TRANSMISSION OF ADVANCED ECONOMIES CENTRAL BANKS' AND CENTRAL BANK OF REPUBLIC OF TURKEY'S MONETARY POLICIES TO TURKISH FINANCIAL SYSTEM

THE GRADUATE SCHOOL OF SOCIAL SCIENCES OF TOBB UNIVERSITY

OF ECONOMICS AND TECHNOLOGY

ÜNAL KAYA

THE DEPARTMENT OF ECONOMICS,

THE DEGREE OF MASTER OF SCIENCE

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I certify that this thesis satisfies all the requirements as a thesis for the degree of Master of Science.

Professor Serdar SAYAN

Director of

Social Sciences Institute

I hereby, certify that I have read this thesis and that it in my opinion is fully adequate, in scope and quality, as a thesis for the Degree of Master of Science in the field of Economics of Graduate School of Social Sciences.

Thesis Advisor

Associate Professor Bedri Kamil Onur TAŞ

(TOBB ETU, Economics)

Thesis Committee Members

Assistant Professor Ozan EKŞİ

(TOBB ETU, Economics)

Assistant Professor Hasan CÖMERT

(METU, Economics)

I hereby declare that all information in this document has been obtained and presented in accordance with academic rules and ethical conduct. I also declare that, as required by these rules and conduct, I have fully cited and referenced all material and results that are not original to this work.

Ünal KAYA

ABSTRACT

TRANSMISSON OF ADVANCED ECONOMIES CENTRAL BANKS' AND CENTRAL BANK OF REPUBLIC OF TURKEY'S MONETARY POLICIES TO TURKISH FINANCIAL SYSTEM

KAYA, Ünal

M.Sc., Economics

Supervisor: Assoc. Prof. Bedri Kamil Onur TAŞ

In this study, effects of unconventional monetary policies which are implemented by advanced economies to Turkish financial markets are analyzed. When Central Bank of Republic of Turkey (CBRT) policies are evaluated with advanced economies' policy stance, the response of domestic market rates to CBRT policy decisions may change. To shed light to this issue this study suggests an empirical VAR model. According to the findings, short term market sensitivity against both domestic and international improvements was affected mainly by primary policy tool of CBRT. US dollar exchange rate is quite effective on the long term indicator.

Keywords: Unconventional Monetary Policy, Transmission Mechanism

ÖZ

GELİŞMİŞ ÜLKELER MERKEZ BANKALARININ VE TÜRKİYE CUMHURİYET MERKEZ BANKASI'NIN PARA POLİTİKALARININ TÜRK FİNANSAL SİSTEMİNE AKTARIMI

Ünal KAYA

Yüksek Lisans Tezi, Ekonomi

Danışman: Doç. Dr. Bedri Kamil Onur TAŞ

Bu çalışmada gelişmiş ülkeler tarafından uygulanan geleneksel olmayan para politikalarının Türk finansal piyasalarına etkileri analiz edilmiştir. Türkiye Cumhuriyet Merkez Bankası politikaları gelişmiş ekonomilerin politika duruşuyla birlikte değerlendirildiğinde, yurt içi piyasa faizlerinin TCMB politika kararlarına verdiği tepkisi değişebilmektedir. Bu konuya ışık tutabilmek için çalışma ampirik bir VAR modeli önermektedir. Model dinamik lineer zaman serisi olarak tasarlanmış ve VAR yaklaşımıyla analiz edilmiştir. Bulgulara göre hem yurt içi hem yurt dışı gelişmelere karşı kısa vadeli piyasa hassasiyeti genel olarak TCMB'nin birincil politika aracıyla etkilenmektedir. Uzun dönem göstergesi üzerinde ise ABD dolar kuru oldukça etkilidir.

Anahtar Kelimeler: Geleneksel Olmayan Para Politikası, Aktarım Mekanizması

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CHAPTER I

INTRODUCTION

After the global financial crisis, a new era started on central banking. Policy making practice changed hugely in an innovative way. Some advanced economies became the pioneer of extraordinary practices. Responses which were given to crisis are interpreted as moving on limits of the policy making. Traditional methods became inefficient and caused some questions. Questions like "How did the world reach this phase?" and "Why were conventional monetary policies leaved?" are required to analyze the background of crisis.

Raising importance and usage of financial systems contributes positively to economic activity by causing effective resource allocation. When pre-crisis term is analyzed, global financial system could be seen to trigger rapid credit growth. Easing monetary conditions has led to a boost in consumer and investor activities. However, increased asset prices required more financial instruments to maintain lending system in a healthy way. Meanwhile, competition between financial firms to lend more and to gain higher market share caused mispricing of borrowing demands. Finally, financial systems became unable to respond to the requirements. This trend could be seen on pre-crisis period U.S. mortgage market. Housing prices benefited positively from mortgage credits and then the sharp reduction in prices started the crisis.

To understand the mispricing concept and its effects on the whole economy, Mishkin (2009) defined two risks: valuation risk and macroeconomic risk. According to *valuation risk*, determining exact price of a security in presence of asymmetric information is difficult and may lead to adverse selection problem which is briefly preference of meeting less risky credit demands by lenders. In the boom periods, allocation of resources by lenders contributes positively to economic activity. However, if a financial disruption emerges some way, it may spill over the whole economy because the credit supply prefers to flow less risky but non-effective demand. Thus, misallocation of resources will turn to systemic risk in this economy. During the periods of economic downturns, if financial conditions also deteriorate, total effect will cause more severe destruction than individual effects on overall economy. This concept is defined as *financial accelerator* in the literature (Bernanke, Gertler and Gilchrist 1999). Probability of this worsening in the economy gives the definition of *macroeconomic risk.*

Situation in Europe was a bit different from United States (US). There were several factors which triggered the European Debt Crisis. Similar with US, growing credits was one of the main pillars (Ullah and Ahmed 2014). On the other side, high government indebtedness was the second pillar. Because of high debt obligations, financing concerns of the loans at their maturity raised. In final phase, credit growth and government debt integrated with external imbalances (through deterioration on global financial markets, contraction on easy financing conditions and decline in investor confidence) and spread all over the Europe. The impact gained also strength from monetary union constraint through dependency to the policies of single institution, European Central Bank (ECB) (Lane 2012). As a result of this composition, European crisis began mainly in more vulnerable periphery countries (Greece, Ireland, Italy, Spain and Portugal). Fiscal stability in a successful monetary union is essential (Constâncio 2012). In crisis period this concept was the weak side of the euro area. Hence, the countries which had lower ratings on agencies faced difficulties due to shrinking monetary conditions to meet refinancing obligations on time. Although it is called as global financial crisis, measures which were taken by European decision makers were shaped on three pillars: fiscal policies, structural fields and monetary policies.

The other dimension of crisis was the impact on emerging economies. Highly volatile markets which were caused by extraordinary measures of advanced economies created challenges over these countries. Both of currency and capital flow channels created extraordinary conditions which were administered by these countries. Turkey is the one of these countries and Central Bank of Republic of Turkey (CBRT) has the main responsibility to manage the process. An innovative central banking example was exhibited in this period. Effective usage of conventional tools integrated with some new approaches worked for the benefit of Turkey. However, the answer to the question "How is the effectiveness of policy mix of CBRT interpreted when external conditions are taken into account?" is still a bit fuzzy. In the literature, there is a lack of studies on this topic. To fill this gap, I will try to analyze the effects of policy mix of CBRT on short and long term financial indicators of Turkey. To do that, I will try to use Vector Auto Regression (VAR) analysis as an empirical methodology. Main findings give some clues about the success of CBRT policies. Tools that are used since the crisis are highly correlated with the both short and long term rates. In addition, while inflation rate of Turkey has an effect on short term rates, US exchange rate show its impact over long term rates. However, no clues are founded for FED and ECB policies over Turkish markets.

Without question, global economy still performs under its historical levels with a weak but moderate growth path. Subdued outlook on advanced economies, weak trade links and political uncertainties reflect the source of problems. Nearly ten years after the global financial crisis, monetary policies still dominate the global economy. Rising importance of monetary policies hold the policy making process on agenda. Hence, tracking the improvements and making consistent analysis will help the policy makers.

The study is organized as follows; in the next section monetary policies and their transmission will be searched by covering U.S. and Euro Area policy responses to crisis. Section III focuses on Turkey's monetary policy in a more general perspective and tries to understand the policy mix which was introduced after the crisis. Evolution of monetary policies since 2000 and designing new policy mix in 2010 as a response to crisis will be analyzed. Section IV suggests a model which sheds light to effectiveness of CBRT policies on Turkish financial system in the presence of external financial imbalances. Section V is conclusion.

CHAPTER II

UNCONVENTIONAL MONETARY POLICIES AND TRANSMISSION MECHANISMS

2.1 Evolution of Monetary Policies

Globalization makes the world more integrated. There are strengthening links among countries. While free floating of goods through trade networks between different communities is the most ancient channel, broadening usage of money through advanced financial systems had a growing importance since the last century. When considering the importance of financial systems on resource allocation, this accelerated growing trend creates new financial linkages among countries and gives more responsibilities to central banks.

Before starting to the transmission topic in more detail, giving some information about monetary policies would be helpful. According to Friedman (2000), monetary policy has an objection to influence pace and direction of overall economic activity. To reach this aim central banks use some instruments. In historical perspective, firstly, liabilities side of central banks balance sheets was taken into account by both government and market participants. Economic agents formed their decisions by looking at the money supply. However, history showed that sudden monetary movements such as external shocks or money demand create rapid volatility on balance sheets. This fact led the central banks to hold reserves while designing their monetary policy. In implementation, central banks fulfilled this task by using interest rates over various sub-items of balance sheets. In time, usage of interest rates evolved to set some fundamental interest rates. Central banks choose these rates by determining which instruments performed most on transactions. The policy design through fundamental interest rates becomes a traditional way for central banking till the crisis. However lowering the rates rapidly to zero bound did not provide a solution to crisis and remained insufficient to balance the negative effects. Figure 2.1 clearly shows that when the materialization of financial contraction began, Federal Reserve (FED) rapidly lowered federal funding rate to [0-0.5] percentage range. Thus, FED aimed to slack monetary conditions.

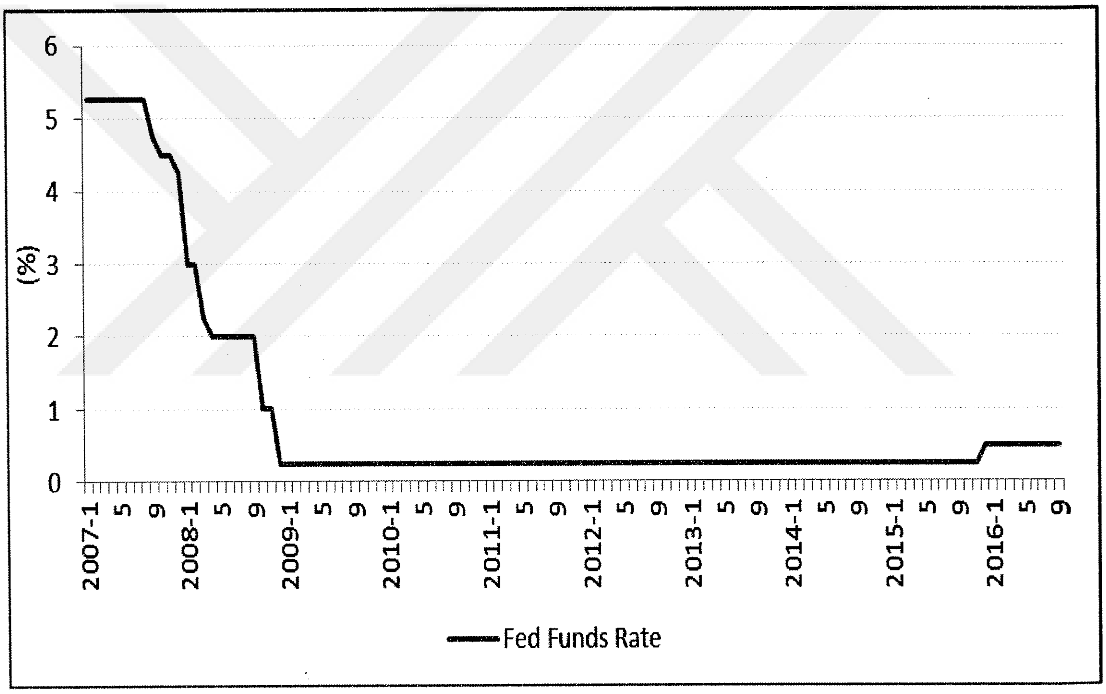

Figure 2.1 FED Funds Rate (Bloomberg)

Similar with FED but gradually European Central Bank (ECB) lowered policy rates by protecting symmetric corridor policies (Figure 2.2). However, this symmetry was intentionally distorted in small time ranges. This divergence could be seen firstly in 2014, then secondly in 2016. The last divergence conducted to favor on one of the ECB's conventional policy tools, *deposit facility*. Beginning from 2014 deposit facility rate was lowered below zero bound to provide effective functioning of transmission mechanism from financial sector to banking sector.

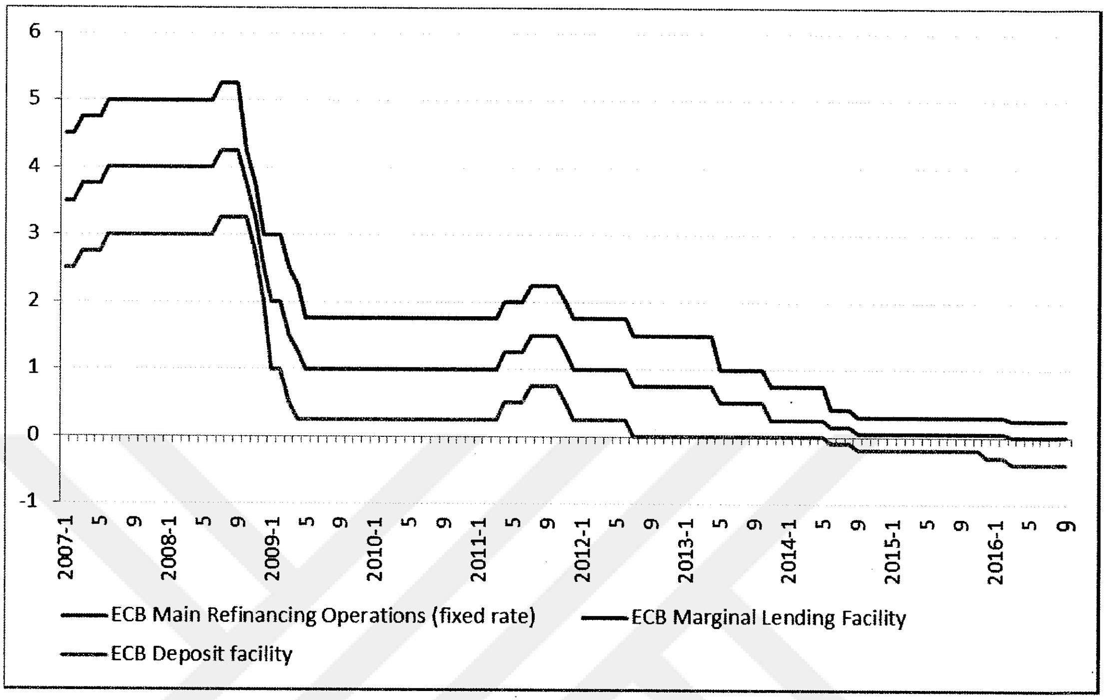

Figure 2.2 European Central Bank Monetary Policy Mix (Bloomberg)

Since the negative effects of crisis could not be overcome by conventional interest rate tool (and also sometimes unusual rates on specific operations like ECB), advanced economies intervened by unconventional policies.

2.2 Unconventional Monetary Policies

Global crisis creates extraordinary circumstances that forced the central banks to take extraordinary measures. In this period monetary policies came one step ahead from the fiscal policies due to several factors. *Firstly*, reflection of fiscal stimulus to real economy comes with a lag. *Secondly*, to enact required fiscal regulations in legal dimension take time to affect the economic activity. Because of these concerns, fiscal policies mostly remained on background in crisis period.

The conventional central banking was implemented by controlling short-term policy rate and moving it within a positive range until the crisis. However, crisis forced advanced economies central banks to take extra measures. After all, new incentive mechanisms that stimulate the real economy were begun to looked for. In the light of this purpose, asset side of the central banks' balance sheets were begun to be discussed.

When Federal Reserve (FED) balance sheet is examined from pre-crisis period to today, nearly 870 billion dollar size rapidly increased to 4.5 trillion dollar. FED, *firstly*, tried to change the composition of balance sheet by introducing short term instruments when financial deterioration started to materialize at the end of 2007. In this term, there was a huge debate on this policy. While one side was defending the thought that changing composition of central bank balance sheet deteriorates healthy resource allocation and price formation, other side was supporting the increase on size. When crisis reached its peak level at the second half of 2008, FED, *secondly*, began to increase the size of balance sheet. At this term, size of the balance sheet rapidly increased over 2 trillion dollar level mostly because of short-term security purchases. FED used two more similar operations hitherto. However, the next two programs mainly focused on longer-term securities (mortgage-backed securities and treasury bonds). After these operations, FED's balance sheet takes its current state (Figure 2.3). From now on, main debate over this issue is when FED will start to reduce the size of balance sheet and how much the final size of balance sheet will be?

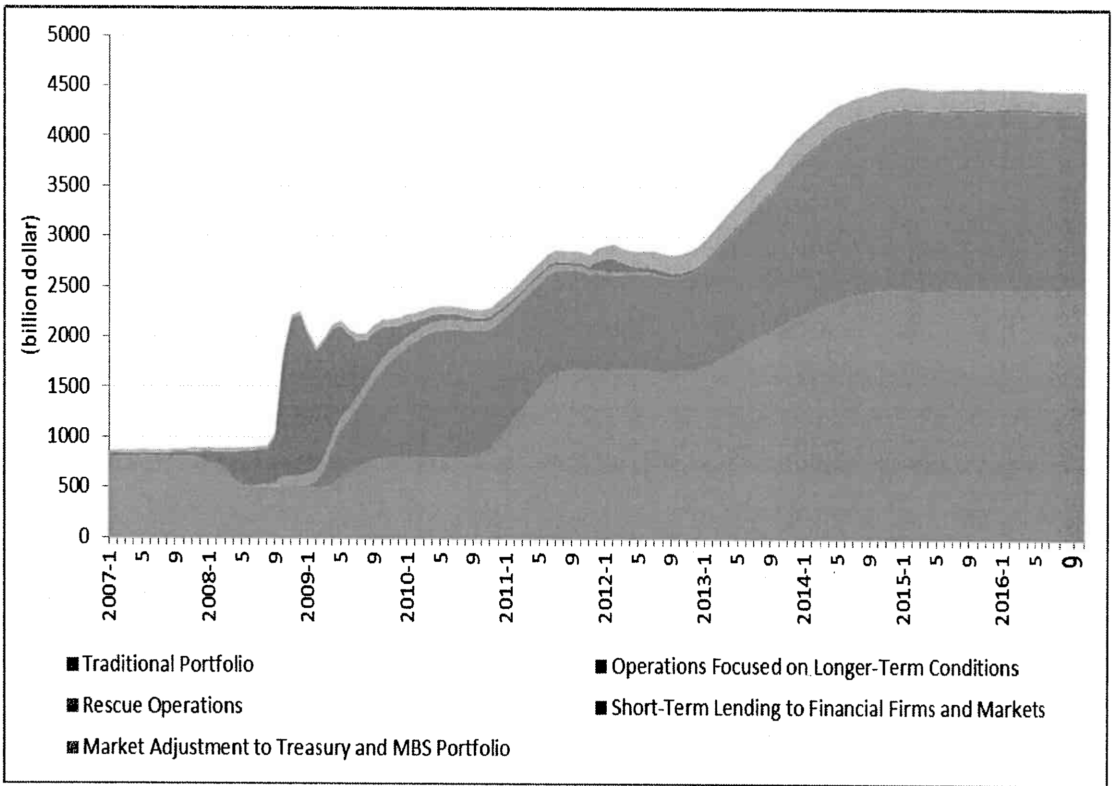

Figure 2.3 Asset Side of Federal Reserve Balance Sheet (Fed Database)

There are some differences between FED and ECB policies. As mentioned on previous section, European Debt Crisis was composed of different dynamics. Therefore, ECB created the policy mix in this context. When the asset side of ECB balance sheet is analyzed, it could be seen that weight of longer term securities is increased beginning from 2nd half of 2007. For instance, long term refinancing operations (LTROs) extended the average maturities of balance sheet sub-items. There was also Covered Bond Purchase Programs (CBPP1 and CBPP2) which were introduced at the end of 2008 and beginning of 2009. These were the first time measures. The second and more comprehensive intervention was held in 2012. Weight of three-year LTROs was increased on balance sheet. Finally, the most comprehensive program introduced at the end of the 2014 and beginning of 2015. ECB announced three targeted long term refinancing operations (TLTROs) in second half of 2014 and Asset Backed Securities Program (ABSPP), Covered Bond

Purchase Program (CBPP3) and Public Sector Purchase Program (PSPP) at the beginning of 2015. These programs aimed effective functioning of transmission mechanism in the region (Figure 2.4).

