DOMESTIC CREDIT EXPANSION, CAPITAL INFLOWS,
AND CURRENT ACCOUNT IMBALANCES:
EMPIRICAL ANALYSES FOR BRAZIL AND TURKEY

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Approval of the Graduate School of Social Sciences

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ABSTRACT

DOMESTIC CREDIT EXPANSION, CAPITAL INFLOWS,
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EMPIRICAL ANALYSES FOR BRAZIL AND TURKEY

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This thesis analyzes the interactions between domestic credit expansion, capital inflows and current account imbalances in a framework of empirical models carried out for Brazil and Turkey. In this context, three vector autoregressive (VAR) models are specified covering the time period between January 2002 and March 2012 for Brazil and 2003 January and 2012 March for Turkey. Real effective exchange rate (REER) and relative yield spreads formed with country specific Embi + indexes are also included in the estimations of the models. The analyses of the models show that capital inflows in these countries trigger the domestic credit expansion which create an upward pressure on import demands and affect current account balances negatively. The results support the implementation of domestic credit tightening policies to reduce the current account imbalances in these countries.

Keywords: Domestic Credit Expansion, Capital Inflows and Current Account Imbalances, VAR Analyses

ÖZ

YURTİÇİ KREDİ BÜYÜMESİ, SERMAYE GİRİŞLERİ VE CARİ İŞLEMLER
DENGESİNDEKİ BOZULMALAR:
AMPİRİK ANALİZLER: BREZİLYA VE TÜRKİYE

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Bu çalışma, yurtiçi kredi genişlemesi, sermaye girişleri ve cari işlemler dengesindeki bozulmaların birbirleriyle etkileşimlerini Brezilya ve Türkiye için oluşturulan ampirik modeller çerçevesinde incelemektedir. Bu kapsamda, Brezilya için Ocak 2002 ve Mart 2012 dönemini, Türkiye için Ocak 2003 ve Mart 2012 dönemini kapsayan üç adet Vektör Otoregresif (VAR) modeli oluşturulmuştur. Reel efektif döviz kuru (REER) ve ülkelere özgü Embi + endeksleri ile hesaplanan ülkelerin göreli getiri farkları da VAR modellerine katılmıştır. Modellerin bulguları, sermaye girişlerinin yurtiçi kredi genişlemesine sebep olduğunu ve bunun da ithalat talepleri üzerinde yukarı yönlü baskı yaratarak cari işlemler dengelerini olumsuz yönde etkilediğini göstermektedir. Sonuçlar, bu iki ülkede, cari işlemler dengesindeki bozulmaların azaltılması için yurtiçi kredi sıkılaştırma politikalarının uygulanmasını desteklemektedir.

Anahtar Kelimeler: Yurtiçi Kredi Genişlemesi, Sermaye Girişleri ve Cari İşlemler Dengesindeki Bozulmalar, VAR Analizleri

To My Parents and My Husband

ACKNOWLEDGMENTS

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CHAPTER 1

INTRODUCTION

Liberalization of economies has created new opportunities in the extent of choice sets of consumption and investment decisions of states, firms and households. The easiness in accessibility to financial markets allows economic agents to spend beyond their budget constraints. And in a global economic environment composed of liberalized economies with internationally open markets, borrowing capacities of economic agents in a country are not only shaped by domestic borrowing and lending conditions but also by global ones.

The domestic and global costs of borrowing, the degrees of the values given by decision makers to present and future for economic activities, not only macro indicators of the domestic economy and liquidity levels of the domestic financial sectors but also the levels of confidence in debtors, and global liquidity conditions and expectations are all significant factors affecting the borrowing conditions and limits of households, firms and states. Insufficient domestic savings and/or higher domestic costs of borrowing and lending relative to foreign costs may increase interaction levels of domestic banks with international financial markets. Moreover, firms which are involved in international trade may withdraw loans directly from abroad due to good facilities of foreign lending. In addition to foreign loan drawings of the firms operating in domestic markets, higher domestic interest rates may attract foreign portfolio investments. Then the economic agents may have the good chances of short term borrowing through equity and debt securities. In such cases, foreign capital inflows increase liquidity in domestic financial markets and in this way they become a source for domestic lending.

Domestic credits usually increase significantly when domestic and global economies are on the boom side of business cycles. The benefits of considerable credit growths are obtained if they give a substantial rise in productive and profitable investments. This kind of a process is accepted as one of the main drivers of growth. However, if the loans are largely used for consumption purposes, this will create dependency on credits provided by foreign resources. Such economies are not sustainable and they are prone to

crises. In fact, the recent crisis experience of Greek economy may be directly associated with the significantly high household and government debt (they were more than 30% of total domestic[1] loans in last three years) and the public debt[2] which was 140% of nominal GDP in 2010 and recorded to be the highest ratio among the European countries.

Credit booms have been a subject of analysis for many studies in the literature. The alarming rates of credit growth observed in many emerging countries after 2008 crises have raised concerns regarding potential undesirable outcomes for the economies both in national and global levels. A recent comprehensive event study of Elekdağ and Wu (2011), covering 99 credit booms[3] of which 39 are observed in advanced economies and the remaining in emerging countries, point out that credit booms have been closely associated with long lasting large capital inflows and loose macroeconomic policy implementations of the authorities. They assert that these rapid credit growths have led asset prices to rise, a stronger domestic demand and widening current account deficits. The study of Decression and Terrones (2011) with 47 countries also account for capital inflows as being the main driving factor for credit booms in emerging countries. On the other hand, they relate productivity gains with rapid credit growth in advanced countries. Moreover, the common results of the credit booms are asserted to be strong expansion of economic activity, rise in the housing and equity prices, sharp, increase in leverages, appreciation of real exchange rates and deterioration of the current account balance.

The mortgage crisis in 2007-2008 in US is a very recent global phenomenon of which the driving factor was excess credit growth. Brunnermeier (2009), in addition to credit boom, attributes the major cause of this crisis to "originate and distribute" banking model. In this model, "loans are pooled, tranched, and then sold via securitization". He claims that transmission from "the traditional banking model in which banks hold loans they lend until they are repaid" to this "originate and distribute" banking model led to a

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[1] Credit to domestic public and private sectors by domestic Monetary Financial Institutions (1980 -) (Central Bank of Greece)

[2] OECD Economic Surveys: Greece (2011)

[3] Elekdağ and Wu (2011) identified credit booms as "....credit boom occurs when the cyclical component of real credit is larger than 1.55 times its standard deviation (an event in which the deviation of real credit from trend is in the top 6th percentile of the distribution)".

decline in the lending standards and finalized with global banking crisis[4]. On the other hand, according to Taylor (2009), the underlying reason of this crisis is the "inherently counterparty risk issue" causing financial sector to be anticipated at great risk rather than suffering just from liquidity crunch. This led to high loss of credibility in the confidence of the system and less willingness to lend; as a result, liquidity have become globally greater concern.

Foreign financial capital flows take the form of direct investments, portfolio investments and other investments consisting of trade credits, loans and currency and deposits. The short term characteristic of portfolio investments may have dramatic consequences when a shock results in a sudden stop with large outflows of capital. In order to determine the underlying forces behind the portfolio capital flows, Fratzcher (2011) developed a factor model with 50 countries which experienced high-frequency portfolio capital flows. The study finds that the common shocks, namely push factors, such as crisis events, liquidity and risk conditions in global levels have substantial influences on global capital flows during the downturn of the global economy. In abnormal times, capital flows from emerging countries to advanced countries proving the "flight to safety" hypothesis. On the other hand, before and after a crisis, in normal times, country specific features, called as pull factors, such as macro indicators, institutional structure and policies become the leading forces in determining the direction of capital flows.

Portfolio investments and other capital inflows through loan drawings and deposits in emerging countries have increased as the global liquidity conditions improved after 2008 crisis. To reduce the unemployment levels which increased dramatically in 2008 crisis period and foster the production for the revival of economic activity, US and many European Union countries implemented expansionary monetary policies and injected

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[4]In March 2008, Bear Stearns, a global investment bank engaging in securitization of assets, collapsed and was sold to JP Morgan Chase. After this bankruptcy, in September 2009 Lehman Brothers, an investment bank, declared its insolvency with the highest debt amounting to 613 billion USD in US history. In addition to these, Merrill Lynch, American International Group, Washington Mutual and Wachovia issued their statute in bankruptcy in the fourth quarter of 2008. On the other hand, not only in US, but also in Europe the banks were also affected because of a strong cointegration with US financial market. ''On 8 October the UK government recapitalized eight of the country's banks followed by an agreement amongst the Euro-zone countries on 15 October on injecting further capital into distressed banks and providing guarantees for interbank loans, at the cost to the taxpayer of more than US$1.3 trillion''(Naude, 2009). Since these banks were operating globally, the financial system overall the world underwent a serious crisis with the large number of defaults of payments.

liquidity to the markets with fiscal stimulus packages, which also pushed upward the global liquidity. In addition to easing policies, a recent study of Hacıhasanoğlu et al (2012) underlined the fact that the surge in capital inflows to emerging countries since 2008 are closely associated with the increase in oil price levels. The empirical findings of the study covering 13 countries show that an increase in the petrol prices does not cause depreciation of local currencies which is expected through an increase in trade deficit. On the contrary, as oil prices increase, dollar denominated assets increase and, in international banking systems, they are treated as capital flows which increase global liquidity and are directed to emerging countries with higher returns, therefore, exchange rates of these countries appreciate.

