long-run coefficient estimates

Constant	**GL**	**logY**	**FDS**
8.19***	-0.01	-0.77***	0.03***
(8.63)	(-0.90)	(-5.23)	(4.45)

Panel C: Diagnostics

F	**ECT_{t-1}**	**LM**	**CUSUM**	**CUSUMQ**	**R2**
7.20***	-0.67***	2.82	S	S	0.46

Notes: t-ratios of parameters is shown in the parenthesis. *, **, *** indicates 10%, %5, and %1 level of significance, respectively.

Morever, following Pesaran et al (2001), we need to be sure the short-run and long-run coefficient estimates are stable. With this purpose, we apply the CUSUM and CUSUMSQ tests and show the stability and instability of the coefficients by “S” and “U in Panel C, respectively. Brown et al. (1975) presents CUSUM tests to establish the structural breaks. The CUSUM test is adapted to test the hypothesis of stability of the long-run relations between sovereign bond spread of Turkey and the global liquidity as well as the other variables. The curves of the CUSUM and CUSUMQ tests should be within the limits of the confidence interval at the 5% threshold. The result shows that although the model chosen to estimate the relationship among the global liquidity and the EMBIG of Turkey as well as the other variables is stable according to CUSUM test, the short-run and long-run coefficient estimates are not found stable in CUSUMQ test. Therefore, it will be sensible to consult NARDL model and test whether there is any nonlinear relation between global liquidity and the sovereign bond spread of Turkey.