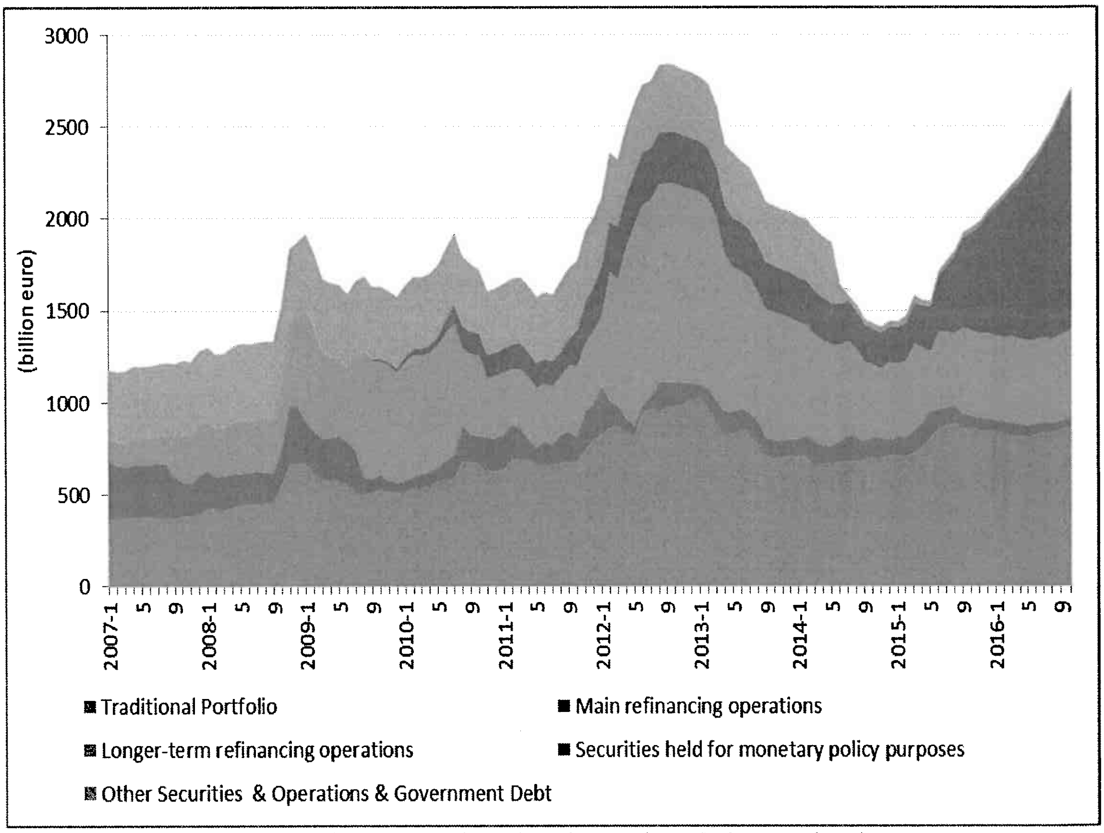

Figure 2.4 Asset Side of European Central Bank Balance Sheet (ECB Database)

The recent practices move around the verge of monetary policy theory. There is also huge literature about the effects of unconventional monetary policies carried out by advanced economies. According to recent literature, Farmer and Zabczyk (2016) define two kind of unconventional monetary policies: *Quantitative Easing* (QE) and *Qualitative Easing* (QualE). While QE is applied by increasing the size of central bank balance sheet, QualE is implemented by changing the composition. Reis (2010) summarize policy responses of US on three titles; *interest rate*, *quantitative policy* and *credit policy*. According to his definition if interest rate is classified as conventional, the others are unconventional. Friedman (2014) claims that if the standard policies do not meet the policy objective anymore, there is two way to stimulate the economic activity; one of them is *asset purchases* and the other is to make *public statements* that refers to forward guidance. Finally, their recent working papers Borio and Zabai (2016) classified unconventional policies as three subgroups: *balance sheet policies*, *forward guidance* and *negative interest rate* policy.

On historical perspective, market participants followed the decisions of central banks. Because of the closed structures, economic agents tried to estimate policy decisions looking at past practices. In literature this concept is called as *signaling*. However, signaling narrowed the movement area of policymakers since it becomes a credibility indicator over time. To affect market expectations for the future policy practices, central banks began to use effectively public statements which are called as *forward guidance*. Thus, policy makers achieved to extent movement area over policies and to protect the credibility objectives at the same time.

Advance economies central banks, FED & ECB in this study, rapidly increased the size of their balance sheets in years. The measures that they took triggered high volume capital movements. Plenty of money and low interest rates eased financing conditions in favor of both domestic and international economic agents.

2.3 Transmission Mechanisms

According to Friedman (2000) if the monetary policy is to be effective, financial decisions made by central banks have to affect non-financial agents' decisions. This concept is brief explanation of the *transmission mechanism* of monetary policy. Mishkin (1996) defines the transmission channels of monetary policies. These channels explain how an increase on monetary base affects output from interest rates to credits.

However, when almost all channels are examined there is only one channel that takes international factors into account on affecting domestic output. This channel works when depreciation in exchange rates caused by monetary policy leads to an increase in net exports. Today, in a more integrated world there is no doubt that all economic agents in all countries consider both domestic and international improvements. Hence decisions made by FED or ECB affect not only US or European economic units but also rest of the world. Therefore, financial linkages have a rising importance. Especially, after the global financial crisis, published studies searched the links among advanced economies monetary policies and their reflections on other countries. When the researches expand with counter policy responses, there are hard to solve problems for researchers. For instance, how do FED's decisions affect the Turkish financial sector investment decisions and to what extent? How do ECB's monetary policies affect any other emerging economy's credit growth? Are policy responses of CBRT effective? These questions are very hard to answer.

To shed light on this topic, a meeting has been arranged at Bank of International Settlements (BIS) in 2014. The consensus was reached on five channels of international spillovers from advanced economies to emerging economies;

1. The exchange rate,
2. The policy rate,
3. Long-term interest rates,
4. International bank lending,
5. Portfolio flows.

But the answer to the question how the interaction between central banks and economic agents emerges remains still a bit uncertain. Exchange rate channel works when the reduction in real interest rates caused by an increase in money supply (e.g. international shock), leads to depreciation in exchange rate. Depreciated currency may increase net export and also the output. For occurrence of this effect, money supply in somewhere has to increase. Similarly, international lending or portfolio flows directly connected to the supply. Hence, they could be classified as balance sheet policies according to Borio and Zabai (2016). If an advanced economy raises money supply in markets (via quantitative easing policies) as monetary policy, this may affect exchange rates, portfolio flows and international lending. Policy rates and long-term rates have indirect interactions. Policy rates are related with the behaviors of responder central banks. Their policy mix on international spillovers constitutes the fundamental of this study. Also, long-term interest rates are independent from direct interventions of foreign or domestic central banks decisions.

As a result of quantitative easing policies with lowered interest rates, advanced economies caused the formation of high volume capital. Some share of this capital remained within the borders of advanced countries, but a considerable amount of the capital crossed over the borders, reached the emerging economies and disrupted their financial systems.

In this study I will try to find interactions between FED, ECB and CBRT policy mixes and their effects on Turkey's financial system by considering transmission channels which are mentioned above. Because of direct or indirect effects of foreign and domestic decisions, Turkish financial system set their rates by looking these conditions. Until now I tried to explain the international conditions and their reflections through channels, but policy mix of CBRT remained as gap. In next section CBRT policies will be analyzed with more detail.

CHAPTER III

MONETARY POLICY MEASURES OF CENTRAL BANK OF REPUBLIC OF TURKEY

Similar with advanced economies, emerging economies use reserves as a tool in policy making. However, implementation differed due to the dollarization problem through time. Since agents see the foreign currencies safer in economic downturn periods, central banks implement reserve policies partially to hold foreign currency. For example, this concept was accepted as a policy tool for some time in Turkey (Erçel 1998).

In early 2000s Turkey's economy faced significant stresses. Taking its root from banking sector, most destructive economic crisis emerged at Turkish modern history. Significant reforms in banking sector were implemented which was part of the transition to strong economic program after the crisis. One of the most important reforms was to change the legal base of CBRT. Managed currency system evolved to price stability targeting through reform efforts in 2001. With price stability objective, CBRT gained instrumental independence and inflation targeting policy started after these reforms. From this time until financial crisis, CBRT's main policy objective was to provide price stability. Inflation targeting regime was used in this context.

2002-2008 periods can be divided into two parts. In first four years (2002-2005), CBRT implemented implicit inflation targeting. Short term interest rates were the main policy instrument in this term. Improvements in price levels indicated that CBRT battled successfully in this period. In the 2006-2008 periods, gains obtained from first period encouraged the CBRT to pass into a more transparent structure. Hence, explicit inflation targeting regime entered into effect.

However, global conditions changed after the second half of 2008. Positive improvements in domestic financial system were suppressed by shrinking global conditions. This period was not specific to Turkey. Improvements in US financial system rapidly spilled over rest of the world. Deterioration in global financial markets and declining investor confidence triggered high volume capital flows. Emerging economies were affected at various ratios depending on their own stories. For instance, although Brazil and Russia benefited less from positive financial conditions, the main contribution to their gains came from high commodity prices via trade channel. Increasing degradation in global conditions forced emerging economies to take their own measures for this new environment. Turkey was one of the fastest-reacting countries to new environment. For instance, CBRT gradually decreased overnight borrowing rate which is used as policy tool more than 1.000 percentage points in a few months (CBRT 2009). This tool can be classified as traditional method of policy making.

In 2010, CBRT announced a new policy mix. Main framework took its shape on two policy tools; interest rates and required reserves (CBRT 2010). *Firstly*, new one-week repo rate was established and overnight operations were setted asymmetrically from this rate. In order to provide flexibility, late liquidity window was established and at the end of the day banks were funded via this channel in certain time range. *Secondly*, CBRT announced that TL denominated required reserves held by banks could be hold as foreign currencies in certain ratios which are determined by CBRT. These two main policy tools provided enough flexibility and movevement area to CBRT and they became effective policy responses to negative effects of crisis. And also these non-standard policy measures were aimed to clarify the uncertainty over money markets.

Changing global conditions and effects of capital movements revealed different funding requirements from time to time. In these terms, market rates deviated from the policy rate. In any case, free-moving market rate had to not exceed the upper bound of corridor. Hence, market participants began to follow average funding rate of CBRT. This rate was calculated as weighted average of both funding quantities and funding rates (Weighted Average Funding Rate - WAFR). It could be clearly seen that market rate which occures among banks and policy rates which is announced by CBRT showed similarities at first, but in 2014 differentiation began between weighted average funding rate and interbank repo rate (Figure 3.1). With the beginning of simplification process upper bound was lowered and asymmetry began to reduce in 2016.

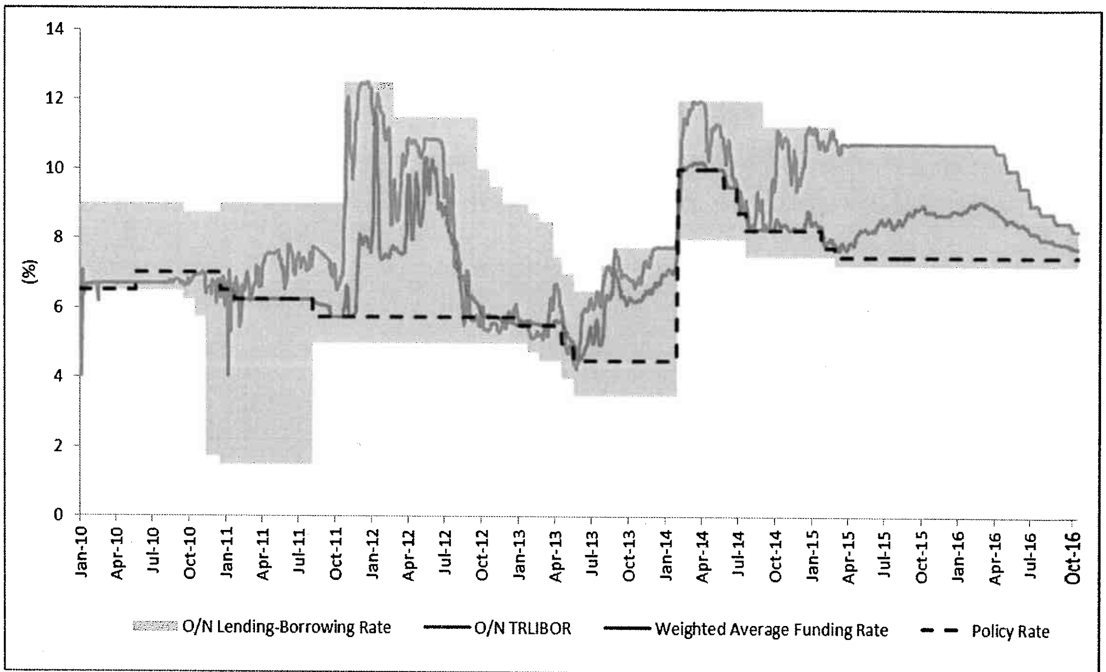

Figure 3.1 Central Bank of the Republic of Turkey Monetary Policy Mix (CBRT Database)

Second main policy tool was required reserves (Figure 3.2). With the introduction of reserve option mechanism, CBRT gained an effective intervention tool on currency market by changing ratios in the case of speculative currency attacks. This should not be interpreted as currency targeting. High volume capital flows affect the consumer behaviors and disrupt the trade balance. Hence, CBRT changed the reserve holding coefficient to regulate sudden movements in exchange rates.

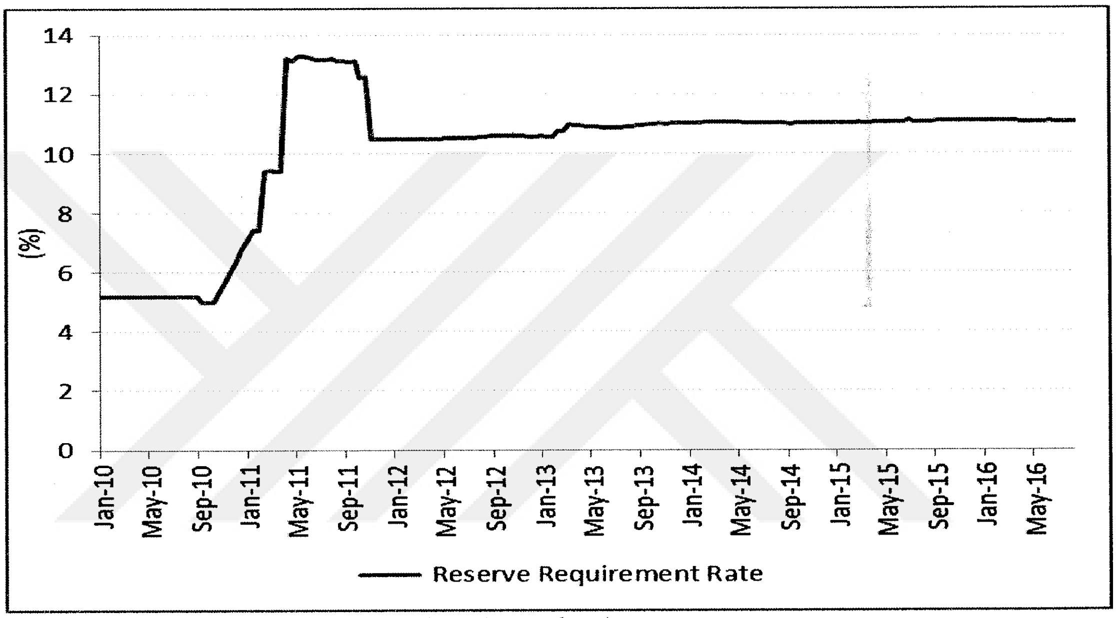

Figure 3.2 Reserve Requirement Rate (CBRT Database)

CHAPTER IV

EMPIRICAL METHODOLOGY, DATA AND RESULTS

4.1. Literature Review

In literature, one of the close works to this study belongs to Fratzscher, Lo Duca and Straub (2013). In this study effects of FED measures to emerging economies were analyzed with a comprehensive dataset. They claim that FED's unconventional policies created international spillovers, and to prove that portfolio flows into bond and equity funds were used. Main motivation in choosing this indicator was to observe the interaction between FED's unconventional measures and investor behaviors. Hereby, "Where did the capital flows go?" question finds its answer. Their results are quite interesting in this context. *Firstly*, they separated timeline of FED measures to QE1 and QE2 basis. According to results while QE1 was highly effective to support US economy, QE2 triggered worldwide asset appreciation and US dollar depreciation. It means that two phase of measures worked in opposite direction. *Secondly*, tangible measures used by FED (e.g. asset purchases) constrained the effects of verbal measures (e.g. forward guidance). *Finally*, measures taken by emerging economies for restricting capital movements did not provide sufficient benefit to them.

Although results contribute beneficial information to literature, two things weakens the study. *Firstly*, their coverage on emerging economies includes 65 countries. Because of all central banks independent from each other, their policies and implementation times were also separated from each other. *Secondly*, after the global financial crisis U.S. was not the only country to apply unconventional policies. Measures of other advanced economies (e.g. which applied by ECB and BoJ) might also have an effect on emerging economies. Therefore, there is a possibility that cannot be ignored that Turkey may affect from ECB's measures.

To evaluate unconventional monetary policies on advanced economies Wu and Xia (2015) developed an interesting logic. When the conventional practices in policy design choked up on zero lower bound, they suggested a shadow rate which explains what have to be the actual rate for an economy to cover unconventional policies. Briefly, shadow rate includes also effects of asset purchase programs that implemented in US and ECB.