The research question of this study which seeks a strong causality between domestic credit expansion, capital inflows and current account imbalances concentrates on two emerging countries: Brazil and Turkey. The reasons for the selection of these two countries are basically; the similarities in their past crisis experiences in 2000-2002 and 2008, monetary and fiscal policy implications in 2000s and the rapid domestic credit growth after the recent crisis. In fact, the differences in the composition of their capital inflows and the underlying reasons under current account imbalances which may lead the results of the empirical models to change also motivated the study to focus on these two countries.

Since the interest rates have been around the zero bands in developed countries, capital flows have occurred towards to relatively safer emerging countries which also pay higher yields for their investment after 2008 crisis. Turkey and Brazil experienced capital flight when the crisis deepened, especially in the last quarter of 2008. This change in the direction of large capital flows in these countries in the 2008 crisis and recovery period support the empirical findings of Fratzcher (2011). Despite the fact that Turkey and Brazil have not been involved in the international mortgage markets or suffered from bankruptcies in their financial sectors, the impacts of the 2008 crisis on employment levels and real incomes have been dramatically bad for both countries due to the liquidity squeezes. The reflections of 2008 crisis on Turkish economy and Brazil were felt severely on their real sector rather than in their financial sector. The protective and regulative reforms undertaken in the financial system after 2001 in Turkey and the

'clean and sound financial system' of Brazil due to the Plano Real and the application of Basel principles I and II prevented their financial systems to be affected deeply (Paiva, 2009). However, a considerable decrease in external financing caused by the international credit crunch led a drastic drop in external and domestic demand and a sharp contraction of real sector in Turkey and Brazil.

As the global conditions improved, since the recovery period up to now, these two countries have been experiencing significant increases in capital inflows, even higher than the pre-crisis levels. In addition to this similarity, the rapid credit growth in both countries in recent years raises the question of how capital inflows and credit expansion are related to each other in these two countries. The first and second figures given below clearly display how capital flows[5] and net drawings of domestic total credits[6] have changed on a quarterly basis in Brazil and Turkey. The close movements of these variables in both countries are noteworthy and the correlation of them for Brazil is computed to be 0.57 and 0.73 for Turkey.
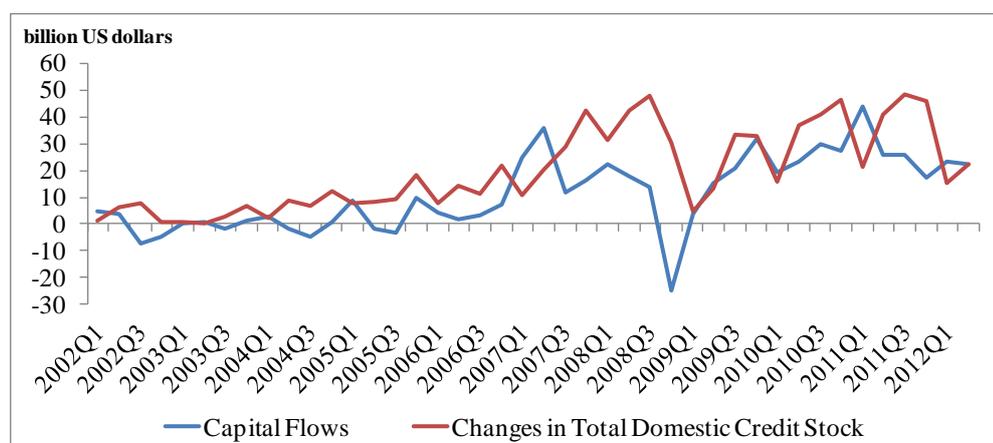
Figure 1[7]: Capital Flows and Changes in Total Domestic Credit Stock in Brazil on a Quarterly Basis

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[5]Net loan payments to International Monetary Fund (IMF) and changes in reserves are not included; it is formed by the rest of the net flows in Capital and Financial Account in Balance of Payments.

[6] Mortgage credits are excluded.

[7]Source: Central Bank of Republic Turkey (CBRT) and Banking Regulation and Supervision Agency (BRSA)

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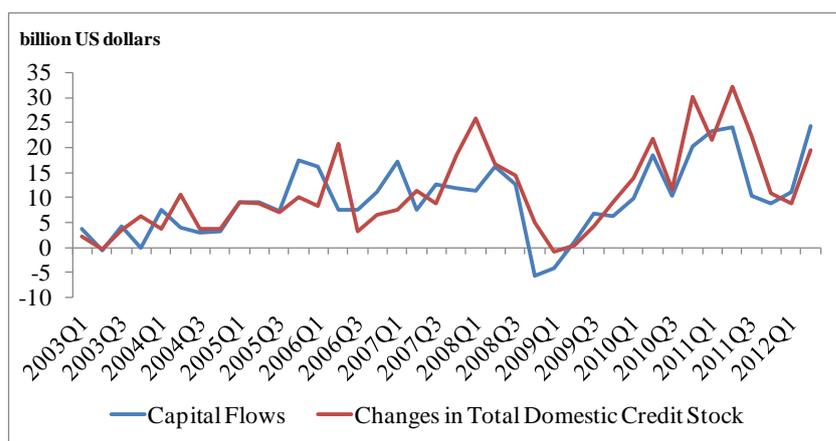
Figure 2[8]: Capital Flows and Changes in Total Domestic Credit Stock in Turkey on a Quarterly Basis

Credit expansion definitely prompts the growth of the economies by triggering domestic demand, production and employment demand. Strong domestic demand supported by higher incomes and credit expansion are certainly reflected in demand for foreign products which makes deterioration of a current account balance inevitable. If a country's currency is appreciated with considerable capital inflows, relatively cheaper prices of imports also stimulate purchases of foreign goods or services. The experiences of current account deteriorations in Turkey and Brazil after 2008 crisis are worth to mention. The third and fourth figures below present how current account balances and net drawings of total domestic credit have changed on a quarterly basis. Inverse symmetric movements of these variables in Turkey are easily noticed. In fact, the correlation of these variables is -0.64 for Brazil and -0.81 for Turkey.

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[8]Source: Banco Central do Brasil (BCB) and Bloomberg
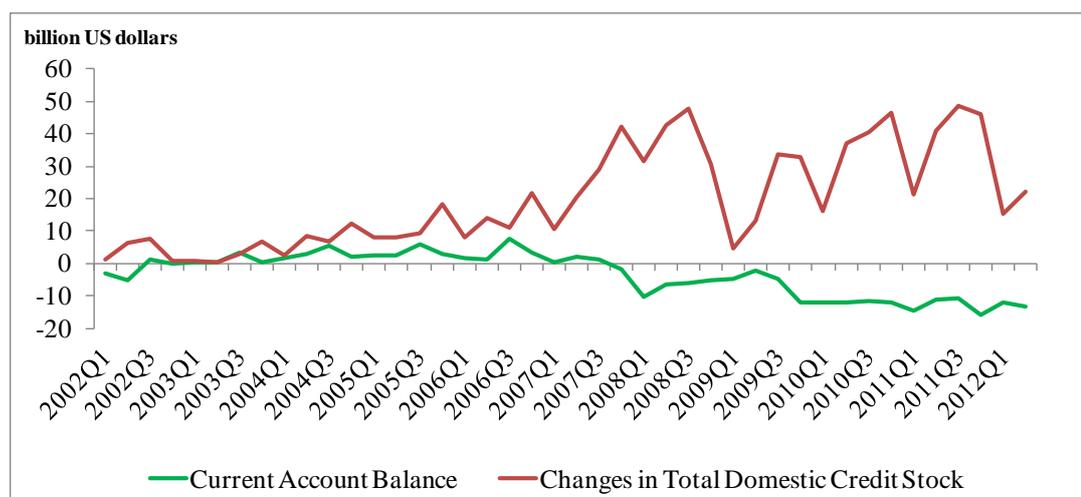
Figure 3[9]: Current account balance and changes in total domestic credit stock in Brazil on a Quarterly Basis
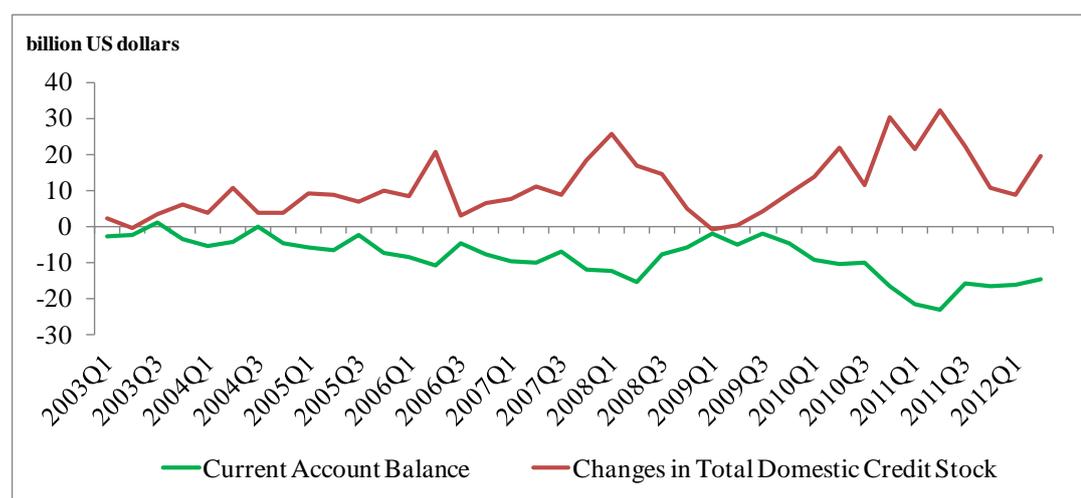
Figure 4[10]: Current account balance and changes in total domestic credit stock in Turkey on a Quarterly Basis