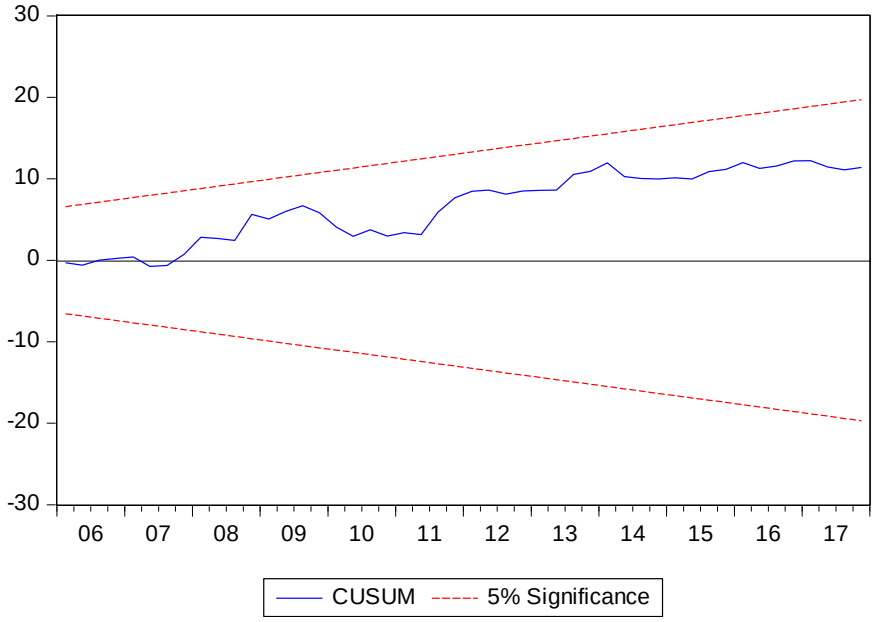

Figure 10 CUSUM test result ARDL Model

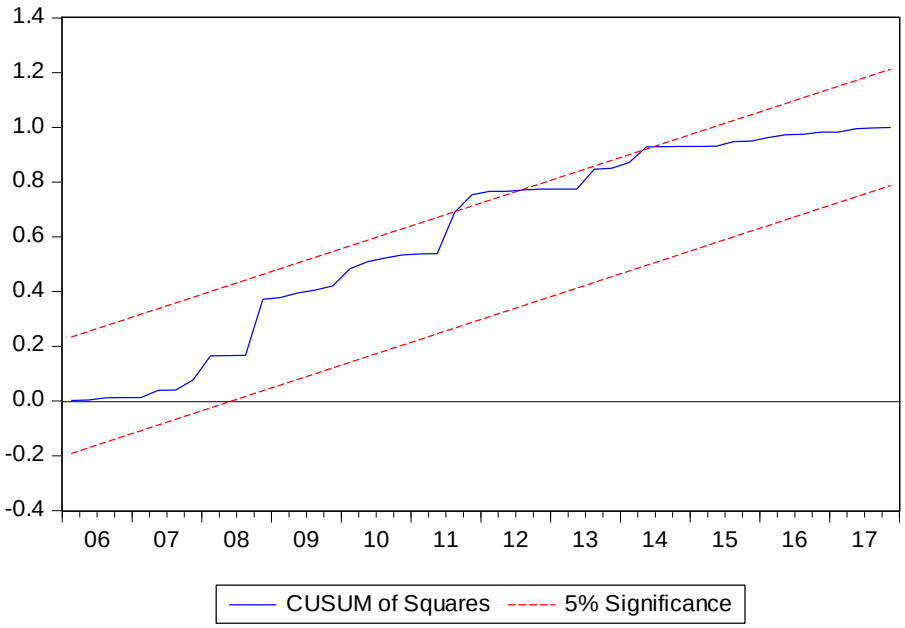

Figure 11 CUSUMQ test result for ARDL Model

3.2.2.2.Nonlinear ARDL Model

After we show the long run relation between the variables via ARDL bounds testing approach, we go one step further and investigate whether there is any nonlinear relation between global liquidity and sovereign bond spread of Turkey (Dailami et al, 2005)

As it is seen in existing literature, studies taking into account the asymmetric relation between global liquidity and sovereign bond spread of emerging markets are limited. However, sharp reversals of global liquidity can affect the probability of default asymmetrically rather than symmetrically. For example, if economic activity is plausible or emerging markets are not suffered from any solvency problem and also if they have a moderate level of debt, decrease of global liquidity may not bother foreign investors in emerging economies. On the other hand, if developing countries are in the border of repayment capacity, decrease of global liquidity can dramatically increase the debt burden of emerging markets and raise the probability of default (Dailami et al, 2005).

When taking into account of the external debt level of emerging markets including Turkey and the discussion of leading Central Banks such as FED and ECB about to normalize their monetary policy in the long run, it is important to present the nonlinear impact of global liquidity on country risk for taking some measures to eliminate the possible risk of global liquidity fluctuations in future periods.

By that logic, analyzing the nonlinear relation between global liquidity and the sovereign bond spread of Turkey can be helpful to more accurately understand the relation between these variables. In order to test this scenario, Nonlinear Autoregressive Distributed Lag (NARDL) model developed by Shin et al (2014) has been employed in this study.

NARDL models have been used in many different fields to explain the existence of nonlinear cointegration between variables. For example, Bahmani-Oskoee and Halicioglu (2017) express the nonlinear relation between exchange rate changes and bilateral trade balance of Turkey. Moreover, while Greenwood-Nimmo and Shin (2013) show the asymmetric impact of taxation on retail energy prices, Katrakilidis and Trachanas (2012) examine the drivers of house prices. To the best of our knowledge, the asymmetric effect of global liquidity has not examined using the NARDL model in the existing literature.

3.2.2.2.1. The Model

In this model, to show the asymmetric effects of global liquidity, the positive changes of global liquidity has been separated from the negative changes of global liquidity. In this new model, we denote the positive changes of global liquidity by $\Delta GL^{+}$and the negative changes of global liquidity by ΔGL^{-}. Partial sums of global liquidity are constructed as follows;

$$GL_t^{+} = \sum_{j=1}^{t} \Delta GL_j^{+} = \sum_{j=1}^{t} \max(\Delta GL_j, 0)$$

$$GL_t^- = \sum_{j=1}^{t} \Delta GL_j^- = \sum_{j=1}^{t} \min(\Delta GL_j, 0)$$

(3)

And the long run model can be formed as follows,

$$LogEMBIG_t = \pi_1 + \pi_2 \text{Log}Y_t + \pi_3 FDS_t + \pi_4 GL^+{}_t + \pi_5 GL^-{}_t + \varepsilon_t \quad (4)$$

Afterwards, we replace GL in Equation 2 by GL^+ and GL^- variables. Finally, we can establish our new error-correction model as follows:

$$\Delta\text{Log EMBIG}_t = \alpha + \sum_{k}^{p} \omega_k \, \Delta\text{Log EMBIG}_{t-k} + \sum_{k}^{p} \varphi_k \, \Delta\text{Log Y}_{t-k} + \sum_{k}^{p} \tau_k \, \Delta \text{FDS}_{t-k} + \sum_{k}^{p} \rho_k \, \Delta \text{GL}^+{}_{t-k} + \sum_{k}^{p} \mu_k \, \Delta \text{GL}^-{}_{t-k} +$$

$$\sigma_1 \text{Log EMBIG}_{t-1} + \sigma_2 \text{Log Y}_{t-1} + \sigma_3 FDS_{t-1} + \sigma_4 \, GL_{t-1}^+ + \sigma_5 GL_{t-1}^- + \varepsilon_t$$

(5)

The nonlinear ARDL model (NARDL) is presented in Equation 5. The asymmetry is established by producing two new (GL^+, GL^-) variables. While estimating the Nonlinear ARDL model, same procedures of ARDL model are advised by Shin et al (2014). After following the steps of ARDL to test the existence of the joint cointegration of NARDL model, we also test whether global liquidity has an symmetric or asymmetric impact on sovereign bond spread of Turkey both in the short and the long term.