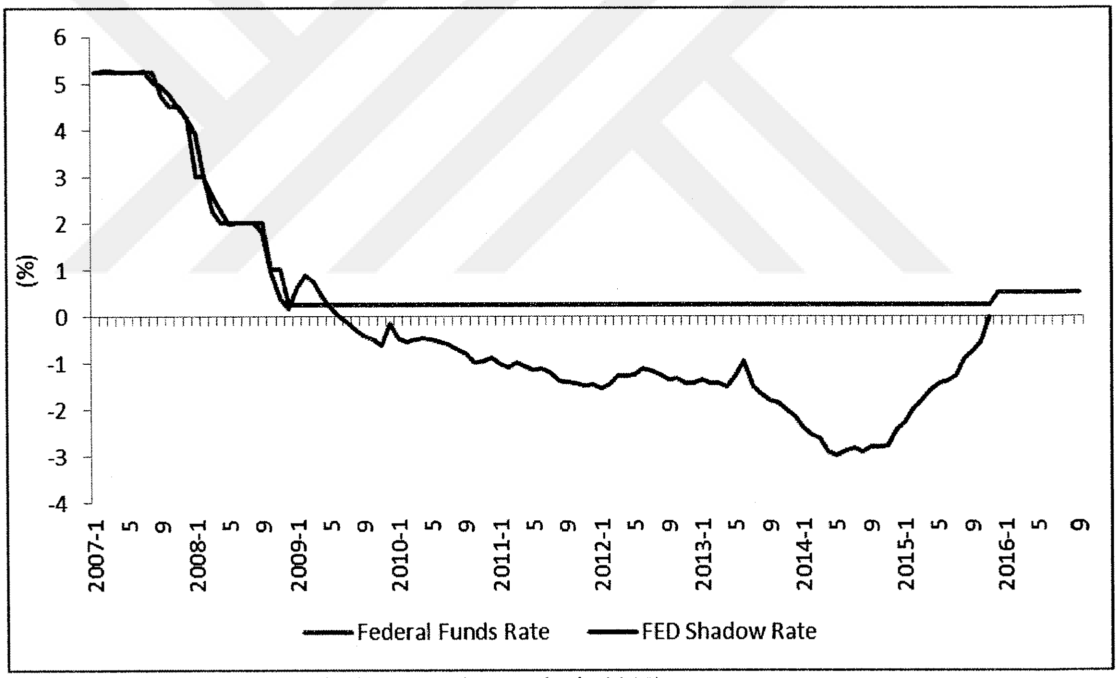

Figure 4.1 Federal Reserve Shadow Rate (Wu and Xia 2015)

If FED did not implement the unconventional policies, what would be the actual federal funds rate? As mentioned before, FED developed lots of instrument to give strong response to the financial disruption. The economic effects of these tools to economic agents are hard to observe and decompose. Therefore, exposure level of market participants to effective federal funds rate which is covering all other instruments can be reflected by shadow rate. When the logic is evaluated in this framework, effective federal funds rate was at negative levels since 2009 (Figure 4.1). End of 2015 was the date of first rate hike of FED after a long time. Hence, FED funds rate gain functioning again at this date. Similar with FED, measures of ECB may observable on shadow rate concept (Figure 4.2). Because of the rates are on zero level and asset purchases still on progress, ECB's actual rate is negative according to shadow rate concept.

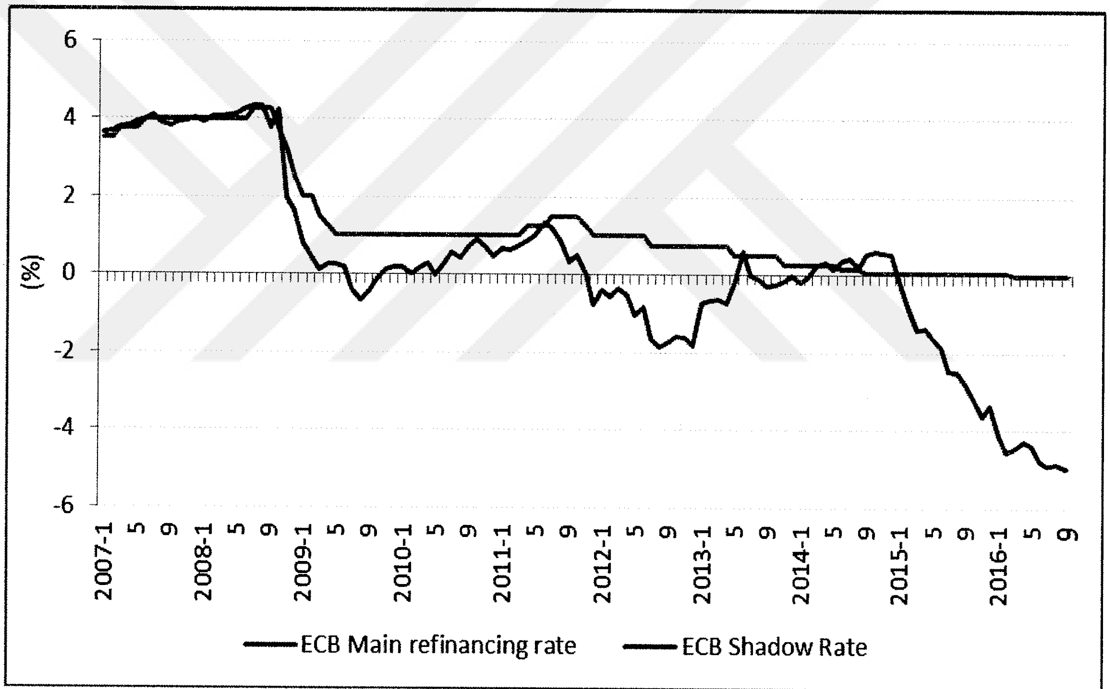

Figure 4.2 ECB Shadow Rate (Wu and Xia 2015)

Recently, a working paper was published on BIS. Chen, Lombardi, Ross and Zhu (2017) took into account the shadow rate concept as a single set while analyzing advanced economies monetary policies. Similar with Fratzscher et al study but less than their coverage, they analyzed 24 emerging economies. They included also European Central Bank shadow policy rate to model as an indicator.

After the global crisis, CBRT took some non-standard measures to prevent international spillovers. In the literature, transmission of CBRT measures to Turkish financial system is analyzed by Binici, Kara and Özlü (2016). Historically, banking sector is relatively high weighted in Turkish financial system Thus, transmission of CBRT decisions to real sector highly dependent on banking sector improvements. Hence, Binici et al (2016) analyzed the difference between announced rates of CBRT and market rates implemented by banks. Their conclusion over differentiation is that transmission of CBRT decisions are weak and funding costs of real sector determined by de-facto rates among banks.

Binici et al (2016) used formal CBRT funding rates as explanatory variables. Weighted average funding rate (WAFR) and overnight interbank lending rate were chosen. Their assumption on overnight interbank lending rate is; CBRT may treat funding composition on BIST interbank market. However, funding composition covered already by WAFR and also CBRT is not the only participant that affects interbank market. Both domestic and especially international effects can impact banks on this market. Therefore using interbank market rate as an explanatory variable of monetary policy stance, it can reduces exposition of the model.

Reserve requirements have been frequently used as a policy tool by CBRT after the crisis. Binici et al (2016) classified policy aims of required reserves at three groups: to change coverage of liabilities and rates of announced required reserves, to change on the payment rate to funds holding as reserves and to provide an option called as reserve option mechanism (ROM) which is holding TL denominated reserves as foreign currency in certain ratio. To cover all this objectives in one set, Alper et al (2014) developed an effective required reserve ratio (Figure 4.3).

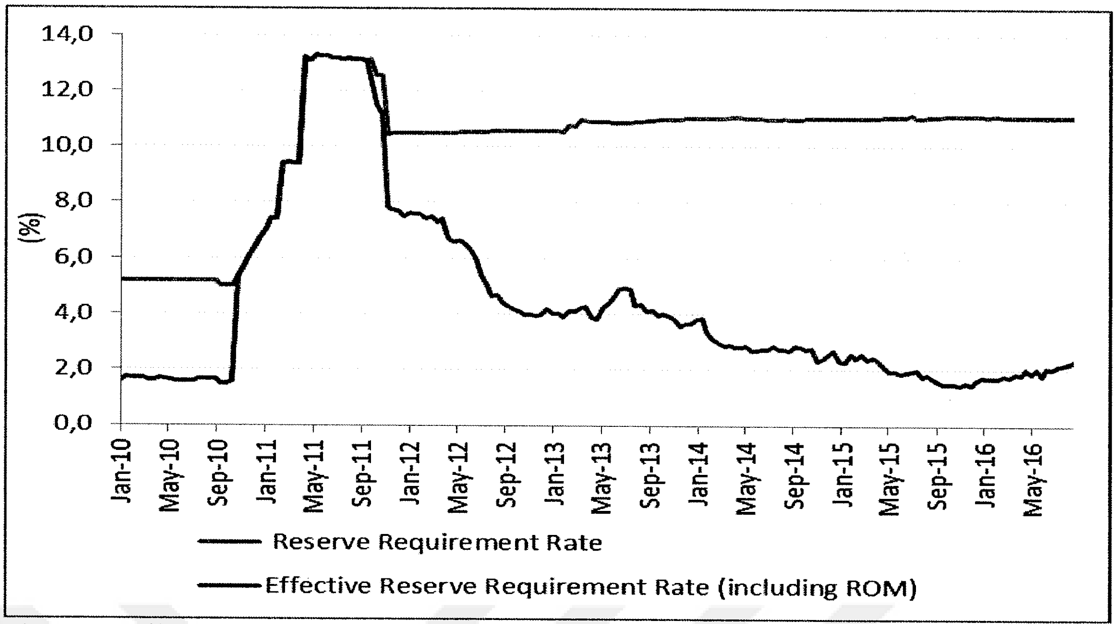

Figure 4.3 Effective Reserve Requirement Rate (Author's calculation)

Effective reserve requirement ratio indicates one single metric to measure the actual rate for required reserves on different maturities and currencies.

4.2. Data and Model Selection

This study is similar with the Fratzscher et al (2013) and Binici et al (2016) studies in a more integrated perspective. Therefore, study tries to produce an answer for the main question of how FED and ECB's unconventional monetary policies affect Turkish financial system with policy response of CBRT. While it remains on more micro scale when compared with Fratzscher et al and Chen et al studies, it will remain more macro scale when compared with Binici et al study. Thus, results will provide Turkey specific evaluations of external spillovers from monetary policies evaluated with domestic policies.

To do that study takes into account the following model:

$$FS_{it} = \beta_0 + \beta_1 * CBRT_{it} + \beta_2 * AEMP_{it} + \beta_3 * CV_t + u_{it}$$

In this model, dependent variable FS is assigned to symbolize the first letters of financial sector indicators. Overnight interbank interest rate (TRLIBOR) and 5 year government bond yield (GOVTB) will be analyzed in this framework. The TRLIBOR indicator gives the short-term movements of domestic or foreign improvements occurred in market. GOVTB covers the long-term movements of Turkey's treasury yields. There are also other long-term indicators with different maturities. Due to wide usage in literature, 5 year government bond yield fits the model as long-term financial indicator for an emerging economy.

One of the independent variables on the model, CBRT, reflects implemented monetary policy measures of central bank of Turkey since crisis. In this context, variable covers two main policy tools: weighted average funding rate (WAFR) and cost effective required reserves (REQRES). Sectoral behavior differentiated time to time especially on one week repo rate. In these terms, market sentiment gains independence from policy rate and closes to upper bound of corridor (marginal lending rate). To consider duality between policies and market sentiment, model will use WAFR that includes both upper bound and policy rate and their quantities since 2010. The other main policy instrument of CBRT was to change reserve requirement ratio with supportive mechanisms (for instance Reserve Option Mechanism). To cover all this measures in one set model uses Cost Effective Reserve Requirement Ratio which is mentioned in detail on previous section.

To observe foreign effects for related period, AEMP reflects the advanced economies monetary policies. Study follows shadow rate concept that is a good indicator for advanced economies unconventional policies. Different policy instruments are covered in a single set and suggest actual policy rate for these economies.

Study uses also some control variables (CV) which have effects on short and long term indicators. Usage of these variables will increase the explanatory strength of chosen policy variables.

Study covers as data range between 2010 and 2016. However, data size is differentiated from each other due to all variables have different frequencies. To overcome this problem some adjustments are required. With this purpose, all datasets are transformed to monthly basis via simple average method. As data source, TRLIBOR, GOVTB and CV are obtained from Bloomberg terminal. Shadow rates of FED (FEDSHD) and ECB (ECBSHD) are obtained from formal website of Wu and Xia. WAFR data is obtained from CBRT's electronic data distribution system on the formal website. REQRES is calculated by author taking into account the concept of Alper et al (2014). As a computer program, study uses EViews application.

Range [2010M01-2016M09]	Indicator	Original Frequency	Original Size	Transformation	Actual Size
Domestic Variables	TRLIBOR	Daily	1678	Average, Monthly	81
	5y Government Bond Yield	Daily	1527	Average, Monthly	81
	Weighted Average Funding Rate	Daily	1765	Average, Monthly	81
	Cost Effective Required Reserve Rate	Bi-weekly	173	Two Week Average	81
International Variables	FED Shadow Rate	Monthly	81	Level	81
	ECB Shadow Rate	Monthly	81	Level	81

Table 4.1 Summary Table of Variables Type and Size

However, transformation on data is not sufficient to directly work on model. Therefore, datasets have to be checked whether contains trend. When the all datasets are controlled, it will be understood that none of them satisfy the stationary conditions. To clearly see that there is two simple way. For every dataset, the correlogram of raw set will reflect that sets are not interior of confidence intervals

(A.1). On the other hand, unit root tests can be used. When the sets tested by Augmented Dickey-Fuller, Phillips-Perron and NG-Perron tests, all datasets fail to satisfy the stationary condition of not include unit root (A.2). To overcome this problem all sets are purified from their trends by Hodrick-Prescott filter (A.3). After this operation sets are analyzed again whether contains trend. This time tests show that nearly all sets do not include unit root (sets have unit root hypotheses are rejected on 5 percent significance level) (A.4.a). However, only the de-trended FEDSHD, ECBSHD and EURTRY sets failed to satisfy the stationary conditions. For these three subsets, taking first differences on raw data solve the problem (A.4.b).

For analyzing the model, study takes into account a Vector Auto-Regression (VAR) method. In the existence of ambiguous relation between variables, using VAR method is advantageous. However, ordering of variables is important in this method. In the literature, generally most exogenous variable takes first order and placement continue to the most endogenous variable. In this study I would like to examine both international and domestic affects to Turkish financial system. Hence, financial system indicators are thought as more endogenous or more exposed variables. As a natural requirement FEDSHD and ECBSHD variables are most exogenous ones. So, putting them to the first order is normal. CBRT decisions (WAFR and REQRES) are thought that more independent from domestic market improvements but more dependent to the international improvements. Thus, these variables are put to second order. As real sector variables, model uses some control variables which are industrial production (reflects the total economic activity-INDPRO), inflation rate (INFRATE), US dollar (USDTRY) and Euro (EURTRY) currencies, commercial credits (COMMCREDT) and deposit rates (DEPRATE). For ordering among CVs, industrial production is thought to take first order, then inflation rates as a significant indicator of price formation. Exchange rates also significant indicators over emerging economies. Finally, commercial credits and deposit rates are indicators that reflect the transmission between banks and real sector.

Range [2010M01-2016M09]	Code	Indicator	Original Frequency	Original Size	Transformation	Actual Size
Domestic Variables	TRLIBOR	TRLIBOR	Daily	1678	Average, Monthly	81
	GOVTB	5y Government Bond Yield	Daily	1527	Average, Monthly	81
	WAFR	Weighted Average Funding Rate	Daily	1765	Average, Monthly	81
	REQRES	Cost Effective Required Reserve Rate	Bi-weekly	173	Two Week Average	81
Foreign Variables	FEDSHD	FED Shadow Rate	Monthly	81	Level	81
	ECBSHD	ECB Shadow Rate	Monthly	81	Level	81
Control Variables	INDPRO	Industrial Production	Monthly	81	Monthly Change	81
	INFRATE	Inflation Index	Monthly	81	Monthly Change	81
	USDTRY	US Dollar / TL Rate	Monthly	81	Level	81
	EURTRY	Euro / TL Rate	Monthly	81	Level	81
	DEPRATE	Deposits (TL)	Weekly	352	Average, Monthly	81
	COMMCREDT	Credits (TL-Commercial)	Weekly	352	Average, Monthly	81

Table 4.2 Detailed Table of Variables Type and Size

VAR method also requires lag selection. According to final prediction error (FPE) and Akaike Information (AIC), Schwarzh Information (SC) Hannan-Quinn Information (HQ) criteria 1 lag have to be chosen for this model (A.5). In this direction VAR (1) results are derivated (A.6).

4.3. Empirical Results

To interpret the results of VAR (1), Impulse-Response (IR) analysis has been done (A.7). IR functions indicate the effects of shocks in time. For instance, when a shock occurs in a variable, how other variable respond to that? To answer this question IR functions are used. According to results there are four significant shocks which affect the short-term variable of model. Firstly, WAFR variable has a huge impact while interpreting response of TRLIBOR. However, this effect reduces in time and becomes insignificant since 5th period (Figure 4.4). Economic interpretation of the first significant IR is 1.0 percentage point change in weighted average funding rate triggered nearly 0.55 percentage point on interbank interest rate. If weighted average rates accepted as natural policy rate, 100 basis point increase raises 55 basis point in market rate. That means these are highly correlated variables as expected and consistent with literature. Also effect end on 5th period. Results give some significant hints. If the short-term IR result is decomposed by variance decomposition method, one unit of shock on TRLIBOR explained by weighted average funding rate at 62 percent ratio for the first period. Effect reduces gradually to 40 percent in 4th period which is insignificant after that.

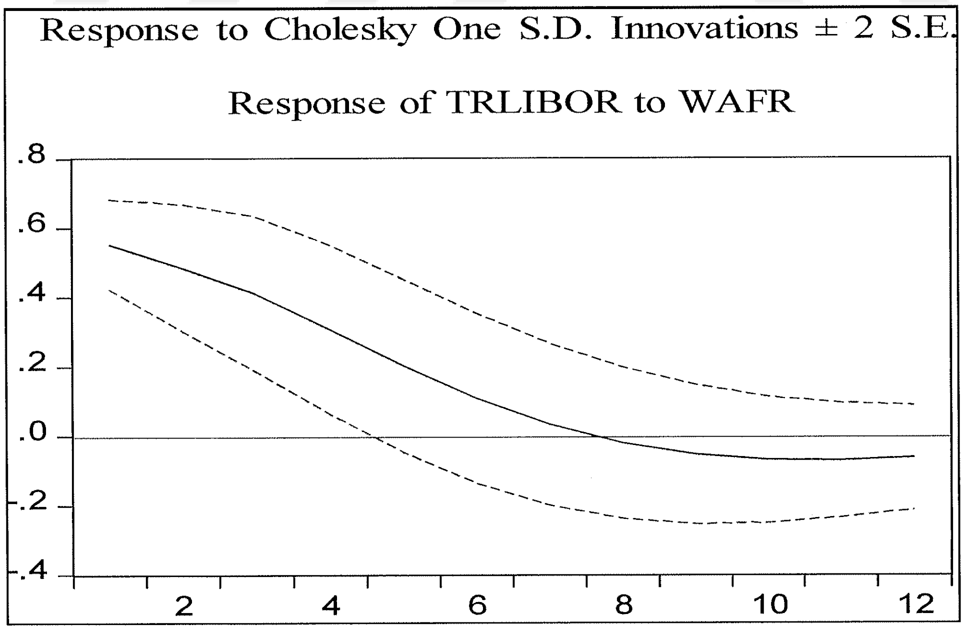

Figure 4.4 IR Results of WAFR to TRLIBOR

REQRES shock has smaller effect when compared with WAFR, and becomes insignificant after 2nd period (Figure 4.5). Required reserves are frequently used tool of CBRT. IR results give that there is negative relation between market rate and reserve rate only 1 period. If required reserve rate is increased by 1.0 percentage point, market rate reduces 0.14 percentage point for the first term. Although these result statistically significant, economically contractionary preventions by increasing rates on reserves are expected to higher the market rate. Also, only for the first term one unit shock of TRLIBOR explained by required reserve at 4.2 percent.