In many studies credit expansion is evaluated to be more critical if it is largely composed of consumer credits. As consumption increases above certain levels, the resources transferred to investment decrease. Therefore, higher consumer credits are not desirable, but credits for investments to be used in capital accumulation are needed for the real growth of an economy. On the other hand, mortgage credits may have no or little effect

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[9]Source: CBRT and BRSA

[10]Source: BCB and Bloomberg

on current account balances through a direct a sale or purchase of real estate; therefore, they are excluded from all domestic credit calculations throughout this study as long as their inclusion is not mentioned. The figures below present how consumer credits as a percentage of total credits have changed. It is easily noticed that the share of consumer credits-mortgage excluded in Brazil is significantly higher than Turkey.
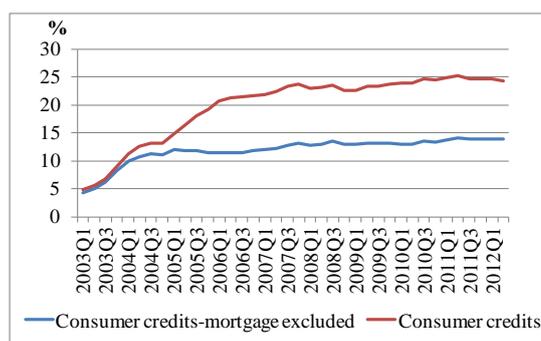
**Figure 5[11]: Consumer Credits
as a % of Total Credits of Turkey**
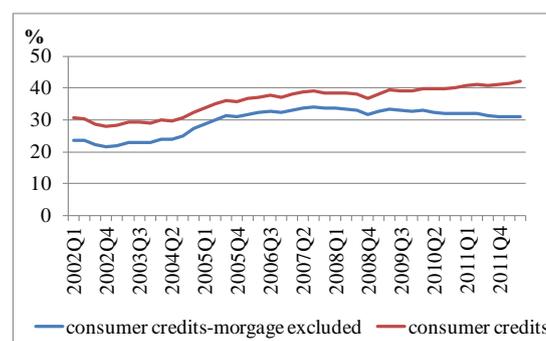
**Figure 6[12] : Consumer Credits
as a % of Total Credits of Brazil**

In both countries, the return of the economies to their pre-crisis conditions after macroprudential policies started gradually during 2010. In order to prevent the adverse impacts of rapid credit growths on the financial systems of the domestic economies, those ones which increase current account imbalances especially, the central banks tightened monetary tools to reduce the pace of the credit growths. Therefore, the comparisons of these two countries in the settings of above mentioned issues, searching the degree of the linkages between capital inflows-credit growth, credit growth-current account balances and current account balances-capital inflows, comprise the main subject of this study.

This thesis differs from other studies in the literature mainly in two aspects. First, it tries to find out the degree of causalities between all variables in a complete picture other than focusing in only dual relationships between these variables. Before carrying out empirical study it is expected to find out strong linkages between these variables which even form a cause-effect circulation: capital inflows increase credit expansion which

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[11] Source: BRSA

[12] Source: Bloomberg

worsens the current account balance and higher current account deficits call for higher foreign financing, so capital inflows creates upward pressure on domestic credits and so on. To determine these cause-effect relations, econometric studies in the context of Vector Autoregressive analyses are carried out. The second distinguishing aspect is the empirical research realized with the data of Brazil and Turkey. In the literature, due to similarities in past experiences of debt sustainability, high inflation, inflation targeting monetary policies as well as exchange rate regimes, different comparisons of Brazil and Turkey have become a subject of many studies, but this kind of evaluation will be the first. The different approach of this thesis to a common problematic issue of many emerging countries, rapid credit growth, is believed to contribute to the literature with its empirical findings of Brazil and Turkey.

This thesis is composed of six main chapters with the introduction. Chapter 2 covers the studies undertaken in the literature of which subjects are close to this thesis. Chapter 3 introduces the variables to be used in vector autoregressive (VAR) models and informs about the summary statistics of balance of payments, domestic credits, country specific Embi + indexes and real effective exchange rates of Brazil and Turkey during 2000s. Chapter 4 presents statistical properties of the data, specification of VAR models, impulse response analysis based on one positive standard deviation shocks of the error terms and Cholesky exogenity ordering, and variance decomposition of the variables with the help of proper tables, figures and brief explanations. Chapter 5 evaluates the policy responses of central banks of Brazil and Turkey to control the liquidity for dealing with rapid credit growth in recent years. Final chapter gives a brief overview of the thesis subject and concludes with offering new research questions.

CHAPTER 2

LITERATURE REVIEW

There are many studies concentrating on capital inflows to emerging countries, domestic credit growth and current account balances. Mendoza and Terrones (2008) analyze credit boom periods and point out the leading factors of this type of cycles and their severe consequences. They define the credit boom as the phase when the credit growth of private sector is higher compared to the credit growth during a typical business cycle expansion period. Using event study methods to observe how macroeconomic aggregates and financial indicators of banking sectors respond to the cycles of credit boom, they work on 48 countries by making the industrial and emerging country distinction over the time horizon of 1960-2006. Their study differs from other works which are generally based on the method of Gourinchas, Valdes and Landerretche (2001) which analyze a set of macroeconomic indicators during the lending boom periods for 91 countries and reach to a conclusion that lending booms are the leading causes of banking and balance of payments crises. Mendoza and Terrones (2008) choose the real credit per capita instead of the credit-output ratio as the credit variable, use 'Hodrick-Prescott (HP) filter in its standard form' to create the trend of credit variable instead of using 'expanding HP trend'. They choose the threshold depending on each country's cyclical variability of credit while other studies generally use the same threshold for all countries. The findings of this event study point out important facts about the systematic relationship between the credit boom periods and the characteristics of macro and micro variables of the countries. On the macro side, the credit boom phases are closely related to the expansion periods of the economies characterized with the increases in equity and housing prices, real appreciation in local currencies, the increases in external debts and the following downturns, leading to financial crises. In the framework of micro data, firms experience increases in the leverage of borrowing, firm values, dependency on foreign finance whereas banks have higher profits and lending activities, but lower quality of assets. Moreover, Mendoza and Terrones (2008) assert that credit booms in emerging countries cause higher fluctuations in the macro and micro indicators and the reasons of recent crises in these countries are highly attributed to the credit booms.

Furthermore, large capital inflows are stated to be the main underlying factor behind the frequency of credit booms in emerging markets. Meanwhile, in industrialized countries the financial reforms and improvements in total factor productivity are shown to cause credit booms. The fixed or managed exchange rate regimes rather than floating regimes are claimed to be more influential in creating credit booms regardless of the type of the country.

Bruno and Shin (2012) constructed a model based on the linkages between the global liquidity, cross-border banking and leverage levels. Depending on a panel study with 47 developed and emerging countries, they claim that gross capital flows raise global funding passing from global banks to local banks and finally to a private sector of a recipient country. Their empirical findings show that household deposits available to banking sectors are insufficient during the periods of credit booms and the core funding appears with the intermediation of global banks. They also underline that the credit conditions of the global banks are reflected in the lending conditions of the local economies; the more lenient the global lending conditions, the more lenient the lending conditions in the recipient country.

Mallick (2005) compares the effects of tight credit policy and devaluation of the local currency on the trade balance of India between 1950 and 1995 on a yearly basis. Performing a dynamic econometric model of error correction mechanism, he analyzes the results through simulations. According to this study, in which inflation is modelled in an open economy context, when a negative trade shock appears, devaluation worsens trade balance contrary to its improvement effect. This is because devaluation creates an upward pressure on price level and also dependency on oil imports prevents devaluation to adjust trade balance. On the other hand, limiting domestic credits improves trade balance with its reduction effect on import demand, therefore, controlling domestic credit flows is offered as a better policy when trade balance is deteriorated.

Lahiri and Morshed (2010) developed a two-country, a two period model, in which physical capital and financial capital are mobile and domestic capital accumulation is endogenous, to analyze the causal relationship between current account balances and foreign investments under financial account. They considered two cases; current account is endogenous and foreign investments are exogenous in the first case and current

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account is exogenous and foreign investments are endogenous in the second case. They stated that the model results are highly dependent on country specific conditions, especially in the second model. In the first case in which the foreign investments are exogenous, they claim that increases in foreign investments in the first and second period cause current account deficits to increase and they illustrate this with the experience of Chile between 1992 and 1994. On the other hand, when the current account is exogenous, a more realistic approach for a small open economy, the direction of the change in the foreign investments depends on the degree of the complementarity of domestic capital and foreign capital. That is; if foreign finance such as foreign direct investments increases the level of accumulated domestic capital, an increase in the current account deficit increases the foreign capital inflows in the second period. However, if the foreign capital is not used for domestic investment purposes but for consumption in a great deal, that is; if the complementarity of foreign and domestic investments is low, an increase in the current account deficit causes the outflow of foreign capital in the second period which explains the reversals in capital flows in Latin America countries in mid 1980s.