Moreover, as it is suggested by Shin et al. (2014), we test the impact of 'asymmetry' in the short run via testing whether the sum of ΔGL^+ significantly differs from the sum of ΔGL^-.

($\sum \rho = \sum \mu$). Moreover, we also display the long-term asymmetric relation between global liquidity and the EMBIG spread of Turkey via testing if ($\sigma_4 = \sigma_5$). These asymmetries are also tested with the help of the Wald test.

3.2.2.2.2. The Results of the Nonlinear ARDL (NARDL) Model

As it is mentioned above, we follow the same steps of ARDL and estimate the NARDL model outlined by equations 5 for Turkey using quarterly data which comprises 2003:Q1-2017:Q4. The NARDL model test results are reported in Table 4. In this table, while Panel A shows the short-term estimation results, Panel B demonstrates the long-term estimated variables. Also, diagnostic statistics are presented by Panel C.

In Panel A, we notice that, despite the ARDL model, both the Real GDP and the foreign debt stock to GDP ratio have not made any significant impact on risk perception of Turkey in the short run. However, in panel B, we show that, while the estimate of Real GDP negatively and significantly affects the sovereign bond spread of Turkey, foreign debt stock to GDP ratio has a significant and positive effect on the EMBIG spread of Turkey in long run. As it seen in Table 4, while a one percent increases in the Real GDP causes to 0.79 percent decrease on the sovereign bond spread, a one point increases in the external debt to GDP causes to 5 percent increase on the sovereign bond spread of Turkey in the long run.

Furthermore, although increase in global liquidity (GL^+) has not any significant impact on sovereign bond spread of Turkey, the estimates of decrease in global liquidity (GL^-) have negative and significant impacts on Turkey's sovereign bond spread both in the short and the long run.

To prove these examinations, the joint cointegration among the observed variables in Equation 5 needs to be tested by means of Pesaran et al (2001)'s new tabulated system. Afterwards, we also judge whether global liquidity has an asymmetric impact on sovereign bond spread. If the two partial sums have same coefficient in sign and size, we can

consider that the effects are symmetric. If not, they are asymmetric. As it is seen in Table 4, the coefficients of negative and positive changes of global liquidity have different size and significance level both in the long and the short run. Thus, this case signifies the asymmetric relation between the global liquidity and the sovereign bond spread of Turkey. However, these effects must be proved by Wald test to strengthen our results.

Calculated F statistic is realized as 6.36 which is highly significant that proves cointegration at the 1% level of significance Furthermore, we also compute the error correction term (ECT_{t-1}) and the result gives us additional support for cointegration in our NARDL model.

Now we can judge the asymmetric impact of global liquidity on the EMBIG spread of Turkey. Wald-S which denotes Wald test result of the short term asymmetry shows that global liquidity has an asymmetric effect on sovereign bond spread of Turkey in the short run at 5% significance level. However, could this picture change in the long run?

As it is seen in Panel B, the impact of global liquidity on sovereign bond spread of Turkey is asymmetric in the long run. Whereas, the positive changes of global liquidity carry insignificant and negative coefficient, the negative changes of global liquidity carry also negative but significant coefficient. Are these coefficients significantly differentiated from each other in the long run? Again, Shin et al. (2014) recommend to apply the Wald test. Long term Wald test result shown by Wald-L is also found significant at 1 percent level that proves asymmetric impact of global liquidity on sovereign bond spread of Turkey in the long term.