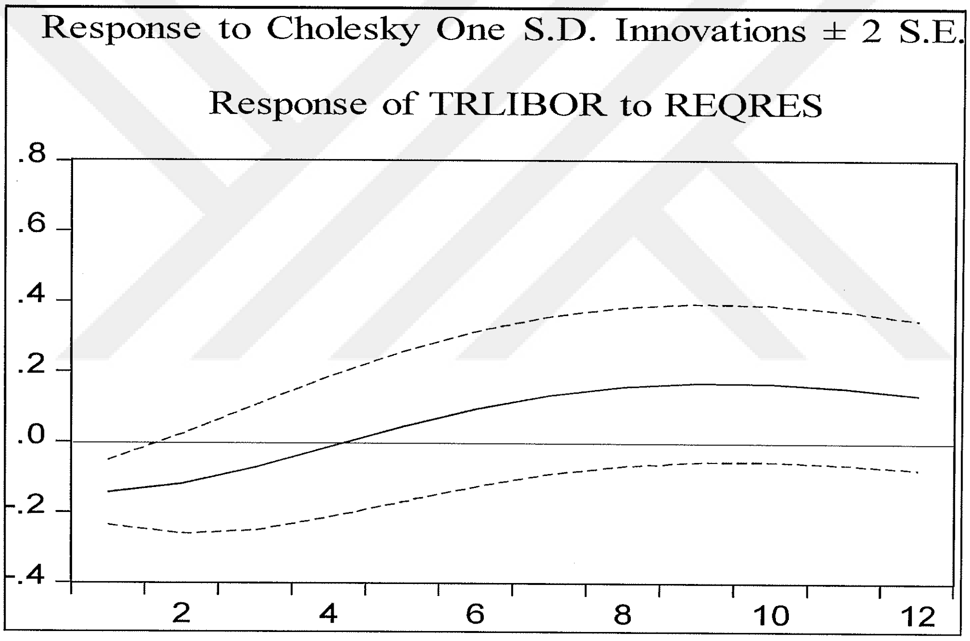

Figure 4.5 IR Results of REQRES to TRLIBOR

INFRATE has an effect firstly on raising path, but then impact reduces till 6th period on TRLIBOR and becomes insignificant thereafter (Figure 4.6). Statistically, 1 percentage point increase in inflation rate increases market rates at 0.12 percentage point at first term and also effect increases next two terms. Economically relation between inflation and interest rates is quite uncertain. But in this sample period, there is positive correlation between two variables until 6th period. Variance decomposition results indicate that one unit shock on TRLIBOR explained by inflation rate at 3.3 percent ratio. Effects rapidly reach 15.1 and 20.9 percent next two periods.

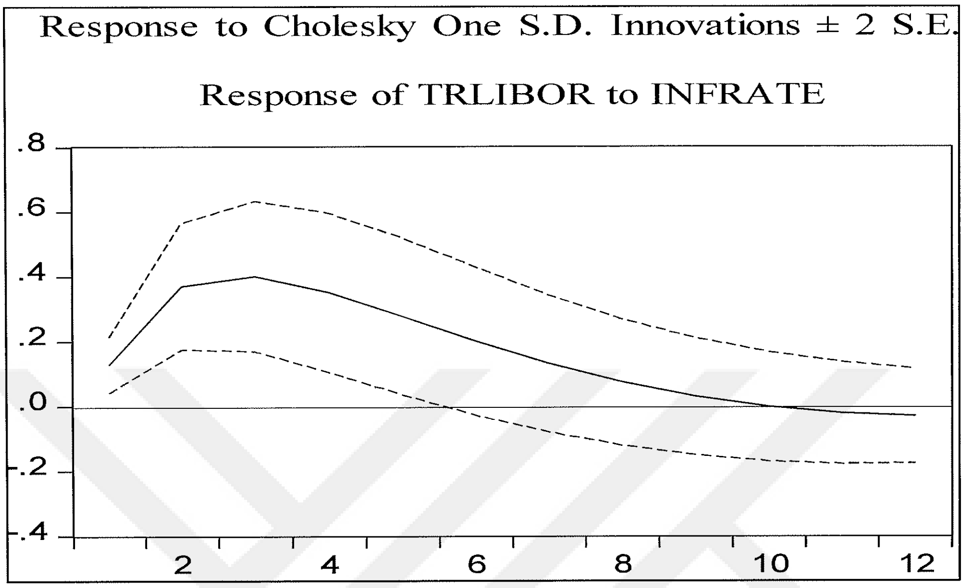

Figure 4.6 IR Results of INFRATE to TRLIBOR

Finally, DEPRATE shock emerges partial impact on TRLIBOR and disappeares after 2nd period (Figure 4.7). For the first period, 1 percentage point change in deposite rate increases market rate at 0.14 percentage point. For the first term, deposite rate has 4 percent explanation over 1 unit shock of TRLIBOR according to variance decomposition.

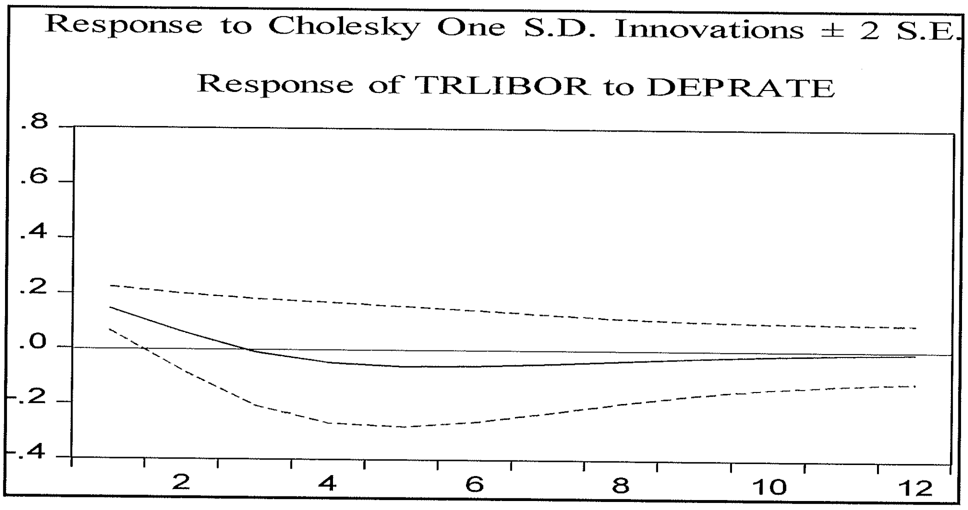

Figure 4.7 IR Results of DEPRATE to TRLIBOR

For the long term, there are two significant impacts on GOVTB variable. Firstly, similar at short term, one standard deviation in WAFR has significant impact on TRLIBOR response (Figure 4.8). The difference from short term, impact disappears after 3rd period. Economically, 1 percentage point increase in weighted average rate raise 5y government bond rate 0.12 percentage points. Also, variance decomposition results give that one unit shock on 5y government bond explained by weighted average funding rate at 7.8 percent ratio.

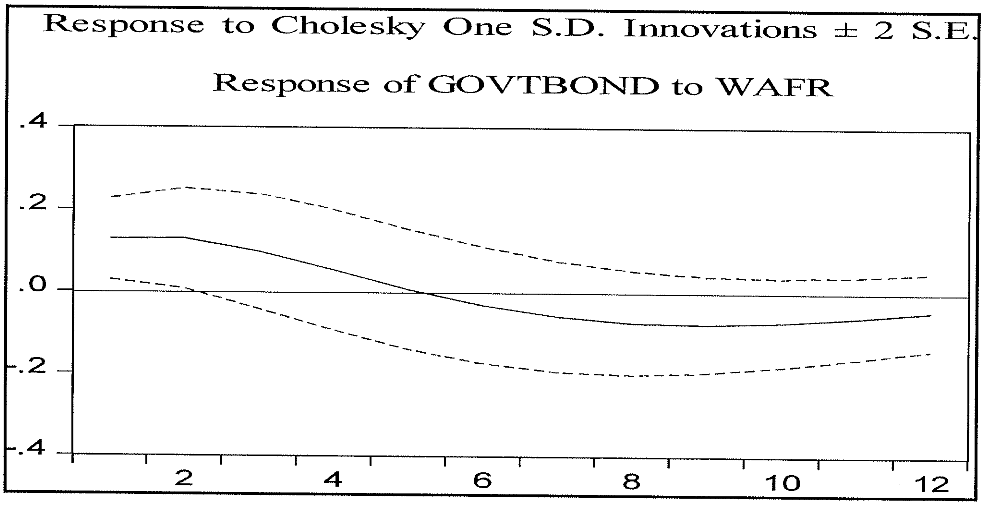

Figure 4.8 IR Results of WAFR to GOVTB

Interestingly, a shock from U.S. dollar rate has been significantly responded by GOVTB (Figure 4.9). US dollar exchange rate has quite high effect on government bond rate. Both rate of impact and duration of exposure are remarkable. If the exchange rate rises 1 Turkish Lira against US dollar, government bond rate also raises 0.24 percentage point. Explanation ratio of US dollar exchange is quite huge. One unit shock of 5y government bond is explained by 29.0 percent ratio of exchange rate. Until the effects end at 6th period, explanation ratio reaches the 35.9 percent.

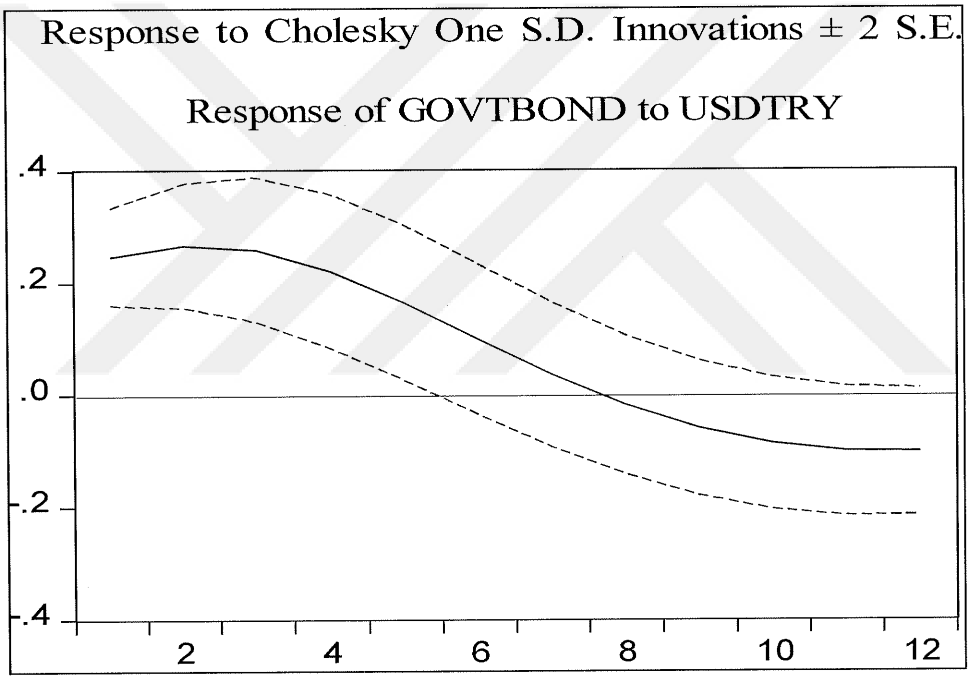

Figure 4.9 IR Results of USDTRY to GOVTB

CHAPTER V

CONCLUSION

In this study, established model analyzes both short and long-term financial developments in Turkish financial markets. Results give some significant hints.

Weighted average funding rate which is main policy tool of CBRT is highly effective on short-term market rate. This means that transmission of CBRT decisions to real sector met its fundamental objective in sample period. Hence market sensitivity to interest rates is quite high.

Effects of inflation rate over market rate are positively quite high. Relation between these two variables is economically expected. Hence, the finding should be evaluated consistent with the literature that defend contractionary effect of raising interest rates also raises prices.

I expected that the required reserves have been more effective on market rate. Because of proactive usage of reserves by advanced economies saved them from highly destructive effects since crisis period, required reserves as a balance sheet policy had quite limited effect on Turkish market. Hence, it can be assumed that this policy was only used to offset the exchange rate pressure. Also, there is no evidence that this policy has made any contribution to affect market interest rate. Similarly, although TL denominated deposite rate has a limited effect over primary market rate, impact is fading in a short-term.

For the long term, US dollar is more decisive over 5y government bond than weighted average funding rate. This finding may also support the idea that previously mentioned which is CBRT's prevention using reserves offset the negative effects of US dollar at long term. However, findings do not give significant result to reach that interpretation within the scope of this study.

As a conclusion, weighted average funding rate is highly effective both on short and long term indicators. This rate is composed by upper bound of corridor and policy rate. So, while this policy seems to be vey effective, the effects of other policy tool (reserves) are quite uncertain by findings.

I also expected to see the effects of foreign improvements to Turkish financial markets but both FED and ECB shadow rates do not reflects any significant result over two main Turkish indicators.

After all, I believe that future works in this field with different methods will produce beneficial results to the policy makers.

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APPENDIXES

A.1. Correlograms of the Variables

Correlogram of TRLIBOR

Date: 02/06/17 Time: 15:39
Sample: 2010M01 2016M09
Included observations: 81

Lag	AC	PAC	Q-Stat	Prob
1	0.923	0.923	71.620	0.000
2	0.808	-0.301	127.15	0.000
3	0.701	0.062	169.47	0.000
4	0.623	0.109	203.39	0.000
5	0.564	-0.007	231.52	0.000
6	0.495	-0.138	253.44	0.000
7	0.402	-0.143	268.10	0.000
8	0.301	-0.041	276.41	0.000
9	0.203	-0.065	280.28	0.000
10	0.137	0.093	282.05	0.000
11	0.086	-0.053	282.76	0.000
12	0.044	0.014	282.95	0.000
13	0.012	0.077	282.97	0.000
14	-0.009	0.039	282.97	0.000
15	-0.041	-0.159	283.15	0.000
16	-0.072	0.009	283.68	0.000
17	-0.096	0.010	284.65	0.000
18	-0.090	0.132	285.50	0.000
19	-0.066	0.002	285.98	0.000
20	-0.033	0.065	286.10	0.000

Correlogram of GOVTBOND

Date: 02/06/17 Time: 15:43
Sample: 2010M01 2016M09
Included observations: 81

Lag	AC	PAC	Q-Stat	Prob
1	0.890	0.890	66.516	0.000
2	0.711	-0.387	109.52	0.000
3	0.537	0.024	134.40	0.000
4	0.401	0.044	148.44	0.000
5	0.294	-0.043	156.09	0.000
6	0.190	-0.115	159.34	0.000
7	0.072	-0.145	159.80	0.000
8	-0.056	-0.101	160.10	0.000
9	-0.185	-0.130	163.29	0.000
10	-0.305	-0.131	172.12	0.000
11	-0.371	0.122	185.36	0.000
12	-0.387	-0.009	199.97	0.000
13	-0.345	0.159	211.74	0.000
14	-0.281	-0.001	219.63	0.000
15	-0.223	-0.019	224.72	0.000
16	-0.168	0.069	227.65	0.000
17	-0.097	0.081	228.63	0.000
18	-0.014	-0.004	228.65	0.000
19	0.087	0.103	229.47	0.000
20	0.198	0.067	233.77	0.000

Correlogram of WAFR

Date: 02/06/17 Time: 15:49
Sample: 2010M01 2016M09
Included observations: 81

Lag	AC	PAC	Q-Stat	Prob
1	0.920	0.920	71.088	0.000
2	0.790	-0.361	124.24	0.000
3	0.658	0.002	161.51	0.000
4	0.539	0.005	186.86	0.000
5	0.427	-0.087	202.97	0.000
6	0.325	-0.009	212.43	0.000
7	0.208	-0.226	216.35	0.000
8	0.103	0.081	217.33	0.000
9	0.018	-0.014	217.36	0.000
10	-0.040	0.020	217.52	0.000
11	-0.087	-0.042	218.24	0.000
12	-0.111	0.064	219.45	0.000
13	-0.102	0.179	220.48	0.000
14	-0.075	-0.056	221.05	0.000
15	-0.050	-0.035	221.31	0.000
16	-0.036	-0.075	221.44	0.000
17	-0.013	0.146	221.46	0.000
18	0.034	0.140	221.58	0.000
19	0.110	0.101	222.88	0.000
20	0.178	-0.074	226.37	0.000

Correlogram of REQRES

Date: 02/06/17 Time: 15:50
Sample: 2010M01 2016M09
Included observations: 81

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
		1	0.974	0.974	79.658	0.000
		2	0.923	-0.478	152.15	0.000
		3	0.860	-0.076	215.84	0.000
		4	0.785	-0.156	269.69	0.000
		5	0.703	-0.076	313.38	0.000
		6	0.612	-0.147	346.93	0.000
		7	0.524	0.185	371.89	0.000
		8	0.447	0.112	390.30	0.000
		9	0.373	-0.149	403.29	0.000
		10	0.302	-0.031	411.93	0.000
		11	0.237	0.004	417.31	0.000
		12	0.180	0.022	420.46	0.000
		13	0.135	0.071	422.25	0.000
		14	0.096	0.000	423.18	0.000
		15	0.064	-0.012	423.60	0.000
		16	0.039	0.009	423.76	0.000
		17	0.022	-0.012	423.81	0.000
		18	0.010	-0.029	423.82	0.000
		19	0.003	0.081	423.82	0.000
		20	0.001	0.027	423.82	0.000

Correlogram of FEDSHD

Date: 02/06/17 Time: 15:53
Sample: 2010M01 2016M09
Included observations: 81

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
		1	0.960	0.960	77.409	0.000
		2	0.908	-0.169	147.54	0.000
		3	0.847	-0.125	209.35	0.000
		4	0.774	-0.166	261.59	0.000
		5	0.691	-0.121	303.88	0.000
		6	0.603	-0.095	336.44	0.000
		7	0.508	-0.095	359.92	0.000
		8	0.409	-0.094	375.34	0.000
		9	0.307	-0.080	384.17	0.000
		10	0.206	-0.058	388.17	0.000
		11	0.108	-0.010	389.29	0.000
		12	0.022	0.069	389.34	0.000
		13	-0.059	-0.034	389.68	0.000
		14	-0.133	-0.015	391.45	0.000
		15	-0.197	-0.007	395.41	0.000
		16	-0.257	-0.072	402.22	0.000
		17	-0.309	-0.041	412.27	0.000
		18	-0.351	0.008	425.40	0.000
		19	-0.383	-0.012	441.29	0.000
		20	-0.402	0.047	459.10	0.000

Correlogram of ECBSHD

Date: 02/06/17 Time: 15:54
Sample: 2010M01 2016M09
Included observations: 81

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
		1	0.941	0.941	74.400	0.000
		2	0.880	-0.046	140.31	0.000
		3	0.816	-0.059	197.71	0.000
		4	0.746	-0.089	246.30	0.000
		5	0.676	-0.037	286.73	0.000
		6	0.600	-0.095	318.97	0.000
		7	0.524	-0.040	343.92	0.000
		8	0.440	-0.126	361.72	0.000
		9	0.358	-0.034	373.66	0.000
		10	0.284	0.017	381.29	0.000
		11	0.205	-0.102	385.31	0.000
		12	0.135	0.017	387.09	0.000
		13	0.063	-0.081	387.48	0.000
		14	0.002	0.032	387.48	0.000
		15	-0.054	-0.029	387.78	0.000
		16	-0.101	0.031	388.84	0.000
		17	-0.142	-0.029	390.95	0.000
		18	-0.179	-0.019	394.37	0.000
		19	-0.216	-0.075	399.44	0.000
		20	-0.239	0.071	405.72	0.000

Correlogram of INDPRO

Date: 02/06/17 Time: 15:56
Sample: 2010M01 2016M09
Included observations: 81

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
		1	-0.496	-0.496	20.640	0.000
		2	0.015	-0.306	20.659	0.000
		3	0.006	-0.199	20.662	0.000
		4	-0.132	-0.335	22.176	0.000
		5	-0.025	-0.485	22.231	0.000
		6	0.280	-0.163	29.275	0.000
		7	-0.042	0.102	29.433	0.000
		8	-0.137	-0.015	31.164	0.000
		9	0.055	-0.011	31.451	0.000
		10	-0.078	0.038	32.027	0.000
		11	-0.204	-0.437	36.005	0.000
		12	0.563	0.119	66.857	0.000
		13	-0.306	0.080	76.088	0.000
		14	0.002	-0.015	76.088	0.000
		15	0.027	0.019	76.163	0.000
		16	-0.155	-0.073	78.644	0.000
		17	0.014	-0.128	78.664	0.000
		18	0.279	0.018	86.981	0.000
		19	-0.072	0.108	87.536	0.000
		20	-0.214	-0.202	92.588	0.000