Büyükkarabacak and Valev (2008) searched the link between rapid growth of bank credits and banking crises by making the distinction of household credits and enterprise credits. They selected 45 countries' total credit, enterprise, household credit data covering different time periods but generally overlapping the period 1990-2005. Büyükkarabacak and Valev (2008) accepted the countries having at least one of the following for banking crises variable, namely; 'the ratio of non-performing assets to total assets in the banking system exceed 10%, the cost to rescue operations is at least 2% of GDP, banking sector problems resulted in a large scale nationalization of banks or generalized guarantees were enacted by the government in response to the crisis'. This empirical research involving a panel logit model and robust estimation procedures of Hubber/White sandwich estimator reached to a conclusion which is also supported by the finance-growth literature: Expansion of enterprise credits improve the productive capacity of the economy leading to higher income levels whereas the increase in household credits cause banking instability and negative long-run effect on growth. Therefore, it is important to consider the composition of the domestic credits which was also emphasized by Telatar (2011).

Telatar (2011) has recently dealt with determinants of current account deficit from the perspective of aggregate expenditure and income approach; and domestic investment and saving approach. Defining current account imbalances as the indicators of imbalances between the total expenditure and national income and relating this mainly to high trade deficits, he draws attention to the monetary policy in tackling with this problem without creating undesirable results on unemployment and growth. Telatar claims that the country in its initial phase of development will have insufficient savings to meet its investment expenditures crucial to its growth process. The foreign resources are defined as 'the good' if the country borrows abroad to increase its productive capacity which will decrease its dependency on the rest of the world and finally make it free in its production ability later. This kind of current account deficit problem carries its solution inside itself as the formation of productive capacity. In his study, moving from the point of lower savings relative to the investments in a historical horizon, Telatar relates the reason of current account deficit to higher private consumption and questions this relationship in his econometric study by using the data of domestic credits and current account deficits between the years 2003-2010 on a quarterly basis. According to the Granger and Sims causality test[13], Telatar finds out that there is no causality from quarterly increases in total domestic credits to current account deficits. Underlying the fact that total credits are not homogenous, about 1/3 of them is consumer credits and the rest is commercial credits given to firms, he shows that there is causality from consumer credits to current account deficits. Moreover, he looks the relation between housing credits and current account deficits but finds no causality. Telatar calls the current account deficits as being malicious, since the foreign resources are not used for productivity purposes but for private consumption. Telatar proposes the required reserves ratio as a monetary policy instrument to be used in a selective way in the credit expansion process. Domestic credits should be decomposed, investment and enterprise credits such as Small and Medium Size Enterprise loans and household private consumption credits should be subject to different required reserve ratios to shift the foreign borrowing to be used in real dynamics of growth and eliminate the malicious current account deficit. Then, the monetary policy instrument towards the current account deficit will also bring satisfying results for the problems of unemployment and growth according to Telatar.

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[13] Causality test was proposed by Granger (1969) and developed by Sims (1972)

The bank lending analysis of Aydın and Igan (2010) is supportive demonstrates how contraction of economic policies is effective in domestic credit expansion in Turkey. Their study does not only examine the effects of monetary policy changes on liquidity[14] and bank credit to private sector but also consider the implications of fiscal policies on retail-banking[15]. Moreover, the study is developed with the distinction of supply and demand side effects and isolation of supply-side response. Depending on their two stage regression study with quarterly bank lending data covering the period 2002-2008, Aydın and Igan suggest that the contractionary monetary policies lead to dramatic declines in lending for the liquidity constrained banks whereas fiscal discipline decreases the restricting impact on loan supply, in other words, crowding-out effect is reduced for banks enabling them to focus on retail-banking. Besides, liquidity constraining policies are found to be effective on domestic currency denominated credits and to cause the maturity of the bank credits to shift towards short-term maturity.

The empirical study of Alper, Hülagu and Keles (2012) on liquidity and bank lending shows that Turkish banks' credit expansion is directly affected from the monetary policies changing the systematic liquidity in the economy. They used dataset of 13 commercial banks in Turkey which has the 94.7 percent share in total loans extended in Turkish Liras and 95.3 percent share in total assets as at 2011Q1 and made a panel regression covering the quarterly periods between 2002Q4 and 2011Q1. In this empirical study, seasonally adjusted growth, inflation, average overnight policy rate, liquidity position[16] and excess systematic liquidity[17] are found to be significant in affecting the dependent variable, total Turkish credits. Alper et al. (2012) also claim that bank specific

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[14] 'This measure includes cash and balances with the central bank; money market securities; banks and other financial institutions; financial assets marked-to-market; and financial assets available for sale'(Aydın and Igan, 21, 2008).

[15] 'The measure we use as a proxy for the role of retail banking activities versus money market trades, which are dominated by government securities, in the bank's business model is constructed based on banks' loan activities in proportion to their overall assets. The retail-banking focus variable, thus, assigns values to each bank based on the ratio of its loan-to-asset ratio to the average loan-to asset ratio of the banking sector for a given year'.(Aydın and Igan, 16, 2008).

[16](The quarterly average of net liquid assets- required reserves)/Total assets.

[17]The quarterly average of the net of open market operations divided by price level.

liquidity becomes less relevant in bank lending if the excess systematic liquidity is high. This empirical result supports central banks' active use of required reserve ratios, especially post 2008 crisis period, to control the liquidity of banks to prevent undesirable credit growth which deteriorates the current account balance.

Togan and Berument (2011) develop a VAR model with the purpose of searching how current account balance, capital flows and domestic credits are related with each other in Turkey. Their model, estimated with a quarterly data between 1993 and 2010, covers real credits, real exchange rate, real GDP and real capital flows over one lagged value of real GDP as endogenous variables. They do not include current account balance directly in the model but they evaluate current account balance in an elasticity model context in which current account balance/nominal GDP ratio is principally determined by real exchange rate, domestic income/foreign income ratio and oil prices. The causalities between current account balance, capital flows and domestic credits are evaluated with the direct inclusion of real exchange rate and domestic income in the model and the consideration of the elasticity model[18]. The empirical results of this VAR model are stated to be: Increases in real credits do not affect real exchange rate but are effective on real GDP in a lower degree; therefore, it is claimed that real credits have limited impact on current account balance over nominal GDP. On the other hand, an increase in economic activity, measured by an increase in real GDP, affects real credits. Moreover, capital inflows are found to increase real GDP and appreciate real exchange rate, as a result, current account balance/ GDP ratio worsens as capital inflows increase in Turkey.

Goldfajn and Minella (2007) analyze the interaction of capital flows and macroeconomic performance in Brazilian economy with a VAR approach. The endogenous variables of their model are current account balance, private capital account, terms of trade, EMBI +Brazil, real effective exchange rate and domestic interest rate (Selic rate) while Fed Funds interest rate and US industrial production are chosen as the exogenous variables. Their estimations based on monthly data cover the period between January 1995 and August 2004. Their empirical findings are stated as:

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[18]In elasticity model, an increase in real exchange rate increases current account balance over nominal GDP through the improvement of competitive power and higher growth of domestic income relative to foreign income stimulates import demand which reduces current account balance.

"It is interesting to observe the behaviour of the variables when the economy is hit by a shock to the EMBI. An increase in the country risk premium clearly leads to a positive response of interest rate, exchange rate depreciation (depreciation of domestic currency), and a reduction in capital flows (measured by the private capital account balance). Although with some lag, output falls. As exchange rate depreciates, terms of trade deteriorate. These results are in line with the historical evidence concerning the effects of several crises on the economy. As expected, in response to positive interest rate shocks, output falls. Positive shocks to the current account, in turn, lead to an exchange rate appreciation, reduction in the EMBI, and some improvement in terms of trade and output levels. Positive shocks to capital flows are not persistent but lead to a reduction in the interest rate, which seems to cause the depreciation of exchange rate. In response to a favorable shock to terms of trade, exchange rate tends to appreciate. Finally, positive shocks to the exchange rate are followed by an increase in the interest rate and EMBI. The increase in the country risk premium, in turn, tends to cause a reduction in the capital flows. Current account tends to respond somewhat positively. Output, however, declines, but it reverts as the exchange rate, EMBI, and interest rate return to their previous values"(Goldfajn and Minella, 2007) .

The following analysis in this thesis concentrates on the interactions between domestic credit expansion, capital flows and current account imbalances both in Turkey and Brazil. The VAR approach is employed in the empirical analyses by taking also other macroeconomic variables into account. To the best of our knowledge, there is no other study which brings all these variables including domestic credit using VAR models.

CHAPTER 3

DATA AND DESCRIPTIVE STATISTICS

This section describes which variables are used in the estimation of VAR models. The basic endogenous variables used in empirical research are certainly; current account balance, capital inflows and domestic credits given to households and firms. The relative yield spreads and the changes in exchange rates are significant factors for attracting or discouraging the foreigners to invest in a country. In fact, based on the literature and economic theory, current account balance is directly affected from the changes in the exchange rate, since the export and import prices are generally determined in foreign currencies. Therefore, indicators for relative yield spreads and exchange rate are also included in the VAR models.