Table 4 Nonlinear Model Estimations (NARDL)

Panel A: Short-run coefficient estimates

Lag order	0	1	2	3	4
ΔlogEMBIG		0.36***			
		(2.73)			
ΔGL^+	0.01				
	(0.37)				
ΔGL^-	-0.06**				
	(-2.62)				
ΔlogY	-0.26				
	(-1.09)				
ΔFDS	0.02				
	(0.88)				

Panel B: Long-run coefficient estimates

Constant	GL^+	GL^-	logY	FDS
7.48***	-0.01	-0.11***	-0.79***	0.05***
(12.27)	(-0.42)	(-3.90)	(-6.11)	(7.71)

Panel C: Diagnostics

F	ECMt-1	LM	CUSUM	CUSUMQ	Wald-S	Wald-L	R2
6.36***	-0.60***	1.04	S	S	3.59**	6.61***	0.44

Notes: t-ratios of parameters is shown in the parenthesis. *, **, *** indicates 10%, 5%, and 1% level of significance, respectively.

Again, diagnostics tests are demonstrated in Panel C. To evaluate serial correlation, we employ the Lagrange Multiplier (LM) test. When distributed as $\chi 2$ four degree of freedom, our reported statistics become insignificant that supports our model has autocorrelation free residuals. In addition, we apply the CUSUM and CUSUMSQ tests again and show the stability in Panel C. As it is seen in panel C and also shown in figure 12 and figure 13, the estimates of coefficients seem stable. In addition, we present R^2 to show how good the model fits the data.