Correlogram of INFRATE

Date: 02/06/17 Time: 15:57
Sample: 2010M01 2016M09
Included observations: 81

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
		1	0.131	0.131	1.4317	0.231
		2	-0.212	-0.233	5.2540	0.072
		3	-0.054	0.012	5.5020	0.139
		4	-0.339	-0.410	15.523	0.004
		5	-0.079	0.040	16.069	0.007
		6	0.251	0.083	21.733	0.001
		7	-0.048	-0.150	21.944	0.003
		8	-0.175	-0.234	24.772	0.002
		9	0.007	-0.020	24.776	0.003
		10	-0.232	-0.286	29.863	0.001
		11	-0.009	-0.008	29.871	0.002
		12	0.398	0.141	45.309	0.000
		13	0.069	-0.035	45.780	0.000
		14	-0.043	-0.053	45.962	0.000
		15	0.088	0.089	46.742	0.000
		16	-0.204	-0.063	51.055	0.000
		17	-0.149	-0.098	53.383	0.000
		18	0.060	-0.170	53.768	0.000
		19	-0.090	-0.071	54.639	0.000
		20	-0.023	-0.074	54.698	0.000

Correlogram of USDTRY

Date: 02/06/17 Time: 15:58
Sample: 2010M01 2016M09
Included observations: 81

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
		1	0.965	0.965	78.184	0.000
		2	0.927	-0.053	151.26	0.000
		3	0.889	-0.012	219.42	0.000
		4	0.852	-0.014	282.85	0.000
		5	0.814	-0.035	341.52	0.000
		6	0.779	0.022	395.97	0.000
		7	0.738	-0.115	445.45	0.000
		8	0.692	-0.084	489.54	0.000
		9	0.642	-0.084	528.00	0.000
		10	0.592	-0.023	561.22	0.000
		11	0.545	0.006	589.78	0.000
		12	0.497	-0.053	613.89	0.000
		13	0.447	-0.059	633.68	0.000
		14	0.405	0.085	650.14	0.000
		15	0.369	0.067	663.98	0.000
		16	0.327	-0.091	675.07	0.000
		17	0.290	0.029	683.93	0.000
		18	0.253	-0.037	690.77	0.000
		19	0.219	0.029	695.97	0.000
		20	0.191	0.056	699.99	0.000

Correlogram of EURORTRY

Date: 02/06/17 Time: 15:59
Sample: 2010M01 2016M09
Included observations: 81

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
		1	0.961	0.961	77.568	0.000
		2	0.915	-0.102	148.85	0.000
		3	0.875	0.051	214.82	0.000
		4	0.830	-0.088	275.02	0.000
		5	0.774	-0.160	328.08	0.000
		6	0.721	0.017	374.68	0.000
		7	0.670	-0.019	415.50	0.000
		8	0.615	-0.075	450.34	0.000
		9	0.560	-0.010	479.57	0.000
		10	0.511	0.032	504.27	0.000
		11	0.470	0.070	525.50	0.000
		12	0.422	-0.120	542.89	0.000
		13	0.376	0.000	556.85	0.000
		14	0.344	0.122	568.72	0.000
		15	0.323	0.090	579.35	0.000
		16	0.299	-0.034	588.60	0.000
		17	0.284	0.088	597.06	0.000
		18	0.275	-0.002	605.15	0.000
		19	0.270	0.032	613.07	0.000
		20	0.270	0.067	621.08	0.000

Correlogram of COMMCREDT

Date: 02/06/17 Time: 16:02
Sample: 2010M01 2016M09
Included observations: 81

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
		1	0.950	0.950	75.836	0.000
		2	0.863	-0.407	139.17	0.000
		3	0.769	0.030	190.14	0.000
		4	0.684	0.046	230.97	0.000
		5	0.604	-0.070	263.23	0.000
		6	0.524	-0.070	287.82	0.000
		7	0.428	-0.230	304.44	0.000
		8	0.321	-0.065	313.90	0.000
		9	0.217	0.017	318.29	0.000
		10	0.127	0.005	319.83	0.000
		11	0.059	0.074	320.16	0.000
		12	0.002	-0.064	320.16	0.000
		13	-0.048	0.008	320.39	0.000
		14	-0.086	0.109	321.14	0.000
		15	-0.114	-0.030	322.47	0.000
		16	-0.130	0.029	324.22	0.000
		17	-0.122	0.153	325.79	0.000
		18	-0.099	-0.014	326.83	0.000
		19	-0.073	-0.038	327.41	0.000
		20	-0.061	-0.160	327.82	0.000

Correlogram of DEPRATE

Date: 02/06/17 Time: 16:04
Sample: 2010M01 2016M09
Included observations: 81

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
		1	0.945	0.945	75.112	0.000
		2	0.837	-0.534	134.74	0.000
		3	0.718	0.121	179.21	0.000
		4	0.611	0.036	211.83	0.000
		5	0.521	-0.010	235.84	0.000
		6	0.428	-0.228	252.29	0.000
		7	0.318	-0.181	261.46	0.000
		8	0.192	-0.059	264.86	0.000
		9	0.069	0.007	265.31	0.000
		10	-0.033	0.036	265.41	0.000
		11	-0.103	0.039	266.43	0.000
		12	-0.142	0.105	268.39	0.000
		13	-0.156	0.083	270.78	0.000
		14	-0.157	-0.006	273.26	0.000
		15	-0.156	-0.041	275.74	0.000
		16	-0.146	0.081	277.96	0.000
		17	-0.116	0.106	279.38	0.000
		18	-0.060	0.085	279.76	0.000
		19	0.007	-0.132	279.76	0.000
		20	0.062	-0.078	280.19	0.000

A.2. Unit Root Tests

Null Hypothesis: TRLIBOR has a unit root
Exogenous: Constant
Lag Length: 1 (Automatic - based on AIC, maxlag=11)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-2.396472	0.1460
Test critical values:	1% level	-3.515536	
	5% level	-2.898623	
	10% level	-2.586605	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: TRLIBOR has a unit root
Exogenous: Constant
Bandwidth: 2 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-2.100007	0.2453
Test critical values:	1% level	-3.514426	
	5% level	-2.898145	
	10% level	-2.586351	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	0.612652
HAC corrected variance (Bartlett kernel)	0.848273

Null Hypothesis: TRLIBOR has a unit root
Exogenous: Constant
Lag length: 1 (Spectral GLS-detrended AR based on SIC, maxlag=11)
Sample: 2010M01 2016M09
Included observations: 81

		MZa	MZt	MSB	MPT
Ng-Perron test statistics		-8.32078	-2.02749	0.24367	2.99184
Asymptotic critical values*:	1%	-13.8000	-2.58000	0.17400	1.78000
	5%	-8.10000	-1.98000	0.23300	3.17000
	10%	-5.70000	-1.62000	0.27500	4.45000

*Ng-Perron (2001, Table 1)

HAC corrected variance (Spectral GLS-detrended AR)	1.214146

Null Hypothesis: GOVTBOND has a unit root
Exogenous: Constant
Lag Length: 1 (Automatic - based on AIC, maxlag=11)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.171827	0.0254
Test critical values:	1% level	-3.515536	
	5% level	-2.898623	
	10% level	-2.586605	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: GOVTBOND has a unit root
Exogenous: Constant
Bandwidth: 0 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-2.188356	0.2121
Test critical values:	1% level	-3.514426	
	5% level	-2.898145	
	10% level	-2.586351	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	0.245089
HAC corrected variance (Bartlett kernel)	0.245089

Null Hypothesis: GOVTBOND has a unit root
Exogenous: Constant
Lag length: 1 (Spectral GLS-detrended AR based on SIC, maxlag=11)
Sample: 2010M01 2016M09
Included observations: 81

		MZa	MZt	MSB	MPT
Ng-Perron test statistics		-13.0299	-2.54893	0.19562	1.89412
Asymptotic critical values*:	1%	-13.8000	-2.58000	0.17400	1.78000
	5%	-8.10000	-1.98000	0.23300	3.17000
	10%	-5.70000	-1.62000	0.27500	4.45000

*Ng-Perron (2001, Table 1)
HAC corrected variance (Spectral GLS-detrended AR) 0.551135

Null Hypothesis: WAFR has a unit root
Exogenous: Constant
Lag Length: 1 (Automatic - based on AIC, maxlag=11)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-2.579420	0.1015
Test critical values:	1% level	-3.515536	
	5% level	-2.898623	
	10% level	-2.586605	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: WAFR has a unit root
Exogenous: Constant
Bandwidth: 2 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-2.181414	0.2146
Test critical values:	1% level	-3.514426	
	5% level	-2.898145	
	10% level	-2.586351	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	0.267696
HAC corrected variance (Bartlett kernel)	0.398416

Null Hypothesis: WAFR has a unit root
Exogenous: Constant
Lag length: 1 (Spectral GLS-detrended AR based on SIC, maxlag=11)
Sample: 2010M01 2016M09
Included observations: 81

		MZa	MZt	MSB	MPT
Ng-Perron test statistics		-10.9896	-2.32127	0.21122	2.32019
Asymptotic critical values*:	1%	-13.8000	-2.58000	0.17400	1.78000
	5%	-8.10000	-1.98000	0.23300	3.17000
	10%	-5.70000	-1.62000	0.27500	4.45000

*Ng-Perron (2001, Table 1)
HAC corrected variance (Spectral GLS-detrended AR) 0.591759

Null Hypothesis: REQRES has a unit root
Exogenous: Constant
Lag Length: 6 (Automatic - based on AIC, maxlag=11)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-1.524630	0.5157
Test critical values:	1% level	-3.521579	
	5% level	-2.901217	
	10% level	-2.587981	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: REQRES has a unit root			
Exogenous: Constant			
Bandwidth: 5 (Newey-West automatic) using Bartlett kernel			
		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-1.486862	0.5352
Test critical values:	1% level	-3.514426	
	5% level	-2.898145	
	10% level	-2.586351	
*MacKinnon (1996) one-sided p-values.			
Residual variance (no correction)			0.428021
HAC corrected variance (Bartlett kernel)			1.163565

Null Hypothesis: REQRES has a unit root					
Exogenous: Constant					
Lag length: 1 (Spectral GLS-detrended AR based on SIC, maxlag=11)					
Sample: 2010M01 2016M09					
Included observations: 81					
		MZa	MZt	MSB	MPT
Ng-Perron test statistics		-5.91989	-1.70322	0.28771	4.19390
Asymptotic critical values*:	1%	-13.8000	-2.58000	0.17400	1.78000
	5%	-8.10000	-1.98000	0.23300	3.17000
	10%	-5.70000	-1.62000	0.27500	4.45000
*Ng-Perron (2001, Table 1)					
HAC corrected variance (Spectral GLS-detrended AR)					1.531609

Null Hypothesis: FEDSHD has a unit root			
Exogenous: Constant			
Lag Length: 3 (Automatic - based on AIC, maxlag=11)			
		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-1.672477	0.4411
Test critical values:	1% level	-3.517847	
	5% level	-2.899619	
	10% level	-2.587134	
*MacKinnon (1996) one-sided p-values.			

Null Hypothesis: FEDSHD has a unit root			
Exogenous: Constant			
Bandwidth: 6 (Newey-West automatic) using Bartlett kernel			
		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-0.889338	0.7869
Test critical values:	1% level	-3.514426	
	5% level	-2.898145	
	10% level	-2.586351	
*MacKinnon (1996) one-sided p-values.			
Residual variance (no correction)			0.023936
HAC corrected variance (Bartlett kernel)			0.073901

Null Hypothesis: FEDSHD has a unit root					
Exogenous: Constant					
Lag length: 3 (Spectral GLS-detrended AR based on SIC, maxlag=11)					
Sample: 2010M01 2016M09					
Included observations: 81					
		MZa	MZt	MSB	MPT
Ng-Perron test statistics		-6.88919	-1.78466	0.25905	3.80930
Asymptotic critical values*:	1%	-13.8000	-2.58000	0.17400	1.78000
	5%	-8.10000	-1.98000	0.23300	3.17000
	10%	-5.70000	-1.62000	0.27500	4.45000
*Ng-Perron (2001, Table 1)					
HAC corrected variance (Spectral GLS-detrended AR)					0.203144

Null Hypothesis: ECBSHD has a unit root			
Exogenous: Constant			
Lag Length: 0 (Automatic - based on AIC, maxlag=11)			
		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		0.689586	0.9912
Test critical values:	1% level	-3.514426	
	5% level	-2.898145	
	10% level	-2.586351	
*MacKinnon (1996) one-sided p-values.			

Null Hypothesis: ECBSHD has a unit root			
Exogenous: Constant			
Bandwidth: 3 (Newey-West automatic) using Bartlett kernel			
		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		0.529270	0.9868
Test critical values:	1% level	-3.514426	
	5% level	-2.898145	
	10% level	-2.586351	
*MacKinnon (1996) one-sided p-values.			
Residual variance (no correction)			0.115541
HAC corrected variance (Bartlett kernel)			0.131279

Null Hypothesis: ECBSHD has a unit root					
Exogenous: Constant					
Lag length: 0 (Spectral GLS-detrended AR based on SIC, maxlag=11)					
Sample: 2010M01 2016M09					
Included observations: 81					
		MZa	MZt	MSB	MPT
Ng-Perron test statistics		1.92634	1.05107	0.54563	29.4314
Asymptotic critical values*:	1%	-13.8000	-2.58000	0.17400	1.78000
	5%	-8.10000	-1.98000	0.23300	3.17000
	10%	-5.70000	-1.62000	0.27500	4.45000
*Ng-Perron (2001, Table 1)					
HAC corrected variance (Spectral GLS-detrended AR)					0.118920

Null Hypothesis: INDPRO has a unit root			
Exogenous: Constant			
Lag Length: 10 (Automatic - based on AIC, maxlag=11)			
		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.462323	0.0120
Test critical values:	1% level	-3.527045	
	5% level	-2.903566	
	10% level	-2.589227	
*MacKinnon (1996) one-sided p-values.			

Null Hypothesis: INDPRO has a unit root			
Exogenous: Constant			
Bandwidth: 79 (Newey-West automatic) using Bartlett kernel			
		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-47.54802	0.0001
Test critical values:	1% level	-3.514426	
	5% level	-2.898145	
	10% level	-2.586351	
*MacKinnon (1996) one-sided p-values.			
Residual variance (no correction)			55.13302
HAC corrected variance (Bartlett kernel)			3.563630

Null Hypothesis: INDPRO has a unit root					
Exogenous: Constant					
Lag length: 11 (Spectral GLS-detrended AR based on SIC, maxlag=11)					
Sample: 2010M01 2016M09					
Included observations: 81					
		MZa	MZt	MSB	MPT
Ng-Perron test statistics		0.25651	1.49847	5.84166	1800.08
Asymptotic critical values*:	1%	-13.8000	-2.58000	0.17400	1.78000
	5%	-8.10000	-1.98000	0.23300	3.17000
	10%	-5.70000	-1.62000	0.27500	4.45000
*Ng-Perron (2001, Table 1)					
HAC corrected variance (Spectral GLS-detrended AR)					0.057181

Null Hypothesis: INFRATE has a unit root			
Exogenous: Constant			
Lag Length: 9 (Automatic - based on AIC, maxlag=11)			
		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-5.009539	0.0001
Test critical values:	1% level	-3.525618	
	5% level	-2.902953	
	10% level	-2.588902	
*MacKinnon (1996) one-sided p-values.			

Null Hypothesis: INFRATE has a unit root			
Exogenous: Constant			
Bandwidth: 5 (Newey-West automatic) using Bartlett kernel			
		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-7.993630	0.0000
Test critical values:	1% level	-3.514426	
	5% level	-2.898145	
	10% level	-2.586351	
*MacKinnon (1996) one-sided p-values.			
Residual variance (no correction)			0.602548
HAC corrected variance (Bartlett kernel)			0.304113

Null Hypothesis: INFRATE has a unit root					
Exogenous: Constant					
Lag length: 5 (Spectral GLS-detrended AR based on SIC, maxlag=11)					
Sample: 2010M01 2016M09					
Included observations: 81					
		MZa	MZt	MSB	MPT
Ng-Perron test statistics		-1.50100	-0.73553	0.49003	13.6961
Asymptotic critical values*:	1%	-13.8000	-2.58000	0.17400	1.78000
	5%	-8.10000	-1.98000	0.23300	3.17000
	10%	-5.70000	-1.62000	0.27500	4.45000
*Ng-Perron (2001, Table 1)					
HAC corrected variance (Spectral GLS-detrended AR)					0.056353

Null Hypothesis: USDTRY has a unit root			
Exogenous: Constant			
Lag Length: 1 (Automatic - based on AIC, maxlag=11)			
		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		0.234517	0.9732
Test critical values:	1% level	-3.515536	
	5% level	-2.898623	
	10% level	-2.586605	
*MacKinnon (1996) one-sided p-values.			

Null Hypothesis: USDTRY has a unit root			
Exogenous: Constant			
Bandwidth: 4 (Newey-West automatic) using Bartlett kernel			
		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		0.389757	0.9814
Test critical values:	1% level	-3.514426	
	5% level	-2.898145	
	10% level	-2.586351	
*MacKinnon (1996) one-sided p-values.			
Residual variance (no correction)			0.002779
HAC corrected variance (Bartlett kernel)			0.003046

Null Hypothesis: USDTRY has a unit root					
Exogenous: Constant					
Lag length: 0 (Spectral GLS-detrended AR based on SIC, maxlag=11)					
Sample: 2010M01 2016M09					
Included observations: 81					
		MZa	MZt	MSB	MPT
Ng-Perron test statistics		1.83211	2.12463	1.15967	106.878
Asymptotic critical values*:	1%	-13.8000	-2.58000	0.17400	1.78000
	5%	-8.10000	-1.98000	0.23300	3.17000
	10%	-5.70000	-1.62000	0.27500	4.45000
*Ng-Perron (2001, Table 1)					
HAC corrected variance (Spectral GLS-detrended AR)					0.002994

Null Hypothesis: EUROTRY has a unit root			
Exogenous: Constant			
Lag Length: 0 (Automatic - based on AIC, maxlag=11)			
		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-0.221233	0.9305
Test critical values:	1% level	-3.514426	
	5% level	-2.898145	
	10% level	-2.586351	
*MacKinnon (1996) one-sided p-values.			

Null Hypothesis: EUROTRY has a unit root			
Exogenous: Constant			
Bandwidth: 1 (Newey-West automatic) using Bartlett kernel			
		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-0.305686	0.9185
Test critical values:	1% level	-3.514426	
	5% level	-2.898145	
	10% level	-2.586351	
*MacKinnon (1996) one-sided p-values.			
Residual variance (no correction)			0.004918
HAC corrected variance (Bartlett kernel)			0.005623

Null Hypothesis: EUROTRY has a unit root					
Exogenous: Constant					
Lag length: 0 (Spectral GLS-detrended AR based on SIC, maxlag=11)					
Sample: 2010M01 2016M09					
Included observations: 81					
		MZa	MZt	MSB	MPT
Ng-Perron test statistics		1.11182	0.84976	0.76430	44.5174
Asymptotic critical values*:	1%	-13.8000	-2.58000	0.17400	1.78000
	5%	-8.10000	-1.98000	0.23300	3.17000
	10%	-5.70000	-1.62000	0.27500	4.45000
*Ng-Perron (2001, Table 1)					
HAC corrected variance (Spectral GLS-detrended AR)					0.005118

Null Hypothesis: COMMCREDT has a unit root			
Exogenous: Constant			
Lag Length: 6 (Automatic - based on AIC, maxlag=11)			
		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-2.596352	0.0983
Test critical values:	1% level	-3.521579	
	5% level	-2.901217	
	10% level	-2.587981	
*MacKinnon (1996) one-sided p-values.			