Current account balance covers three main items, namely; balance of goods, services and income, and current transfers. Goods account, in other words, the trade balance, covers general merchandise, goods for processing, repairs on goods, goods procured in ports by carriers and nonmonetary gold (commodity gold) while services account includes transportation (including freight), travel, communication services, construction services, insurance services, financial services, computer and information services, royalties and license fees, merchandising and other trade-related services, operational leasing services, miscellaneous technical services, personal, cultural and recreational services and government services. Income account, on the other hand, serves to report the compensation of employees, incomes such as equity income, reinvested income, dividends, interest payments of bonds and other debt securities under the items of direct investment, portfolio investment and other investments. Current transfers, as the fourth item in current account balance, display the transfers such as general government's grants and workers' remittances and other transfers which are without a quid pro quo. Among these four items, deficits in services and income accounts in Brazil and trade deficit in Turkey are the leading factors in creating distortions in current account balances of these countries.

Different from other studies in the literature, capital inflows recorded in the financial account of the balance of payments are not totally included in this empirical study. As the detailed presentation of financial account[19] in balance of payments[20] given in Table 1 shows, this account is mainly composed of direct investments, portfolio investments, other investments and reserve assets[21]. Direct investments[22] are transferred to country for building up a new enterprise or increase the existing financial capital of firm; they are generally different in use since these flows do not represent foreign borrowings which are recorded in the form of foreign credits, and equity and debt securities. Therefore, they are not included in the VAR estimations which only include the capital flows of net liabilities or borrowings of the agents in terms of equity and debt securities, loans, currency and deposits.

Reserve assets[23] as being under the control of monetary authorities stand to serve in the framework of monetary policy goals, especially in exchange rate interventions and as a financial source for the country when foreign finance is insufficient. Therefore, the changes in reserve assets are also not included as a variable of foreign capital flow.

Portfolio investment item in financial account reports the international transactions of investment equity and debt securities of residents and non-residents. The residents' security transactions, bond issues and repurchase agreements in international markets are reported in the asset item of portfolio investments. On the other hand, in liabilities item, while non-residents' security transactions in domestic market is recorded in equity securities item, residents'(general government, banks and other sectors) bond issues in domestic and international market are reported in debt securities item.

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[19]Capital and Financial Account Balance= -(Current Account Balance + Net Errors and Omissions)

[20] Detailed explanation of its items is available at: www.tcmb.gov.tr/odemedenge/bopmet.pdf

[21]In Turkey's balance of payments statistics changes in reserves are included in financial account, but Brazil reports it outside the financial account.

[22]Direct investments are included as a separate capital inflow in VAR analysis of Turkey but found to be insignificant.

[23] Reserve assets include monetary gold, special drawing rights (SDR), reserve position in the Fund, foreign exchange holdings and other claims.

Table 1: Financial Account Balance in Balance of Payments

FINANCIAL ACCOUNT

1. Direct Investments

Code	Item
1.1.	Abroad
	Inflow
	Outflow
1.2.	In Turkey
1.2.1	Equity Capital
	Inflow
	Outflow
1.2.2	Other Capital
1.2.3	Real Estate

2. Portfolio Investments

Code	Item
2.1.	Assets
2.1.1.	General Government
2.1.2.	Banks
2.1.3.	Other Sectors
2.2.	Liabilities
2.2.1.	Equity Securities
2.2.2.	Debt Securities
2.2.2.1.	Monetary Authority
2.2.2.2.	General Government
2.2.2.2.1.	In Turkey
2.2.2.2.2.	Abroad
2.2.2.2.2.1.	Borrowing
2.2.2.2.2.2.	Repayment
2.2.2.3.	Banks
2.2.2.3.1.	In Turkey
2.2.2.3.2.	Abroad
2.2.2.4	Other Sectors
2.2.2.4.1.	In Turkey
2.2.2.4.2.	Abroad

3. Other Investments

Code	Item
3.1.	Assets
3.1.1.	Trade Credits
3.1.1.1.	Credits Extended
3.1.1.2	Repayments
3.1.2.	Loans
3.1.2.1.	Monetary Authority
3.1.2.2.	Banks
3.1.3.	Currency and Deposits
3.1.3.1.	Banks
3.1.3.1.1.	Foreign Exchange
3.1.3.1.2.	Turkish Lira
3.1.3.2	Other Sectors
3.1.4.	Other Assets
3.1.4.1.	Monetary Authority
3.1.4.2	General Government
3.1.4.3.	Other Sectors
3.2.	Liabilities
3.2.1.	Trade Credits
3.2.1.1.	Long Term
3.2.1.1.1	Drawings
3.2.1.1.2	Repayments
3.2.1.2.	Short Term
3.2.1.2.1	Drawings
3.2.1.2.2	Repayments
3.2.2.	Loans
3.2.2.1.	Monetary Authority
3.2.2.1.1.	Use of Fund C&L
3.2.2.1.1.1	Drawings
3.2.2.1.1.2	Repayments
3.2.2.1.2.	Long Term
3.2.2.1.2.1	Drawings
3.2.2.1.2.2	Repayments
3.2.2.1.3.	Short Term
3.2.2.2.	General
3.2.2.2.1.	Use of Fund C&L
3.2.2.2.1.1	Drawings
3.2.2.2.1.2	Repayments
3.2.2.2.2.	Long Term
3.2.2.2.2.1	Drawings
3.2.2.2.2.2	Repayments
3.2.2.2.3	Short Term

3. Other Investments — Loans(continued)

Code	Item
3.2.2.	Loans(continued)
3.2.2.3.	Banks
3.2.2.3.1.	Long Term
3.2.2.3.1.1.	Drawings
3.2.2.3.1.2.	Repayments
3.2.2.3.2.	Short Term
3.2.2.4.	Other Sectors
3.2.2.4.1.	Long Term
3.2.2.4.1.1.	Drawings
3.2.2.4.1.2.	Repayments
3.2.2.4.2.	Short Term
3.2.3.	Currency and Deposits
3.2.3.1.	Monetary Authority
3.2.3.1.1.	Long Term
3.2.3.1.2.	Short Term
3.2.3.2.	Banks
3.2.3.2.1.	Foreign Exchange
3.2.3.2.1.1	Drawings
3.2.3.2.1.2	Repayments
3.2.3.2.2.	Turkish Lira
3.2.4.	Other Liabilities

4. Reserve Assets

Code	Item
4.1.	Reserve Position in the Fund
4.2.	Foreign Exchange
4.2.1	Currency and Deposits
4.2.2	Securities

Other investments item includes trade credits, loans, currency and deposits, and other assets and liabilities. Trade credits involve the credits between exporters and importers while loans include the credits extended by residents (monetary authority, central bank, banks and other sectors) to non-residents in asset side and the credits extended to the residents by non-residents in liabilities side. Currency and deposits, on the other hand, reports the flows of deposits (denominated in Turkish Lira and foreign exchange) of banks and other sectors in foreign banks in asset side while non-residents deposits in central bank as well as in domestic banks are followed in liability side in other investments item. In the VAR models, monetary authority's and government's net loan drawings from International Monetary Fund in other investments are excluded. Since, different from other capital inflows, they are determined by stand by agreements and are usually given to a country to facilitate its recovery when it is in deep recession and has difficulty in reaching to financial resources because of its high default risks. Due to this exclusion, this capital inflow variable will be called as *net other investments.*

Portfolio investments and *net other investments* are separately included in the VAR models since they represent different types of borrowings. The easiness of purchasing and selling debt and equity securities in a very short period of time leads portfolio investors to be more sensitive to the changes which are likely to increase or reduce the country risk. Quick and unexpected outflows in portfolio investments cause the consequences of the shocks to be more dramatic. On the other hand, capital inflows under foreign loan borrowings of firms, banks and states do not respond as fast as portfolio investments. A global financial turmoil or a country specific crisis may reduce the new loan drawings from abroad, force the foreign lenders to withdraw their loans and face the country with a liquidity shortage. The capital outflows under net other investments occur with time lags and this helps agents in the economy to anticipate and evaluate the crisis and take precautionary measures. Therefore, capital flows in portfolio investments and net other investments are analyzed individually in the models.

The data sources for current account balance, portfolio investments and net other investments are Balance of Payments Statistics of the Central Bank of Turkey (CBRT) and Banco Central do Brasil (BCB) which are reported in accordance with the Balance of Payments Manual 5 methodology required by IMF.

To present the domestic credit variable, total credits given by domestic banks to households and firms resident in the domestic country are used. Data sources are Banking Regulation and Supervision Agency (BRSA) of Turkey and Brazilian Loan Information System in Bloomberg. The data of domestic credits of both countries exist as stock variables, but the capital flows and current account balance are flow variables, therefore, flow variables namely; quarterly and monthly changes in total domestic credit stock are formed by taking the quarterly and monthly differences of stock of domestic credits, respectively. Since the balance of payments statistics are published in US dollar, therefore, they are converted to US dollars with the quarterly and monthly averages of US dollar foreign exchange rate.