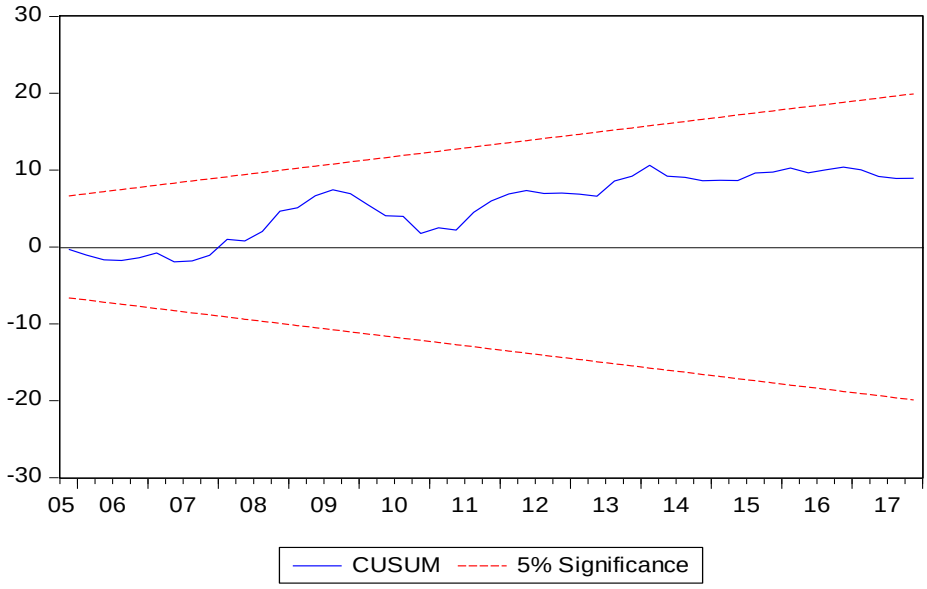

Figure 12 CUSUM test result for NARDL Model

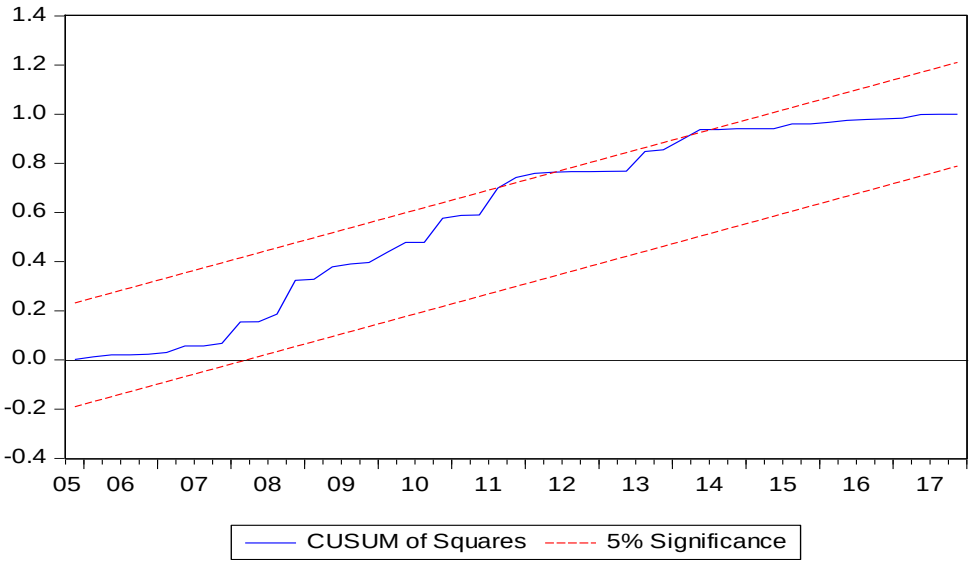

Figure 13 CUSUMQ Test Result for NARDL Model

CONCLUSION

Sovereign bond spreads influence the cost of foreign public debt and repayment capacity of countries. Therefore, it is important to identify which factors affect sovereign bond spreads. Several studies have examined the role of country specific fundamentals as well as global factors on sovereign bond spreads. Among these global factors, global liquidity has received attention in the literature especially after the global crisis in 2008. As it is well known, after 2008, leading central banks such as The Federal Reserve (FED), European Central Bank (ECB), Bank of England and Bank of Japan increased the global liquidity level in the world financial markets via decreasing policy rate and implementing Quantitative Easing (QE) policy to recover and stimulate the economic activity in the world. These policies have led to a decline in the sovereign bond spreads. However, these central banks have decided to normalize their monetary policy actions in recent years. Such actions of leading central banks are expected to increase the cost of borrowing in the world financial markets and to widen sovereign bond spreads of developing countries. As being one of the "fragile five" economies, Turkey can be affected more severely from quantity tightening periods. Thus, the effect of global liquidity on sovereign bond spread of Turkey should be analyzed in detail.

This study has investigated the relation between the global liquidity and the sovereign bond spread of Turkey between 2003:Q1- 2017:Q4 by employing both ARDL bounds testing and NARDL approach. The main motive of this study is to provide a contribution to recent debates about the possible outcome of quantitative tightening actions of leading central banks such as FED and ECB on the sovereign bond spread and the country risk of Turkey.

Our results display the cointegration between global liquidity and the sovereign bond spread of Turkey and demonstrate the nonlinear impact of global liquidity on the country risk. The findings based on ARDL bounds testing approach show that there is cointegration between global liquidity and the sovereign bonds spread of Turkey. It is also found that

while global liquidity has a significant impact on the risk level of Turkey in the short run, it does not have an effect on the sovereign bond spread in the long run.

To investigate whether global liquidity has an asymmetric impact on the country risk of Turkey in the short or/and the long run, we consult to the NARDL model. We also find cointegration between global liquidity and sovereign bond spread of Turkey in this model. Furthermore, the test results reveal that the increase of global liquidity does not have any significant impact on the sovereign bond spread of Turkey but the decrease in global liquidity has a negative impact on the country risk both in the short and the long run.

This study also demonstrates that in addition to the significant role of global financial conditions, macroeconomic fundamentals such as the real GDP and the foreign debt stock to GDP ratio are important determinants of sovereign bond spread and the borrowing cost of Turkey in the long run. However, in the short run analysis, while the real GDP has a significant impact on sovereign bond spread of Turkey in ARDL model, it is not found to be significant in NARDL approach.

This study presents some policy implications for Turkey. While the findings of the study shed light to the recent discussion about the impact of the FED's and the ECB's actions towards decreasing the global liquidity in the world financial market, it also shows possible effects of such actions of leading central banks on Turkey's financial fragility and its' external debt vulnerability.

Considering the foreign debt stock in Turkey and large current account deficit, the focus of policymakers should be placed on to cope with the foreign dependency of the economic growth. Otherwise, any decrease of global liquidity can result in a sharp increase in the sovereign bond spread of Turkey. Moreover, in monetary tightening periods, strong and decisive macroeconomic policies improving domestic fundamentals can mitigate the default risk and decrease the borrowing cost of Turkey.

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APPENDIX 1: TEZ ÇALIŞMASI ORJİNALLİK RAPORU

HACETTEPE UNIVERSITY
GRADUATE SCHOOL OF SOCIAL SCIENCES
THESIS/DISSERTATION ORIGINALITY REPORT

HACETTEPE UNIVERSITY
GRADUATE SCHOOL OF SOCIAL SCIENCES
TO THE DEPARTMENT OF ECONOMICS

07/05/2018

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ADVISOR APPROVAL

APPROVED.

Assoc. Prof. Dr. Ayşe Yasemin Yalta

APPENDIX 2: ETİK KURUL İZNİ MUAFİYET FORMU

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1. Does not perform experimentation on animals or people.
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