Null Hypothesis: COMMCREDT has a unit root			
Exogenous: Constant			
Bandwidth: 2 (Newey-West automatic) using Bartlett kernel			
		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-1.686355	0.4343
Test critical values:	1% level	-3.514426	
	5% level	-2.898145	
	10% level	-2.586351	
*MacKinnon (1996) one-sided p-values.			
Residual variance (no correction)			0.411144
HAC corrected variance (Bartlett kernel)			0.683511

Null Hypothesis: COMMCREDT has a unit root					
Exogenous: Constant					
Lag length: 1 (Spectral GLS-detrended AR based on SIC, maxlag=11)					
Sample: 2010M01 2016M09					
Included observations: 81					
		MZa	MZt	MSB	MPT
Ng-Perron test statistics		-5.00353	-1.46907	0.29361	5.17356
Asymptotic critical values*:	1%	-13.8000	-2.58000	0.17400	1.78000
	5%	-8.10000	-1.98000	0.23300	3.17000
	10%	-5.70000	-1.62000	0.27500	4.45000
*Ng-Perron (2001, Table 1)					
HAC corrected variance (Spectral GLS-detrended AR)					1.272395

Null Hypothesis: DEPRATE has a unit root			
Exogenous: Constant			
Lag Length: 2 (Automatic - based on AIC, maxlag=11)			
		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-2.014640	0.2801
Test critical values:	1% level	-3.516676	
	5% level	-2.899115	
	10% level	-2.586866	
*MacKinnon (1996) one-sided p-values.			

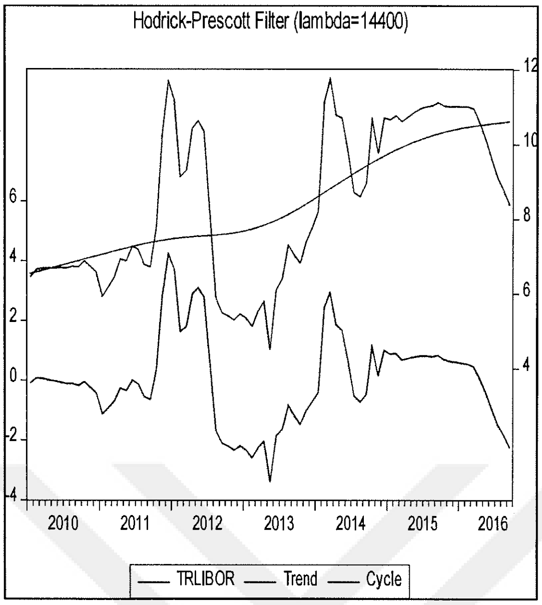
Null Hypothesis: DEPRATE has a unit root			
Exogenous: Constant			
Bandwidth: 2 (Newey-West automatic) using Bartlett kernel			
		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-1.813668	0.3715
Test critical values:	1% level	-3.514426	
	5% level	-2.898145	
	10% level	-2.586351	
*MacKinnon (1996) one-sided p-values.			
Residual variance (no correction)			0.144653
HAC corrected variance (Bartlett kernel)			0.262991

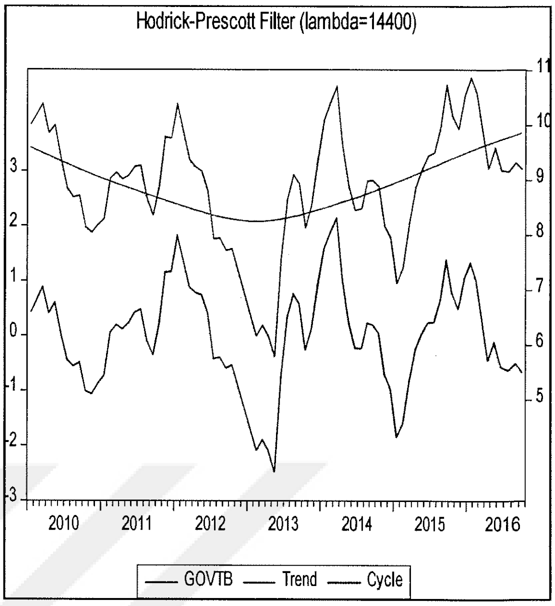
Null Hypothesis: DEPRATE has a unit root
Exogenous: Constant
Lag length: 1 (Spectral GLS-detrended AR based on SIC, maxlag=11)
Sample: 2010M01 2016M09
Included observations: 81

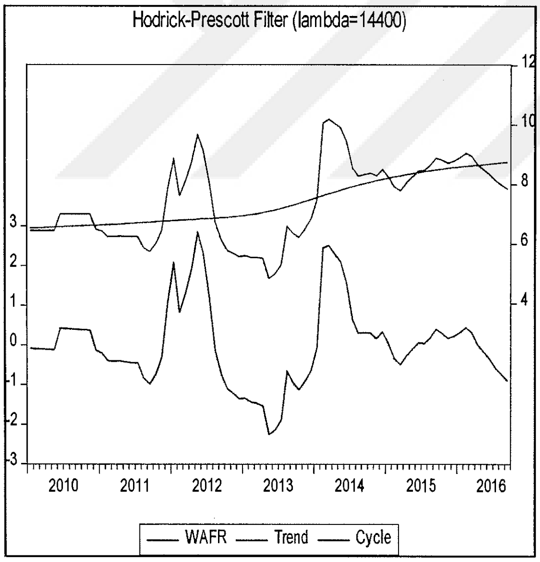
		MZa	MZt	MSB	MPT
Ng-Perron test statistics		-13.1248	-2.50700	0.19101	2.08001
Asymptotic critical values*:	1%	-13.8000	-2.58000	0.17400	1.78000
	5%	-8.10000	-1.98000	0.23300	3.17000
	10%	-5.70000	-1.62000	0.27500	4.45000

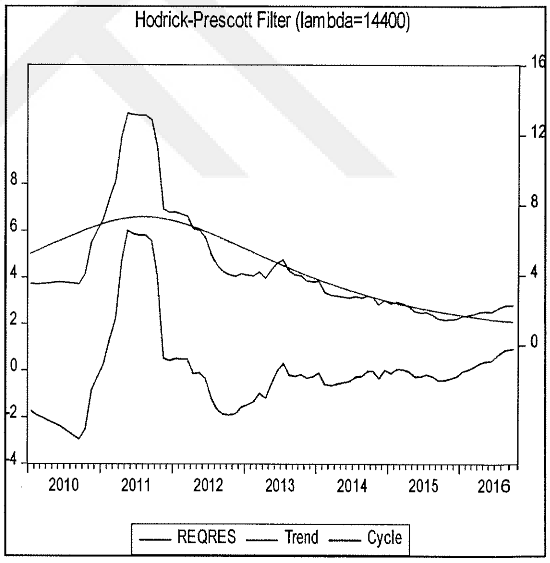
*Ng-Perron (2001, Table 1)
HAC corrected variance (Spectral GLS-detrended AR) 0.554775

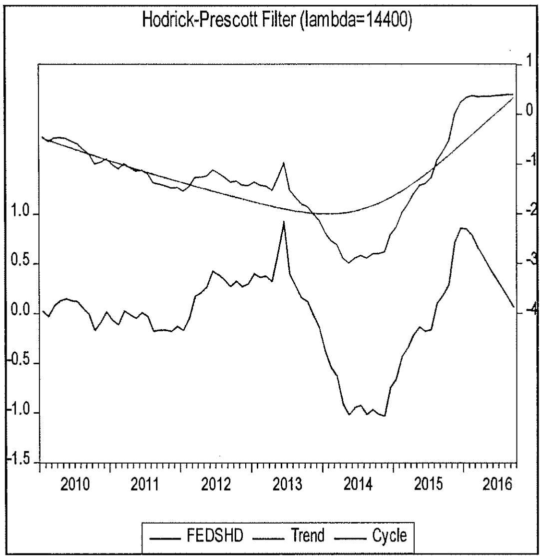
A.3. Detrending of Variables



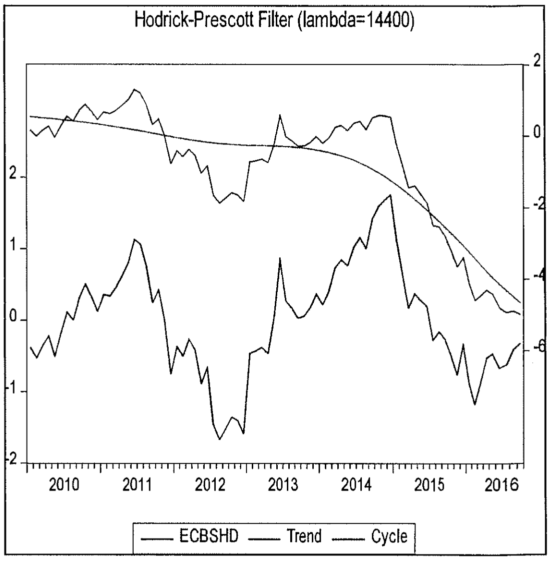




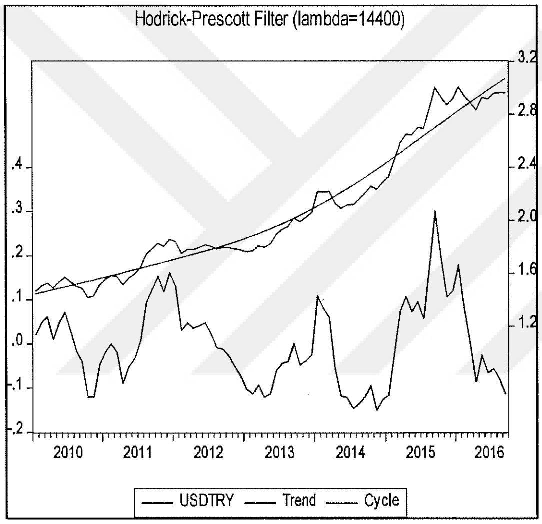




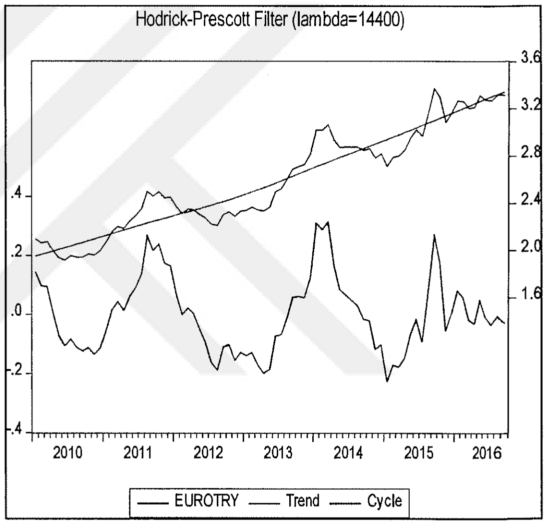
Hodrick-Prescott Filter (lambda=14400)
1
0
-1
-2
-3
-4
1.0
0.5
0.0
-0.5
-1.0
-1.5
2010
2011
2012
2013
2014
2015
2016
FEDSHD
Trend
Cycle



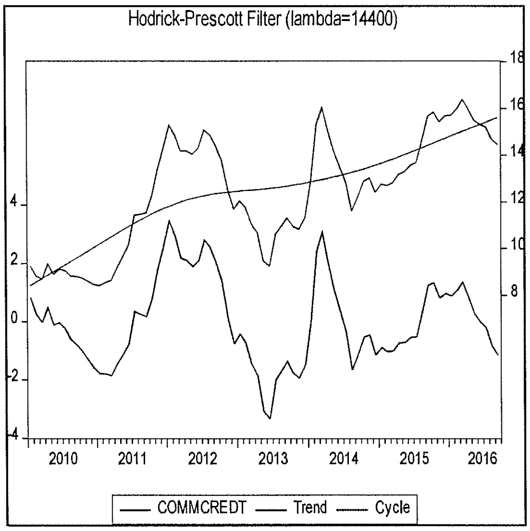
Hodrick-Prescott Filter (lambda=14400)
2
0
-2
-4
-6
2
1
0
-1
-2
2010
2011
2012
2013
2014
2015
2016
ECBSHD
Trend
Cycle



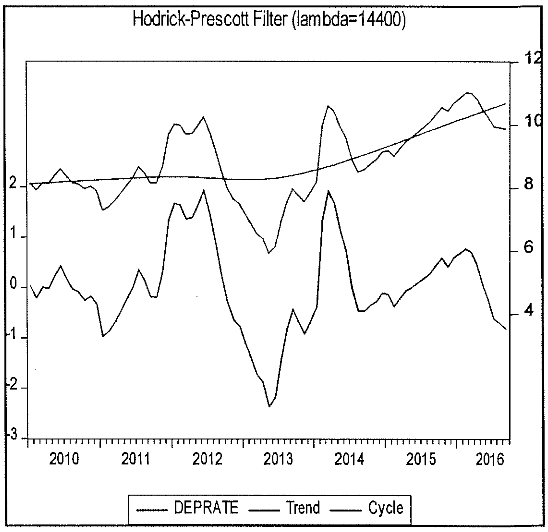
Hodrick-Prescott Filter (lambda=14400)
3.2
2.8
2.4
2.0
1.6
1.2
.4
.3
.2
.1
.0
-.1
-.2
2010
2011
2012
2013
2014
2015
2016
USDTRY
Trend
Cycle



Hodrick-Prescott Filter (lambda=14400)
3.6
3.2
2.8
2.4
2.0
1.6
.4
.2
.0
-.2
-.4
2010
2011
2012
2013
2014
2015
2016
EUROTRY
Trend
Cycle



Hodrick-Prescott Filter (lambda=14400)
18
16
14
12
10
8
4
2
0
-2
-4
2010
2011
2012
2013
2014
2015
2016
COMMCREDT
Trend
Cycle



Hodrick-Prescott Filter (lambda=14400)
12
10
8
6
4
2
1
0
-1
-2
-3
2010
2011
2012
2013
2014
2015
2016
DEPRATE
Trend
Cycle

A.4. Unit Root Tests of Detrended and Differenced Variables

A.4.a. Unit Root Tests of Detrended Variables

Null Hypothesis: TRLIBOR has a unit root
Exogenous: Constant
Lag Length: 1 (Automatic - based on AIC, maxlag=11)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.110033	0.0298
Test critical values:	1% level	-3.515536	
	5% level	-2.898623	
	10% level	-2.586605	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: TRLIBOR has a unit root
Exogenous: Constant
Bandwidth: 2 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-2.581911	0.1009
Test critical values:	1% level	-3.514426	
	5% level	-2.898145	
	10% level	-2.586351	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	0.594438
HAC corrected variance (Bartlett kernel)	0.831270

Null Hypothesis: TRLIBOR has a unit root
Exogenous: Constant
Lag length: 1 (Spectral GLS-detrended AR based on SIC, maxlag=11)
Sample: 2010M01 2016M09
Included observations: 81

		MZa	MZt	MSB	MPT
Ng-Perron test statistics		-21.2630	-3.19088	0.15007	1.39597
Asymptotic critical values*:	1%	-13.8000	-2.58000	0.17400	1.78000
	5%	-8.10000	-1.98000	0.23300	3.17000
	10%	-5.70000	-1.62000	0.27500	4.45000

*Ng-Perron (2001, Table 1)
HAC corrected variance (Spectral GLS-detrended AR) 1.287135

Null Hypothesis: GOVTB has a unit root
Exogenous: Constant
Lag Length: 9 (Automatic - based on AIC, maxlag=11)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-5.321035	0.0000
Test critical values:	1% level	-3.525618	
	5% level	-2.902953	
	10% level	-2.588902	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: GOVTB has a unit root
Exogenous: Constant
Bandwidth: 0 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-2.398321	0.1454
Test critical values:	1% level	-3.514426	
	5% level	-2.898145	
	10% level	-2.586351	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	0.239237
HAC corrected variance (Bartlett kernel)	0.239237

Null Hypothesis: GOVTB has a unit root
Exogenous: Constant
Lag length: 1 (Spectral GLS-detrended AR based on SIC, maxlag=11)
Sample: 2010M01 2016M09
Included observations: 81

		MZa	MZt	MSB	MPT
Ng-Perron test statistics		-23.8633	-3.42571	0.14356	1.12348
Asymptotic critical values*:	1%	-13.8000	-2.58000	0.17400	1.78000
	5%	-8.10000	-1.98000	0.23300	3.17000
	10%	-5.70000	-1.62000	0.27500	4.45000

*Ng-Perron (2001, Table 1)
HAC corrected variance (Spectral GLS-detrended AR) 0.575416

Null Hypothesis: WAFR has a unit root
Exogenous: Constant
Lag Length: 1 (Automatic - based on AIC, maxlag=11)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.229531	0.0219
Test critical values:	1% level	-3.515536	
	5% level	-2.898623	
	10% level	-2.586605	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: WAFR has a unit root
Exogenous: Constant
Bandwidth: 2 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-2.661279	0.0853
Test critical values:	1% level	-3.514426	
	5% level	-2.898145	
	10% level	-2.586351	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	0.260170
HAC corrected variance (Bartlett kernel)	0.389706

Null Hypothesis: WAFR has a unit root
Exogenous: Constant
Lag length: 1 (Spectral GLS-detrended AR based on SIC, maxlag=11)
Sample: 2010M01 2016M09
Included observations: 81

		MZa	MZt	MSB	MPT
Ng-Perron test statistics		-21.4799	-3.25529	0.15155	1.21749
Asymptotic critical values*:	1%	-13.8000	-2.58000	0.17400	1.78000
	5%	-8.10000	-1.98000	0.23300	3.17000
	10%	-5.70000	-1.62000	0.27500	4.45000

*Ng-Perron (2001, Table 1)
HAC corrected variance (Spectral GLS-detrended AR) 0.612216

Null Hypothesis: REQRES has a unit root
Exogenous: Constant
Lag Length: 8 (Automatic - based on AIC, maxlag=11)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.542433	0.0095
Test critical values:	1% level	-3.524233	
	5% level	-2.902358	
	10% level	-2.588587	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: REQRES has a unit root
Exogenous: Constant
Bandwidth: 5 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-2.322387	0.1676
Test critical values:	1% level	-3.514426	
	5% level	-2.898145	
	10% level	-2.586351	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	0.384274
HAC corrected variance (Bartlett kernel)	0.944197

Null Hypothesis: REQRES has a unit root
Exogenous: Constant
Lag length: 1 (Spectral GLS-detrended AR based on SIC, maxlag=11)
Sample: 2010M01 2016M09
Included observations: 81

		MZa	MZt	MSB	MPT
Ng-Perron test statistics		-10.9656	-2.30213	0.20994	2.39044
Asymptotic critical values*:	1%	-13.8000	-2.58000	0.17400	1.78000
	5%	-8.10000	-1.98000	0.23300	3.17000
	10%	-5.70000	-1.62000	0.27500	4.45000

*Ng-Perron (2001, Table 1)

HAC corrected variance (Spectral GLS-detrended AR)	1.310107

Null Hypothesis: FEDSHD has a unit root
Exogenous: Constant
Lag Length: 3 (Automatic - based on AIC, maxlag=11)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-2.540817	0.1100
Test critical values:	1% level	-3.517847	
	5% level	-2.899619	
	10% level	-2.587134	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: FEDSHD has a unit root
Exogenous: Constant
Bandwidth: 5 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-1.908065	0.3271
Test critical values:	1% level	-3.514426	
	5% level	-2.898145	
	10% level	-2.586351	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	0.018688
HAC corrected variance (Bartlett kernel)	0.038756

Null Hypothesis: FEDSHD has a unit root
Exogenous: Constant
Lag length: 1 (Spectral GLS-detrended AR based on SIC, maxlag=11)
Sample: 2010M01 2016M09
Included observations: 81

		MZa	MZt	MSB	MPT
Ng-Perron test statistics		-6.84504	-1.84942	0.27018	3.58135
Asymptotic critical values*:	1%	-13.8000	-2.58000	0.17400	1.78000
	5%	-8.10000	-1.98000	0.23300	3.17000
	10%	-5.70000	-1.62000	0.27500	4.45000

*Ng-Perron (2001, Table 1)

HAC corrected variance (Spectral GLS-detrended AR)	0.036798

Null Hypothesis: ECBSHD has a unit root			
Exogenous: Constant			
Lag Length: 0 (Automatic - based on AIC, maxlag=11)			
		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-1.935545	0.3147
Test critical values:	1% level	-3.514426	
	5% level	-2.898145	
	10% level	-2.586351	
*MacKinnon (1996) one-sided p-values.			