As an indicator of yields in Turkey and Brazil relative to other countries, the Emerging Markets Bonds Index Plus (Embi+)[24] is used in this empirical analysis. Embi+ is calculated by JP Morgan and it shows the spread between the yields earned in foreign currency denominated debt instruments (with a minimum face value outstanding of $500 million or more and a remaining life of greater than two and half years) of selected emerging countries and the yields of US Treasury Bonds with the same maturity. If a country specific yield spread rises, the emerging country borrows at a higher cost with its riskless debt instrument and this is also anticipated as an increase in the country risk. In the literature, there are many studies dealing with the determinants of these Embi spreads. According to the dynamic error correction panel estimation analysis of Ferrucci (2003), the country specific indicators such as external debt to GDP ratio, the degree of openness, amortization to reserves ratio, current account balance to GDP ratio, interest payments to external debt ratio and short term debt to total debt ratio are found to be significant in determining sovereign spreads. Moreover, Ferrucci (2003) claims that the country independent conditions such as global liquidity levels and US equity prices are also influential in affecting the yield spreads. On the other hand, in addition to market volatility, political instability and global factors, Ebner (2009) states that spreads increase significantly in crisis periods. This stems from the rise in risk aversion and a fear of contagion of the turmoil to other countries in crisis periods due to simultaneous increase in financial markets' anticipation of defaults in payments. Different from other

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[24]http://www.jpmorgan.com/pages/jpmorgan/investbk/solutions/research/EMBI

studies, Bellas et al (2010) also include Emerging Markets Financial Stress Index[25] in addition to similar explanatory variables such as interest payments to reserves, short-term debt to reserves, amortization to reserves, indices of political risk, volatility index for global liquidity and US government securities yields in their specific work which covers fixed-effects model and pooled mean group model. Emerging Markets Financial Stress Index is formed with a large basket of variables such as; exchange rate, international reserves, default risk measures, capital asset pricing model of banking sector, stock price returns and time-varying stock return volatility. Bellas et al (2010) concluded that this index is positively and significantly correlated with the Embi spreads in the short run.

Since the investors also take into consideration the relative yields between countries, instead of country specific Embi + spread, (Embi + Turkey)/(Embi +) and (Embi + Brazil)/(Embi +) ratios are chosen to observe the net effects of changes in yields on capital inflows. Moreover, in the VAR models, these variables are used by transforming them to natural logarithmic form; $\ln((\text{Embi} + \text{Turkey})/(\text{Embi} +))$ and $\ln((\text{Embi} + \text{Brazil})/(\text{Embi} +))$. The data of country specific Embi + and general Embi + indexes are obtained from Bloomberg.

To represent the exchange rate variable, CPI based real effective exchange rates are used for both countries. Real effective exchange rate (REER)[26] data for Brazil are obtained from Bank for International Settlements (BIS). It is computed with the weights based on trade data of 60 countries which makes it to take place in broad indices, and the base year is stated to be 2010. On the other hand, REER for Turkey with base year 2003 and published by Central Bank of Republic of Turkey is used. It is computed with the considerations of the relative trade weights and relative price indexes of 36 countries. REER data for both countries are transformed to natural logarithmic form, $\ln(\text{REER})$ in the VAR models, and it is important to notice that increase in this variable implies real appreciation of the domestic currency.

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[25]It is developed by Balakrsihman(2009), a staff of IMF

[26]http://www.bis.org/statistics/eer/index.htm

Time Period Choice for VAR Models

Brazil is known to be affected deeply by crises of 1999 and 2002. Dependency on foreign financial resources and shocks of sudden stops which are accepted as the common reasons for the crises experienced by many emerging countries in 1990s also weakened Brazil's economy in these years. Moreover, fiscal dominance appeared with the high debt burden of Brazil in 2002 of which a large portion was in foreign currency prevented inflation targeting monetary policy to achieve its targets. In 2002, concerns of possible defaults in debt payments increased country risk which was also reflected in Embi+ Brazil indexes during this period which were significantly high. After 2002, the policies regarding to reduce the public deficit/GDP ratio became effective and this ratio became lower than 50% since 2005 and 40% since 2010. Samake and Tanner (2008) underline the fact that the fraction of debt denominated in US dollars was reduced to large extent and this also decreased the exchange rate risk. They also claim that the reduction in debt ratio will continue only if the real interest rates remain stable, exchange rate shocks do not appear. As the fiscal dominance decreased, monetary policy has become successful by achieving its target inflation rates[27] or realizing the inflation rate in the upper bound of the target with single digit numbers which was at most 7.6% since 2003. In fact, lower public deficit to GDP ratio and the success of inflation targeting monetary policy have contributed to the growth of Brazilian economy in the subsequent years. In the context of the research question of this paper, Brazil with its gradual but stable growth performance, considerable capital inflows, very high domestic credit stock, except the 2008 crises period, is a preferable country to make an empirical research on since the elections in 2002. Therefore, the analysis period is selected to cover the time interval between January 2002 and March 2012 and balance of payments data reported in monthly basis are converted to quarterly data since nominal GDP of Brazil is reported quarterly.

On the other hand, the time period between January 2003 and March 2012 is preferable for Turkey due to similar reasons stated for Brazil. After 2001 crises, the deep effects of the recession started to disappear in 2002 and in 2003 recovery of Turkish economy

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[27] http://www.bcb.gov.br/pec/metas/InflationTargetingTable.pdf

accelerated and the distortions of 2001 crisis almost disappeared for the chosen time period. Furthermore, during this time period, there have not been dramatic shifts in monetary policies or fiscal policies which would create critical structural breaks in the selected variables. Central bank has been involving in inflation target regime with the aim of price stability since 2001. Reporting the annually inflation rate[28] with consumer prices as 12.06% in July 2008 which is the maximum rate since 2005, central bank can be claimed to be successful in breaking the inflation inertia. Mendoza and Terrones (2008) assert that studying with high inflation periods will not lead correct measure of credit to GDP ratio due to improper price adjustments. Since the variables are divided by nominal GDP values in the VAR estimations, choosing this lower inflation time period is crucial for the correctness of the estimations for both countries.

On the other hand, fiscal policy in Turkey is applied in accordance with the fiscal discipline since 2001 crises. General government reduced the use of the financial sources of domestic banks; rather than holding debt securities of government, banks, focusing on commercial banking, could expand credits to households and private sector. As a result, the real dynamics of the economy has benefited from this process; households has contributed to economic growth by consuming more while firms with investing.

Implementation of flexible exchange rate regimes since 1999 in Brazil and 2001 in Turkey is also worth to mention, since exchange rate variable is not subject to policy change and the same exchange rate policy allows making comparison between the VAR models of two countries. Finally, 2008 crises and the recovery period after 2008-2009 give chance to observe how the paths the variables followed have changed due to liquidity squeeze and subsequent improvement in global liquidity conditions.

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[28]http://evds.tcmb.gov.tr/anaweb/enflasyonUK.html

3.1 OVERVIEW OF BRAZIL'S DATA

To have a better understanding of the main idea behind the empirical study of this paper, the variables used in the VAR model of Brazil are evaluated in this sub section. Table 2 presents a very clear picture of the main items in balance of payments, total domestic credit stock and nominal GDP on a yearly basis since 2000. In addition to nominal values, some items are also given in terms of percentages of nominal GDP.

Table 2: Summary of Balance of Payments Statistics, Domestic Credits and Nominal GDP

(Billion US Dollars)	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Current Account Balance	-24.2	-23.2	-7.6	4.2	11.7	14.0	13.6	1.6	-28.2	-24.3	-47.3	-52.5
% of GDP	-3.8	-4.2	-1.5	0.7	1.8	1.6	1.3	0.1	-1.7	-1.5	-2.2	-2.1
Net Financial Account*	25.9	20.3	-3.9	-0.2	-3.5	13.1	15.4	88.3	28.3	70.2	98.8	110.8
% of GDP	4.0	3.6	-0.8	0.0	-0.5	1.5	1.4	6.4	1.7	4.3	4.7	4.5
Direct Investment	30.5	24.7	14.1	9.9	8.3	12.5	-9.4	27.5	24.6	36.0	36.9	67.7
% of GDP	4.7	4.4	2.7	1.8	1.3	1.4	-0.9	2.0	1.5	2.2	1.7	2.7
Portfolio Investments	7.0	0.1	-5.1	5.3	-4.8	4.9	9.1	48.4	1.1	50.3	63.0	35.3
% of GDP	1.1	0.0	-1.0	1.0	-0.7	0.5	0.8	3.5	0.1	3.1	3.0	1.4
General Government	4.0	3.7	1.9	1.6	0.4	3.2	-1.8	12.8	12.3	10.1	11.0	-3.1
Banks	-2.3	-3.0	-2.2	1.1	-3.2	0.6	4.5	11.4	-5.4	6.8	18.7	13.5
Other Sectors	5.3	-0.6	-4.8	2.6	-2.0	1.0	6.3	24.2	-5.9	32.2	33.3	25.0
Net Other Investments**	-11.3	-4.0	-12.5	-15.2	-6.4	-4.3	15.7	13.1	2.9	-16.3	-1.0	7.8
% of GDP	-1.8	-0.7	-2.4	-2.7	-1.0	-0.5	1.4	1.0	0.2	-1.0	0.0	0.3
Loan Drawing(net)***	-2.2	-2.1	-12.2	-7.1	-7.5	-5.3	4.8	11.9	0.4	4.7	41.8	31.4
General Government***	8.4	-6.8	-12.0	-6.3	2.1	21.6	-0.2	-0.6	0.4	-0.8	3.8	-4.5
Banks	2.1	-0.6	-3.7	-1.2	-0.2	-0.9	0.3	16.6	5.3	-14.8	22.6	24.9
Other Sector	-2.3	-1.3	-7.9	-4.3	-5.0	-2.7	4.9	-3.9	7.6	7.9	14.9	10.9
Deposits	0.0	-0.6	-0.6	0.6	0.5	0.6	1.5	0.6	-1.5	1.1	1.0	-6.3
Reserve Assets	2.3	-3.3	-0.3	-8.5	-2.2	-4.3	-30.6	-87.5	-3.0	-46.7	-49.1	-58.6
Total Domestic Credit Stock****	166	131	103	142	179	270	341	525	540	813	1005	1129
% of GDP	25.8	23.5	19.9	25.4	26.9	30.4	31.2	38.1	32.1	50.0	47.6	45.5
Mortgage credits % of Total credits	17.4	7.2	6.4	6.1	5.2	4.8	4.9	4.9	5.2	6.5	8.1	9.9
Nominal GDP	644	558	519	558	665	889	1090	1376	1681	1625	2110	2480