Null Hypothesis: ECBSHD has a unit root			
Exogenous: Constant			
Bandwidth: 3 (Newey-West automatic) using Bartlett kernel			
		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-2.013249	0.2807
Test critical values:	1% level	-3.514426	
	5% level	-2.898145	
	10% level	-2.586351	
*MacKinnon (1996) one-sided p-values.			
Residual variance (no correction)			0.102306
HAC corrected variance (Bartlett kernel)			0.111376

Null Hypothesis: ECBSHD has a unit root					
Exogenous: Constant					
Lag length: 0 (Spectral GLS-detrended AR based on SIC, maxlag=11)					
Sample: 2010M01 2016M09					
Included observations: 81					
		MZa	MZt	MSB	MPT
Ng-Perron test statistics		-6.35168	-1.78120	0.28043	3.86028
Asymptotic critical values*:	1%	-13.8000	-2.58000	0.17400	1.78000
	5%	-8.10000	-1.98000	0.23300	3.17000
	10%	-5.70000	-1.62000	0.27500	4.45000
*Ng-Perron (2001, Table 1)					
HAC corrected variance (Spectral GLS-detrended AR)					0.102761

Null Hypothesis: USDTRY has a unit root			
Exogenous: Constant			
Lag Length: 1 (Automatic - based on AIC, maxlag=11)			
		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.001104	0.0391
Test critical values:	1% level	-3.515536	
	5% level	-2.898623	
	10% level	-2.586605	
*MacKinnon (1996) one-sided p-values.			

Null Hypothesis: USDTRY has a unit root			
Exogenous: Constant			
Bandwidth: 2 (Newey-West automatic) using Bartlett kernel			
		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-2.659581	0.0857
Test critical values:	1% level	-3.514426	
	5% level	-2.898145	
	10% level	-2.586351	
*MacKinnon (1996) one-sided p-values.			
Residual variance (no correction)			0.002519
HAC corrected variance (Bartlett kernel)			0.003139

Null Hypothesis: USDTRY has a unit root
Exogenous: Constant
Lag length: 1 (Spectral GLS-detrended AR based on SIC, maxlag=11)
Sample: 2010M01 2016M09
Included observations: 81

		MZa	MZt	MSB	MPT
Ng-Perron test statistics		-18.6399	-2.98846	0.16033	1.54812
Asymptotic critical values*:	1%	-13.8000	-2.58000	0.17400	1.78000
	5%	-8.10000	-1.98000	0.23300	3.17000
	10%	-5.70000	-1.62000	0.27500	4.45000

*Ng-Perron (2001, Table 1)
HAC corrected variance (Spectral GLS-detrended AR) 0.004302

Null Hypothesis: EURTRY has a unit root
Exogenous: Constant
Lag Length: 4 (Automatic - based on AIC, maxlag=11)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.503323	0.0105
Test critical values:	1% level	-3.519050	
	5% level	-2.900137	
	10% level	-2.587409	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: EURTRY has a unit root
Exogenous: Constant
Bandwidth: 1 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-2.790761	0.0641
Test critical values:	1% level	-3.514426	
	5% level	-2.898145	
	10% level	-2.586351	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	0.004478
HAC corrected variance (Bartlett kernel)	0.005325

Null Hypothesis: EURTRY has a unit root
Exogenous: Constant
Lag length: 0 (Spectral GLS-detrended AR based on SIC, maxlag=11)
Sample: 2010M01 2016M09
Included observations: 81

		MZa	MZt	MSB	MPT
Ng-Perron test statistics		-7.65028	-1.92299	0.25136	3.32597
Asymptotic critical values*:	1%	-13.8000	-2.58000	0.17400	1.78000
	5%	-8.10000	-1.98000	0.23300	3.17000
	10%	-5.70000	-1.62000	0.27500	4.45000

*Ng-Perron (2001, Table 1)
HAC corrected variance (Spectral GLS-detrended AR) 0.004630

Null Hypothesis: COMCREDT has a unit root
Exogenous: Constant
Lag Length: 6 (Automatic - based on AIC, maxlag=11)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.761916	0.0050
Test critical values:	1% level	-3.521579	
	5% level	-2.901217	
	10% level	-2.587981	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: COMCREDT has a unit root			
Exogenous: Constant			
Bandwidth: 2 (Newey-West automatic) using Bartlett kernel			
		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-2.465920	0.1276
Test critical values:	1% level	-3.514426	
	5% level	-2.898145	
	10% level	-2.586351	
*MacKinnon (1996) one-sided p-values.			
Residual variance (no correction)			0.395283
HAC corrected variance (Bartlett kernel)			0.660987

Null Hypothesis: COMCREDT has a unit root					
Exogenous: Constant					
Lag length: 1 (Spectral GLS-detrended AR based on SIC, maxlag=11)					
Sample: 2010M01 2016M09					
Included observations: 81					
		MZa	MZt	MSB	MPT
Ng-Perron test statistics		-21.0641	-3.20570	0.15219	1.30263
Asymptotic critical values*:	1%	-13.8000	-2.58000	0.17400	1.78000
	5%	-8.10000	-1.98000	0.23300	3.17000
	10%	-5.70000	-1.62000	0.27500	4.45000
*Ng-Perron (2001, Table 1)					
HAC corrected variance (Spectral GLS-detrended AR)					1.281165

Null Hypothesis: DEPRATE has a unit root			
Exogenous: Constant			
Lag Length: 6 (Automatic - based on AIC, maxlag=11)			
		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.818922	0.0042
Test critical values:	1% level	-3.521579	
	5% level	-2.901217	
	10% level	-2.587981	
*MacKinnon (1996) one-sided p-values.			

Null Hypothesis: DEPRATE has a unit root			
Exogenous: Constant			
Bandwidth: 2 (Newey-West automatic) using Bartlett kernel			
		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-2.463725	0.1282
Test critical values:	1% level	-3.514426	
	5% level	-2.898145	
	10% level	-2.586351	
*MacKinnon (1996) one-sided p-values.			
Residual variance (no correction)			0.139513
HAC corrected variance (Bartlett kernel)			0.253339

Null Hypothesis: DEPRATE has a unit root					
Exogenous: Constant					
Lag length: 1 (Spectral GLS-detrended AR based on SIC, maxlag=11)					
Sample: 2010M01 2016M09					
Included observations: 81					
		MZa	MZt	MSB	MPT
Ng-Perron test statistics		-27.8418	-3.70517	0.13308	0.96343
Asymptotic critical values*:	1%	-13.8000	-2.58000	0.17400	1.78000
	5%	-8.10000	-1.98000	0.23300	3.17000
	10%	-5.70000	-1.62000	0.27500	4.45000
*Ng-Perron (2001, Table 1)					
HAC corrected variance (Spectral GLS-detrended AR)					0.570046

A.4.b. Unit Root Tests of Differenced Variables

Null Hypothesis: DFEDSHD has a unit root
Exogenous: Constant
Lag Length: 2 (Automatic - based on AIC, maxlag=11)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-2.624831	0.0924
Test critical values:	1% level	-3.517847	
	5% level	-2.899619	
	10% level	-2.587134	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: DFEDSHD has a unit root
Exogenous: Constant
Bandwidth: 5 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-5.857498	0.0000
Test critical values:	1% level	-3.515536	
	5% level	-2.898623	
	10% level	-2.586605	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	0.019554
HAC corrected variance (Bartlett kernel)	0.024564

Null Hypothesis: DFEDSHD has a unit root
Exogenous: Constant
Lag length: 2 (Spectral GLS-detrended AR based on SIC, maxlag=11)
Sample (adjusted): 2010M02 2016M09
Included observations: 80 after adjustments

		MZa	MZt	MSB	MPT
Ng-Perron test statistics		-8.77417	-2.08900	0.23809	2.81402
Asymptotic critical values*:	1%	-13.8000	-2.58000	0.17400	1.78000
	5%	-8.10000	-1.98000	0.23300	3.17000
	10%	-5.70000	-1.62000	0.27500	4.45000

*Ng-Perron (2001, Table 1)
HAC corrected variance (Spectral GLS-detrended AR) 0.006267

Null Hypothesis: DECBSHD has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on AIC, maxlag=11)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-8.153565	0.0000
Test critical values:	1% level	-3.515536	
	5% level	-2.898623	
	10% level	-2.586605	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: DECBSHD has a unit root
Exogenous: Constant
Bandwidth: 3 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-8.182415	0.0000
Test critical values:	1% level	-3.515536	
	5% level	-2.898623	
	10% level	-2.586605	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	0.116940
HAC corrected variance (Bartlett kernel)	0.125202

Null Hypothesis: DECBSHD has a unit root
Exogenous: Constant
Lag length: 0 (Spectral GLS-detrended AR based on SIC, maxlag=11)
Sample (adjusted): 2010M02 2016M09
Included observations: 80 after adjustments

		MZa	MZt	MSB	MPT
Ng-Perron test statistics		-39.0800	-4.42026	0.11311	0.62733
Asymptotic critical values*:	1%	-13.8000	-2.58000	0.17400	1.78000
	5%	-8.10000	-1.98000	0.23300	3.17000
	10%	-5.70000	-1.62000	0.27500	4.45000

*Ng-Perron (2001, Table 1)
HAC corrected variance (Spectral GLS-detrended AR) 0.120080

Null Hypothesis: DEURTRY has a unit root
Exogenous: Constant
Lag Length: 1 (Automatic - based on AIC, maxlag=11)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-6.709152	0.0000
Test critical values:	1% level	-3.516676	
	5% level	-2.899115	
	10% level	-2.586866	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: DEURTRY has a unit root
Exogenous: Constant
Bandwidth: 5 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-7.603107	0.0000
Test critical values:	1% level	-3.515536	
	5% level	-2.898623	
	10% level	-2.586605	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	0.004854
HAC corrected variance (Bartlett kernel)	0.004547

Null Hypothesis: DEURTRY has a unit root
Exogenous: Constant
Lag length: 0 (Spectral GLS-detrended AR based on SIC, maxlag=11)
Sample (adjusted): 2010M02 2016M09
Included observations: 80 after adjustments

		MZa	MZt	MSB	MPT
Ng-Perron test statistics		-36.6824	-4.28224	0.11674	0.66911
Asymptotic critical values*:	1%	-13.8000	-2.58000	0.17400	1.78000
	5%	-8.10000	-1.98000	0.23300	3.17000
	10%	-5.70000	-1.62000	0.27500	4.45000

*Ng-Perron (2001, Table 1)
HAC corrected variance (Spectral GLS-detrended AR) 0.005396

A.5. VAR Lag Order Selection Criteria

VAR Lag Order Selection Criteria
Endogenous variables: FEDSHD ECBSHD WAFR REQRES INDPRO INFRATE USDTRY EUROTRY COMMERCRDT DEPOSITRATE TRLIBOR GOVTBOND
Exogenous variables: C
Date: 02/07/17 Time: 12:14
Sample: 2010M01 2016M09
Included observations: 77

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-665.0522	NA	7.04e-08	17.58577	17.95104	17.73187
1	-144.1849	865.8572	4.11e-12*	7.797012*	12.54550*	9.696365*
2	-8.036443	183.8889*	6.49e-12	8.000947	17.13266	11.65355
3	108.3023	120.8714	2.80e-11	8.719420	22.23435	14.12527

* indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion

A.6. VAR (1) Estimates

Vector Autoregression Estimates

Vector Autoregression Estimates
Date: 02/07/17 Time: 14:32
Sample (adjusted): 2010M03 2016M09
Included observations: 79 after adjustments
Standard errors in ( ) & t-statistics in [ ]

	FEDSHD	ECBSHD	WAFR	REQRES	INDPRO	INFRATE	USDTRY	EUROTRY	COMMCRDT	DEPRATE	TRLIBOR	GOVTBOND
FEDSHD(-1)	0.393919	-0.274321	-0.319380	0.514085	7.495044	0.122565	0.064028	0.020975	0.124152	-0.034959	0.156088	0.403324
	(0.11250)	(0.28033)	(0.36377)	(0.52301)	(6.86938)	(0.69919)	(0.03905)	(0.05639)	(0.44583)	(0.21264)	(0.60757)	(0.39903)
	[3.50146]	[-0.97856]	[-0.87798]	[0.98293]	[1.09108]	[0.17530]	[1.63955]	[0.37198]	[0.27847]	[-0.16441]	[0.25690]	[1.01075]
ECBSHD(-1)	-0.163914	-0.063646	-0.209965	-0.102430	-2.180559	0.045477	-0.022656	0.010562	-0.077249	-0.063945	-0.092821	-0.074349
	(0.05114)	(0.12744)	(0.16537)	(0.23777)	(3.12290)	(0.31786)	(0.01775)	(0.02563)	(0.20268)	(0.09667)	(0.27621)	(0.18141)
	[-3.20492]	[-0.49942]	[-1.26964]	[-0.43080]	[-0.69825]	[0.14307]	[-1.27612]	[0.41201]	[-0.38113]	[-0.66150]	[-0.33605]	[-0.40985]
WAFR(-1)	0.074125	0.195979	0.660549	0.155553	1.942752	0.013627	-0.037612	-0.040355	-0.080937	0.040798	0.120222	0.081275
	(0.04546)	(0.11328)	(0.14700)	(0.21135)	(2.77593)	(0.28255)	(0.01578)	(0.02279)	(0.18016)	(0.08593)	(0.24552)	(0.16125)
	[1.63047]	[1.73000]	[4.49355]	[0.73599]	[0.69986]	[0.04823]	[-2.38333]	[-1.77105]	[-0.44925]	[0.47481]	[0.48966]	[0.50403]
REQRES(-1)	0.004513	-0.001840	-0.049213	0.947974	0.009615	0.045053	0.002616	0.000972	0.044348	0.007694	0.049792	0.038363
	(0.00870)	(0.02168)	(0.02813)	(0.04044)	(0.53121)	(0.05407)	(0.00302)	(0.00436)	(0.03448)	(0.01644)	(0.04698)	(0.03086)
	[0.51877]	[-0.08488]	[-1.74946]	[23.4387]	[0.01810]	[0.83326]	[0.86641]	[0.22303]	[1.28632]	[0.46790]	[1.05977]	[1.24324]
INDPRO(-1)	0.000977	0.006194	0.005384	-0.001790	-0.502288	0.015953	-0.001348	-0.002290	-0.004387	-0.002462	0.012630	-0.003477
	(0.00173)	(0.00431)	(0.00560)	(0.00805)	(0.10568)	(0.01076)	(0.00060)	(0.00087)	(0.00686)	(0.00327)	(0.00935)	(0.00614)
	[0.56469]	[1.43621]	[0.96198]	[-0.22252]	[-4.75284]	[1.48305]	[-2.24295]	[-2.63980]	[-0.63967]	[-0.75268]	[1.35118]	[-0.56642]
INFRATE(-1)	0.016979	-0.003255	0.133210	-0.077329	1.003627	0.079237	-0.012722	-0.016520	-0.082189	0.012531	0.288610	0.041014
	(0.02079)	(0.05181)	(0.06723)	(0.09666)	(1.26956)	(0.12922)	(0.00722)	(0.01042)	(0.08240)	(0.03930)	(0.11229)	(0.07375)
	[0.81663]	[-0.06283]	[1.98142]	[-0.80000]	[0.79053]	[0.61319]	[-1.76264]	[-1.58521]	[-0.99748]	[0.31886]	[2.57026]	[0.55614]
USDTRY(-1)	0.335076	0.260207	-0.687569	-2.314032	-0.989069	1.318963	0.750634	-0.038017	1.369466	0.450085	1.288763	1.580094
	(0.28989)	(0.72234)	(0.93733)	(1.34767)	(17.7006)	(1.80163)	(0.10063)	(0.14530)	(1.14879)	(0.54791)	(1.56555)	(1.02821)
	[1.15589]	[0.36023]	[-0.73354]	[-1.71706]	[-0.05588]	[0.73209]	[7.45952]	[-0.26166]	[1.19209]	[0.82147]	[0.82320]	[1.53675]
EUROTRY(-1)	-0.502914	-1.359113	0.951338	0.661328	-11.61576	1.147046	0.063181	0.021399	1.427042	0.278430	-0.717233	-0.290909
	(0.25426)	(0.63356)	(0.82213)	(1.18204)	(15.5251)	(1.58021)	(0.08826)	(0.12744)	(1.00760)	(0.48057)	(1.37314)	(0.90184)
	[-1.97796]	[-2.14520]	[1.15716]	[0.55948]	[-0.74819]	[0.72588]	[0.71585]	[0.16792]	[1.41627]	[0.57938]	[-0.52233]	[-0.32257]
COMMCRDT(-1)	0.014647	0.015222	0.011152	-0.115609	0.372895	0.137122	-0.007901	-0.026593	0.856118	0.066147	0.005421	-0.018101
	(0.02693)	(0.06710)	(0.08707)	(0.12519)	(1.64431)	(0.16736)	(0.00935)	(0.01350)	(0.10672)	(0.05090)	(0.14543)	(0.09552)
	[0.54391]	[0.22685]	[0.12807]	[-0.92345]	[0.22678]	[0.81930]	[-0.84524]	[-1.97024]	[8.02223]	[1.29959]	[0.03727]	[-0.18951]
DEPRATE(-1)	-0.083438	-0.169221	-0.240772	-0.071528	-2.426558	-0.132789	0.020988	0.060742	-0.269540	0.329788	-0.629126	-0.403081
	(0.07096)	(0.17683)	(0.22946)	(0.32991)	(4.33314)	(0.44104)	(0.02463)	(0.03557)	(0.28123)	(0.13413)	(0.38325)	(0.25171)
	[-1.17576]	[-0.95697]	[-1.04929]	[-0.21681]	[-0.56000]	[-0.30108]	[0.85200]	[1.70776]	[-0.95844]	[2.45875]	[-1.64155]	[-1.60139]
TRLIBOR(-1)	-0.011130	-0.154328	0.218183	-0.054233	-1.530965	-0.073703	0.016629	-0.004245	0.193819	0.184874	0.936495	0.054475
	(0.02373)	(0.05913)	(0.07673)	(0.11033)	(1.44903)	(0.14749)	(0.00824)	(0.01189)	(0.09404)	(0.04485)	(0.12816)	(0.08417)
	[-0.46901]	[-2.60983]	[2.84339]	[-0.49158]	[-1.05654]	[-0.49972]	[2.01865]	[-0.35691]	[2.06093]	[4.12173]	[7.30713]	[0.64718]
GOVTBOND(-1)	-0.038107	0.058634	0.305202	0.148390	1.850722	-0.069578	0.000716	0.004943	0.247955	0.247069	0.283843	0.911893
	(0.02780)	(0.06928)	(0.08990)	(0.12926)	(1.69772)	(0.17280)	(0.00965)	(0.01394)	(0.11018)	(0.05255)	(0.15016)	(0.09862)
	[-1.37058]	[0.84632]	[3.39480]	[1.14800]	[1.09012]	[-0.40265]	[0.07420]	[0.35470]	[2.25036]	[4.70148]	[1.89031]	[9.24665]
C	-0.006438	-0.043506	-0.121102	0.066439	0.720626	0.520546	0.003897	0.028309	0.003714	-0.022324	-0.210813	-0.043986
	(0.02056)	(0.05124)	(0.06649)	(0.09559)	(1.25552)	(0.12779)	(0.00714)	(0.01031)	(0.08148)	(0.03886)	(0.11105)	(0.07293)
	[-0.31312]	[-0.84913]	[-1.82147]	[0.69503]	[0.57397]	[4.07341]	[0.54595]	[2.74689]	[0.04558]	[-0.57442]	[-1.89843]	[-0.60311]
R-squared	0.421054	0.263459	0.871836	0.919092	0.306667	0.119883	0.814681	0.292552	0.902422	0.939596	0.828745	0.809208
Adj. R-squared	0.315791	0.129542	0.848533	0.904382	0.180606	-0.040138	0.780986	0.163925	0.884681	0.928613	0.797608	0.774518
Sum sq. resids	1.101893	6.841688	11.52049	23.81498	4108.258	42.56137	0.132775	0.276812	17.30479	3.936349	32.13799	13.86256
S.E. equation	0.129210	0.321966	0.417795	0.600694	7.889635	0.803038	0.044853	0.064762	0.512049	0.244216	0.697810	0.458300
F-statistic	4.000022	1.967334	37.41374	62.47879	2.432691	0.749169	24.17850	2.274422	50.86544	85.55315	26.61586	23.32717
Log likelihood	56.66437	-15.46282	-36.04599	-64.73039	-268.1728	-87.66536	140.2514	111.2315	-52.11680	6.372028	-76.56949	-43.35603
Akaike AIC	-1.105427	0.720578	1.241671	1.967858	7.118298	2.548490	-3.221554	-2.486874	1.648527	0.167797	2.267582	1.426735
Schwarz SC	-0.715518	1.110487	1.631580	2.357767	7.508207	2.938399	-2.831645	-2.096965	2.038436	0.557706	2.657491	1.816644
Mean dependent	0.011958	-0.063209	0.002361	0.046129	0.896119	0.598513	-0.000874	0.015855	-0.013832	0.002158	0.000270	-0.013504
S.D. dependent	0.156208	0.345093	1.073508	1.942599	8.715865	0.787391	0.095841	0.070827	1.507860	0.914041	1.551103	0.965148