*Net loan drawings from IMF are subtracted from the Financial Account.
**Net loan drawings from IMF are subtracted from the Other Investments Item in Financial Account.
***They do not include net loan drawings from IMF.
****Mortgage credits are not excluded.

Brazil is an interesting country to study on due to its different experience in its current account balance. Its current account deficit with 24.2 and 23.2 billion US dollars reaching to 3.8% and 4.2% of nominal GDP in 2000 and 2001, respectively, should have risen as an important concern for Brazilian economy. Starting with a very considerable fall in current account deficit in 2002, Brazil recorded current account surpluses between 2003 and 2007. In 2008, with the global financial turmoil, its current account balance turned into negative and the deficit level increased in the subsequent years.

The figure below displays how the main items composing current account balance have changed over time. Trade balance, imports of goods subtracted from exports of goods, has been positive since the second quarter of 2002. Surplus of trade balance dominates the current account balance between 2002Q3 and 2007Q3. Unlike Turkey, Brazil is an oil exporter country[29] which contributes to its trade balance. However, higher debits relative to credits in services and income account have worsened current account balance since the last quarter of 2007. The current account deficits are recorded as; 28.2, 24.3, 47.3 and 52.5 million US dollars in 2008, 2009, 2010 and 2011, respectively, in fact, in last two years it is more than two percentage of nominal GDP.
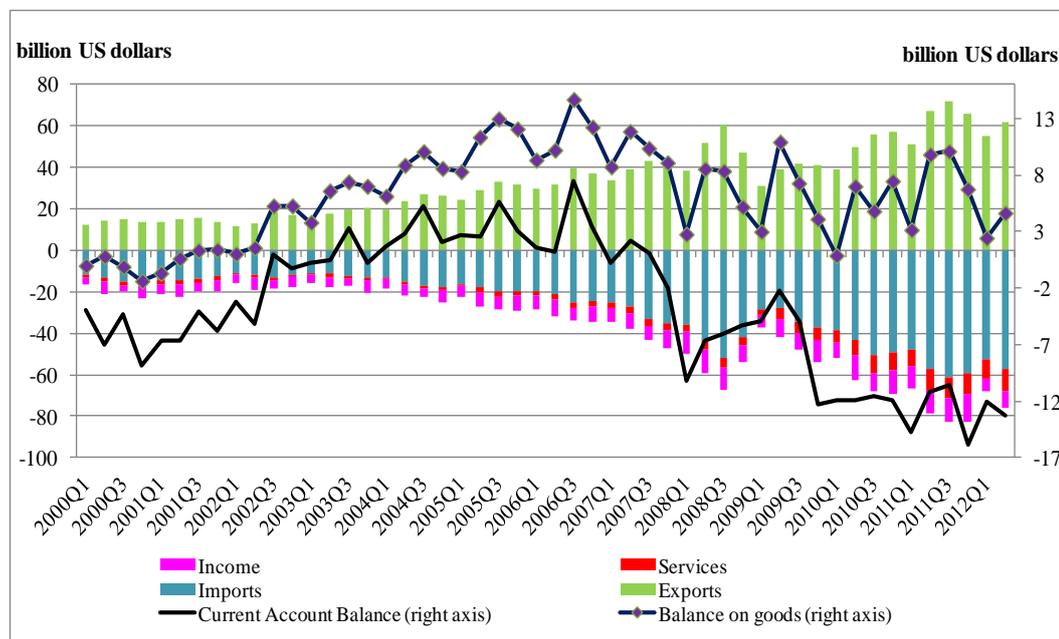
Figure 7: Current Account Balance and its Sub-Items of Brazil on a Quarterly Basis

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[29]OECD Economic Surveys-Brazil (2011)

The table given below presents trade partners of Brazil which were in the first ten in 2011. The exports to US were highest until 2009 and then China has become the major trade partner of Brazil in exports since 2009. On the import side, US have been the main trade partner of Brazil while China has been the second country in imports of Brazil since 2007. Argentina has been the third country both in the ranking of exports and imports of Brazil since 2009. Considering China as the world's highest exporter country in recent years, it is important to notice that Brazil's exports to China have been higher than Brazil's imports from China.

Table 3[30] : Trade Partners of Brazil

Top 10 Export Partners in 2011 (billion US dollars)

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
China	2,5	4,5	5,4	6,8	8,4	10,7	16,4	18,8	30,8	44,3
US	15,5	16,9	20,3	22,7	24,7	25,3	27,7	15,8	19,5	25,9
Argentina	2,3	4,6	7,4	9,9	11,7	14,4	17,6	12,6	18,5	22,7
Netherlands	3,2	4,2	5,9	5,3	5,7	8,8	10,5	8,1	10,2	13,6
Japan	2,1	2,3	2,8	3,5	3,9	4,3	6,1	4,3	7,1	9,5
Germany	2,5	3,1	4,0	5,0	5,7	7,2	8,9	6,1	8,1	9,0
Italy	1,8	2,2	2,9	3,2	3,8	4,5	4,8	3,1	4,2	5,4
Chile	1,5	1,9	2,5	3,6	3,9	4,3	4,8	2,7	4,3	5,4
UK	1,8	1,9	2,1	2,6	2,8	3,3	3,8	3,6	4,6	5,2
Spain	1,1	1,6	2,0	2,2	2,3	3,5	4,1	2,6	3,9	4,7

Top 10 Import Partners in 2011 (billion US dollars)

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
US	11,5	10,7	12,7	14,1	16,3	20,8	28,4	22,3	30,0	37,6
China	1,7	2,4	4,1	5,9	8,8	13,9	22,0	17,5	28,1	36,1
Argentina	5,2	5,1	6,1	6,9	8,9	11,5	14,6	12,2	15,9	18,6
Germany	4,8	4,6	5,6	6,8	7,2	9,5	13,2	10,6	13,8	16,7
Korea	1,2	1,2	1,9	2,6	3,4	3,7	6,0	5,2	9,3	11,1
Nigeria	1,2	1,6	3,8	2,9	4,3	5,8	7,4	5,2	6,5	9,2
Japan	2,6	2,8	3,2	3,7	4,2	5,1	7,5	6,0	7,7	8,7
Italy	1,9	1,9	2,3	2,5	2,8	3,7	5,1	3,9	5,3	6,8
India	0,6	0,5	0,6	1,3	1,6	2,4	3,9	2,4	4,7	6,7
France	1,9	1,9	2,5	3,0	3,1	3,9	5,2	4,0	5,3	6,0

Sub-items of services account are presented in the figure given below. Brazil exports business, professional and technical services to other countries and imports the rest of

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[30]Source: IMF, Direction of Trade Statistics (DOTS)

the all items. The highest expenditure has been made to operational leasing services and payments for travel and transportation services have followed.
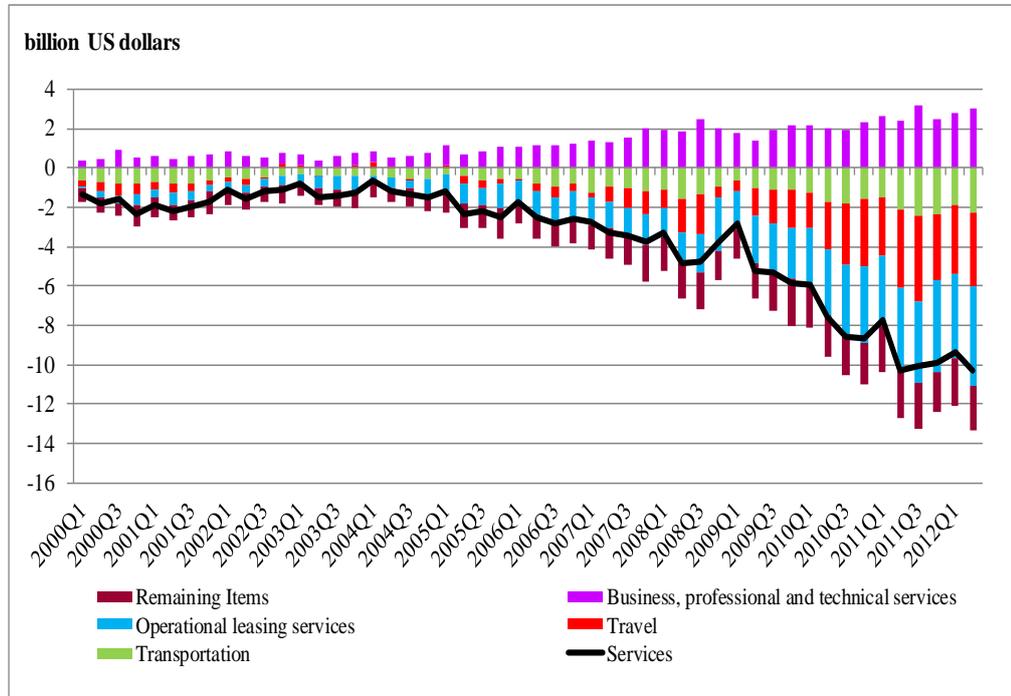
Figure 8: Service Account and its Sub-Items of Brazil on a Quarterly Basis