Determinant resid covariance (dof adj.)	5.55E-13
Determinant resid covariance	6.41E-14
Log likelihood	-145.2167
Akaike information criterion	7.625740
Schwarz criterion	12.30465

A.7. Impulse-Response (IR) Tables and Graphs

Impulse Response to Cholesky (d.f. adjusted) One S.D. Innovations

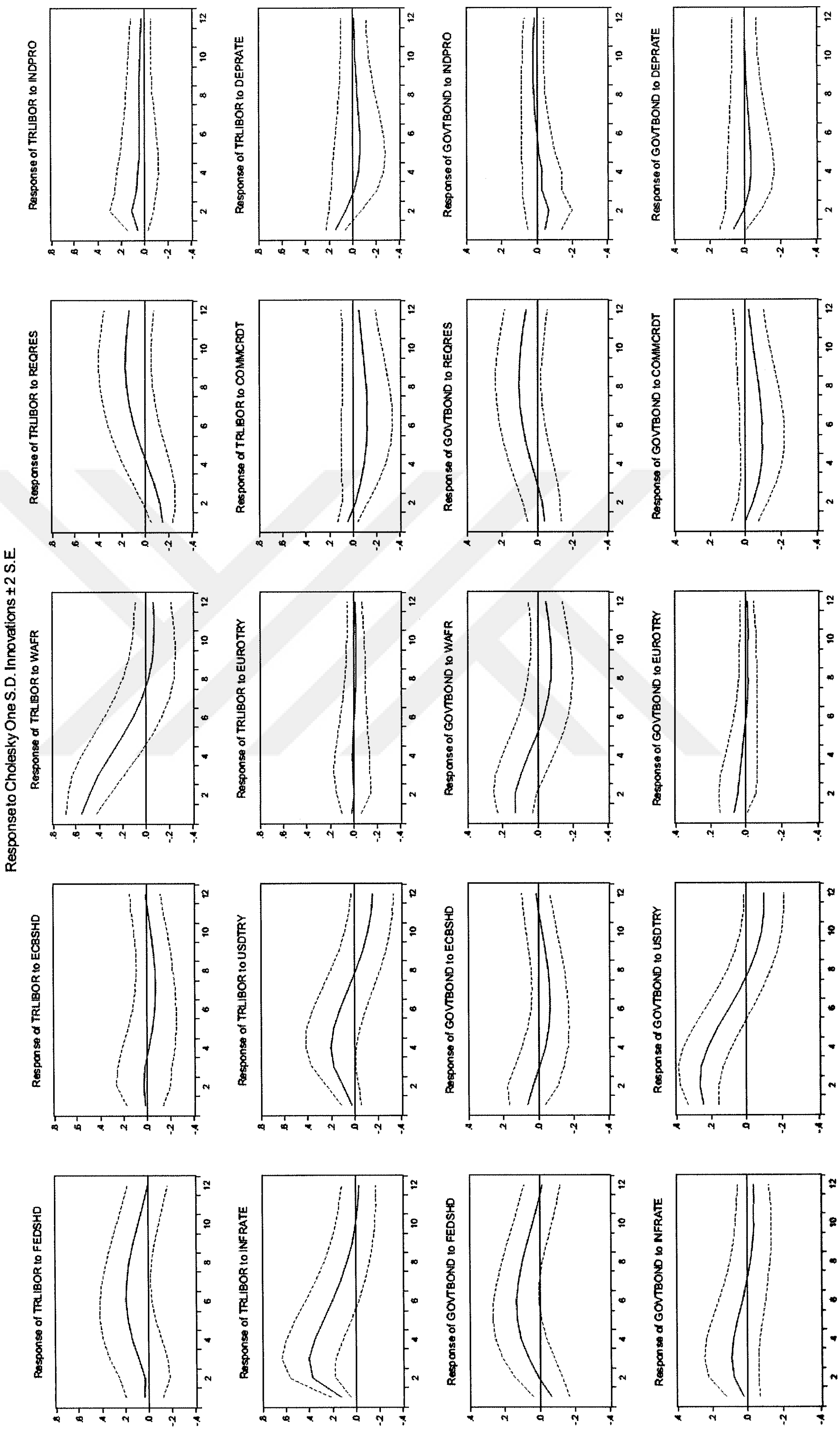
Response of TRLIBOR:

Period	FEDSHD	ECBSHD	WAFR	REQRES	INDPRO	INFRATE	USDTRY	EUROTRY	COMMCRDT	DEPRATE
1	0.037035	0.018045	0.553470	-0.144371	0.059248	0.128315	0.025727	0.016829	0.046092	0.144967
	(0.07845)	(0.07839)	(0.06483)	(0.04618)	(0.04448)	(0.04304)	(0.04176)	(0.04169)	(0.04150)	(0.03970)
2	0.033691	0.029841	0.486092	-0.119812	0.110268	0.370751	0.099635	-0.002221	-0.017734	0.059892
	(0.10729)	(0.11431)	(0.09128)	(0.07084)	(0.09367)	(0.09764)	(0.06933)	(0.07218)	(0.05455)	(0.07004)
3	0.085387	0.018441	0.410436	-0.072951	0.073666	0.401791	0.178504	0.010431	-0.061339	-0.012211
	(0.12244)	(0.11605)	(0.11143)	(0.08907)	(0.08790)	(0.11622)	(0.09256)	(0.07870)	(0.07579)	(0.09709)
4	0.137855	-0.014458	0.308931	-0.014149	0.059066	0.351281	0.201434	0.011935	-0.093243	-0.049911
	(0.12490)	(0.11257)	(0.12188)	(0.10026)	(0.08947)	(0.12296)	(0.10777)	(0.07387)	(0.09385)	(0.10961)
5	0.175687	-0.046799	0.204091	0.043707	0.044558	0.278181	0.177806	0.005598	-0.113597	-0.062632
	(0.11932)	(0.10353)	(0.12464)	(0.10668)	(0.08113)	(0.12123)	(0.11387)	(0.06516)	(0.10495)	(0.10966)
6	0.192409	-0.067166	0.109841	0.094412	0.043037	0.201771	0.124766	-0.003483	-0.122559	-0.060671
	(0.11080)	(0.09311)	(0.12247)	(0.11016)	(0.07323)	(0.11436)	(0.11375)	(0.05661)	(0.10888)	(0.10155)
7	0.188019	-0.074872	0.034414	0.133159	0.042262	0.132441	0.057754	-0.012288	-0.121766	-0.051684
	(0.10284)	(0.08425)	(0.11700)	(0.11202)	(0.06483)	(0.10562)	(0.11026)	(0.04946)	(0.10676)	(0.08947)
8	0.165862	-0.069797	-0.019591	0.158093	0.043790	0.074586	-0.009981	-0.018160	-0.113268	-0.040312
	(0.09697)	(0.07806)	(0.10930)	(0.11280)	(0.05778)	(0.09735)	(0.10553)	(0.04425)	(0.10051)	(0.07704)
9	0.131085	-0.055180	-0.052876	0.168934	0.043240	0.030119	-0.069447	-0.020542	-0.099640	-0.029436
	(0.09310)	(0.07402)	(0.10032)	(0.11258)	(0.05272)	(0.09039)	(0.10090)	(0.04058)	(0.09227)	(0.06688)
10	0.089283	-0.034229	-0.068332	0.167047	0.041134	-0.001139	-0.114850	-0.019423	-0.083293	-0.020594
	(0.09030)	(0.07096)	(0.09106)	(0.11134)	(0.04890)	(0.08440)	(0.09693)	(0.03775)	(0.08397)	(0.06002)
11	0.045746	-0.010686	-0.069847	0.154649	0.036531	-0.020467	-0.143657	-0.015532	-0.066346	-0.014448
	(0.08768)	(0.06790)	(0.08252)	(0.10911)	(0.04599)	(0.07870)	(0.09359)	(0.03521)	(0.07703)	(0.05583)
12	0.004870	0.012374	-0.061668	0.134521	0.030171	-0.029968	-0.155786	-0.009745	-0.050390	-0.010991
	(0.08470)	(0.06443)	(0.07543)	(0.10610)	(0.04316)	(0.07287)	(0.09065)	(0.03272)	(0.07197)	(0.05288)

Response of GOVTBOND:

Period	FEDSHD	ECBSHD	WAFR	REQRES	INDPRO	INFRATE	USDTRY	EUROTRY	COMMCRDT	DEPRATE
1	-0.066850	0.062666	0.127793	-0.041394	-0.045726	0.023354	0.246923	0.067652	0.001540	0.064025
	(0.05129)	(0.05077)	(0.04949)	(0.04832)	(0.04807)	(0.04790)	(0.04364)	(0.03860)	(0.03822)	(0.03788)
2	0.005355	0.029713	0.129146	-0.026664	-0.067797	0.077626	0.266897	0.046466	-0.044044	0.006029
	(0.06763)	(0.07242)	(0.06115)	(0.05370)	(0.06739)	(0.07219)	(0.05555)	(0.05312)	(0.04282)	(0.05161)
3	0.062703	-0.006255	0.097346	0.001967	-0.030988	0.091570	0.259278	0.035959	-0.074501	-0.024400
	(0.07436)	(0.06928)	(0.07016)	(0.05936)	(0.05711)	(0.07737)	(0.06439)	(0.05255)	(0.05159)	(0.06392)
4	0.105269	-0.039755	0.052846	0.031949	-0.030791	0.081065	0.220960	0.023148	-0.092666	-0.034919
	(0.07364)	(0.06539)	(0.07372)	(0.06242)	(0.05508)	(0.07629)	(0.06873)	(0.04551)	(0.05897)	(0.06725)
5	0.128056	-0.058588	0.006311	0.061094	-0.009738	0.055749	0.164186	0.010565	-0.099518	-0.033544
	(0.06936)	(0.05945)	(0.07350)	(0.06375)	(0.04740)	(0.07245)	(0.06912)	(0.03855)	(0.06313)	(0.06452)
6	0.132179	-0.068062	-0.032290	0.083845	-0.000698	0.028132	0.099017	-0.001528	-0.097798	-0.027075
	(0.06432)	(0.05361)	(0.07120)	(0.06445)	(0.04153)	(0.06688)	(0.06719)	(0.03300)	(0.06364)	(0.05826)
7	0.120720	-0.065646	-0.059384	0.098784	0.011653	0.002685	0.036391	-0.009753	-0.089300	-0.018836
	(0.06048)	(0.04957)	(0.06767)	(0.06503)	(0.03681)	(0.06162)	(0.06451)	(0.02910)	(0.06113)	(0.05100)
8	0.098212	-0.055686	-0.074002	0.104759	0.017284	-0.017201	-0.017856	-0.014542	-0.076625	-0.011052
	(0.05814)	(0.04723)	(0.06334)	(0.06535)	(0.03353)	(0.05761)	(0.06201)	(0.02667)	(0.05684)	(0.04472)
9	0.069248	-0.039974	-0.077538	0.102550	0.021298	-0.030685	-0.059414	-0.015707	-0.061831	-0.004781
	(0.05668)	(0.04563)	(0.05868)	(0.06514)	(0.03173)	(0.05463)	(0.06013)	(0.02502)	(0.05213)	(0.04042)
10	0.038181	-0.022006	-0.072234	0.093373	0.021209	-0.037637	-0.086880	-0.014195	-0.046820	-0.000572
	(0.05532)	(0.04391)	(0.05415)	(0.06424)	(0.03018)	(0.05193)	(0.05880)	(0.02350)	(0.04810)	(0.03782)
11	0.008571	-0.003992	-0.060896	0.079129	0.019192	-0.039006	-0.100381	-0.010703	-0.032914	0.001575
	(0.05361)	(0.04165)	(0.05017)	(0.06270)	(0.02862)	(0.04891)	(0.05770)	(0.02184)	(0.04525)	(0.03593)
12	-0.016936	0.011904	-0.046246	0.061754	0.015117	-0.036052	-0.101631	-0.006177	-0.021020	0.001939
	(0.05147)	(0.03892)	(0.04691)	(0.06069)	(0.02665)	(0.04539)	(0.05653)	(0.02003)	(0.04343)	(0.03389)

Cholesky Ordering: FEDSHD ECBSHD WAFR REQRES INDPRO INFRATE USDTRY EUROTRY COMMCRDT DEPRATE TRLIBOR GOVTBOND
Standard Errors: Analytic


Response to Cholesky One S.D. Innovations ± 2 S.E.
Response of TRLIBOR to FEDSHD
Response of TRLIBOR to ECBSHD
Response of TRLIBOR to WAFR
Response of TRLIBOR to REQRES
Response of TRLIBOR to INDPRO
Response of TRLIBOR to INFRATE
Response of TRLIBOR to USDTRY
Response of TRLIBOR to EUROTRY
Response of TRLIBOR to COMMCRDT
Response of TRLIBOR to DEPRATE
Response of GOVTBOND to FEDSHD
Response of GOVTBOND to ECBSHD
Response of GOVTBOND to WAFR
Response of GOVTBOND to REQRES
Response of GOVTBOND to INDPRO
Response of GOVTBOND to INFRATE
Response of GOVTBOND to USDTRY
Response of GOVTBOND to EUROTRY
Response of GOVTBOND to COMMCRDT
Response of GOVTBOND to DEPRATE

A.8. Variance Decomposition Results

Variance Decomposition

Variance Decomposition of TRLIBOR:

Period	S.E.	FEDSHD	ECBSHD	WAFR	REQRES	INDPRO	INFRATE	USDTRY	EUROTRY	COMMCRDT	DEPRATE	TRLIBOR	GOVTBOND
1	0.129210	0.281670	0.066869	62.90912	4.280430	0.720899	3.381284	0.135928	0.058161	0.436292	4.315851	23.41350	0.000000
2	0.152687	0.245848	0.119275	53.21881	3.452172	1.536820	15.09632	1.038557	0.028261	0.239210	2.412988	21.74626	0.865490
3	0.159754	0.651635	0.103500	47.29284	2.694950	1.403072	20.97413	2.823483	0.026401	0.412450	1.646217	20.19591	1.775417
4	0.163009	1.541731	0.094491	43.17196	2.179721	1.316003	23.48627	4.444441	0.028874	0.797358	1.458291	19.17432	2.306538
5	0.164970	2.823017	0.187137	40.12870	2.016949	1.257100	24.41986	5.424046	0.027003	1.315291	1.474521	18.46544	2.460928
6	0.166309	4.256589	0.372733	37.87044	2.269155	1.251257	24.51466	5.732313	0.025660	1.885135	1.534072	17.89877	2.389210
7	0.167252	5.551893	0.591707	36.22000	2.912832	1.270178	24.15159	5.615202	0.030857	2.423935	1.577516	17.37234	2.281950
8	0.167911	6.481485	0.769575	35.00927	3.829534	1.305070	23.55986	5.429131	0.043209	2.863051	1.590119	16.85439	2.265302
9	0.168377	6.968260	0.866983	34.08927	4.842072	1.340384	22.90232	5.459525	0.058575	3.170250	1.577489	16.36192	2.362945
10	0.168710	7.086017	0.888532	33.34838	5.781931	1.369123	22.28427	5.818222	0.071466	3.350848	1.551186	15.92911	2.520906
11	0.168956	6.992522	0.871261	32.72233	6.537003	1.385878	21.75958	6.449668	0.078763	3.434366	1.521385	15.58254	2.664702
12	0.169145	6.848430	0.858812	32.18337	7.064839	1.390517	21.34140	7.205611	0.080612	3.456249	1.494273	15.32940	2.746475

Variance Decomposition of GOVTBOND:

Period	S.E.	FEDSHD	ECBSHD	WAFR	REQRES	INDPRO	INFRATE	USDTRY	EUROTRY	COMMCRDT	DEPRATE	TRLIBOR	GOVTBOND
1	0.321966	2.127668	1.869655	7.775295	0.815771	0.995452	0.259681	29.02831	2.179014	0.001129	1.951670	0.849133	52.14722
2	0.348508	1.100604	1.177021	8.077801	0.593270	1.636428	1.608047	32.35168	1.648321	0.475283	1.012020	1.228833	49.09069
3	0.355442	1.478881	0.850733	7.453965	0.426026	1.341710	2.624018	34.98894	1.408623	1.314550	0.830025	1.446774	45.83576
4	0.359591	2.834396	0.934031	6.577797	0.501052	1.248702	3.127424	36.06454	1.244221	2.335946	0.864424	1.512784	42.75469
5	0.362796	4.679676	1.285222	5.905916	0.935888	1.132526	3.210530	35.86534	1.130696	3.386169	0.922086	1.490206	40.05575
6	0.364974	6.497430	1.764257	5.643053	1.729815	1.057842	3.094970	34.69170	1.056357	4.326860	0.950458	1.419556	37.76770
7	0.366629	7.868224	2.177260	5.776383	2.775413	1.022017	2.944988	33.15452	1.015895	5.039355	0.945222	1.350487	35.93024
8	0.367971	8.612123	2.431036	6.144395	3.878177	1.012750	2.855591	31.81380	0.997199	5.481813	0.919546	1.318949	34.53462
9	0.369155	8.802235	2.510800	6.556815	4.856574	1.023321	2.849354	31.00077	0.986249	5.685165	0.887588	1.339214	33.50191
10	0.370210	8.662949	2.478141	6.879933	5.597349	1.036090	2.901858	30.75959	0.974584	5.724400	0.858389	1.405875	32.72084
11	0.371151	8.433091	2.411878	7.064145	6.073224	1.044728	2.975268	30.92973	0.959404	5.676492	0.835131	1.501881	32.09503
12	0.371974	8.280858	2.374207	7.123301	6.318281	1.044847	3.039419	31.28362	0.942629	5.598483	0.817632	1.608112	31.56861

Cholesky Ordering: FEDSHD ECBSHD WAFR REQRES INDPRO INFRATE USDTRY EUROTRY COMMCRDT DEPRATE TRLIBOR GOVTBOND