Income account balance, given in the following figure, is dominated by direct investment income since 2006. In fact, other sub items also widen the gap between credit and debit item of income account.
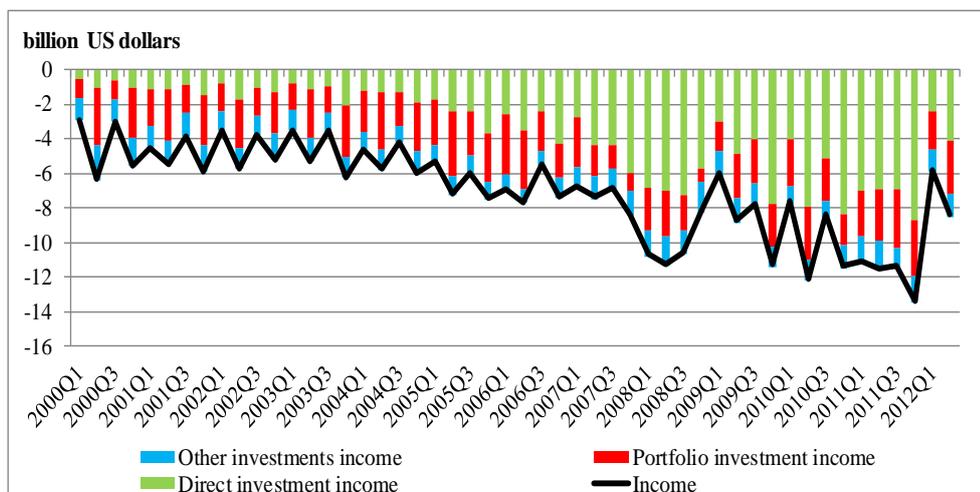
Figure 9: Income Account and its Sub-Items of Brazil on a Quarterly Basis

The second main item, net financial account balance, which is formed by the exclusion of net payments to IMF from financial account balance[31], was reported to have inflows between 2000 and 2011, except the relatively lower values of outflows in 2002, 2003 and 2004.

Direct investments of Brazil were reported to be the highest in 2000. In nominal values, continual and considerable inflows under this item are recorded in last four years.

Portfolio investments experienced outflows only in 2002 and 2004. In 2007, inflows of portfolio investments amounting to 48.4 million US dollars reached to 3.5% of nominal GDP, but in 2008, only 1.1 million US dollars of inflows was reported. Figure 10, formed with the annualized monthly data, shows that outflows between February and August 2009 outweighed the inflows and net annual outflows between these months were recorded. In the subsequent four months the inflows in equity securities dominated the previous outflows and 50.3 billion US dollars of inflows were reported at the end of 2009. In general, inflows stemming from equity securities composed large portion of the portfolio investments until the third quarter of 2011.
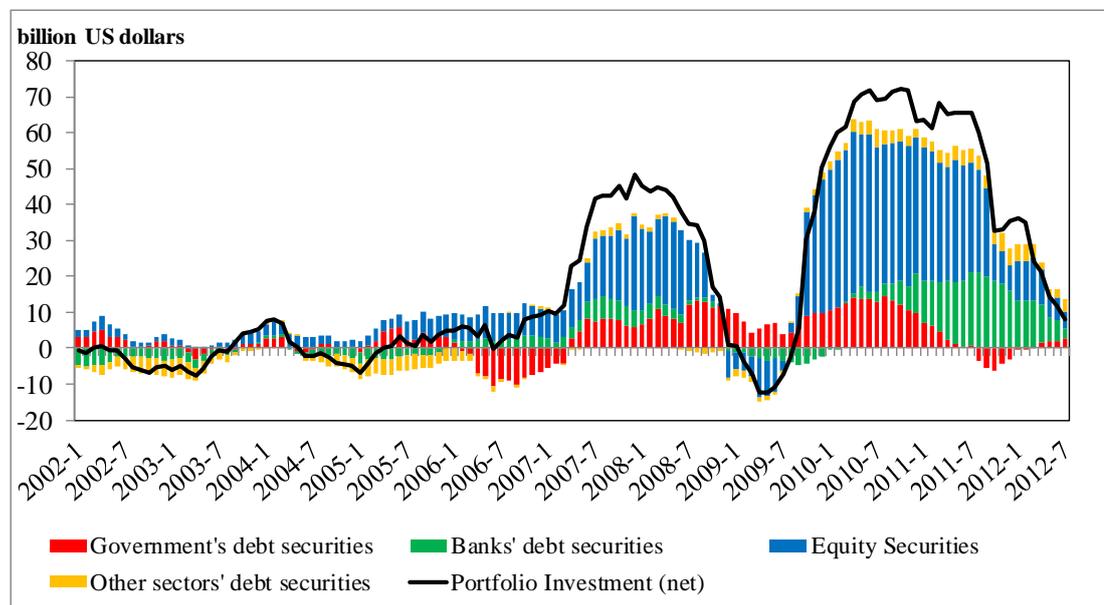
Figure 10: Monthly annualized portfolio investments in Brazil's BOP

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[31] In Brazil's balance of payments changes in reserve assets are reported separately, unlike Turkey, not included in financial account balance.

Flows under net other investments, an item formed by subtracting net payments to IMF from other investments in financial account balance, did not followed a regular pattern during the analysis period. As the figure below displays, foreign loan payments were responsible from net outflows observed in this item between April 2004 and July 2007. Loan drawings and trade credits from abroad dominated the increases in assets[32] under other investments item and net other investments resulted with net inflows until the end of 2008. Despite of considerable increases in loan drawings from abroad, increases in assets in other investments item caused net outflows during 2009. Due to the slowdown in the pace of accumulation of residents' assets abroad, net other investments ended with 7.8 million US dollars of surplus in 2011. Moreover, inflows under trade credits have surpassed net loan drawings in liabilities of net other investments since the beginning of 2012.
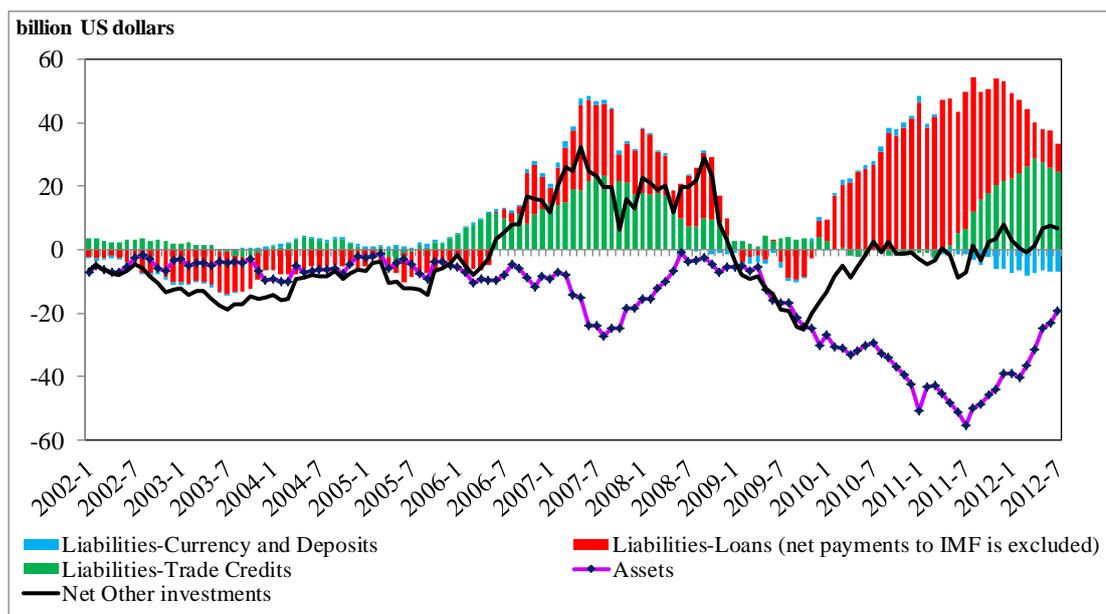
Figure 11: Monthly annualized net other investments in Brazil's BOP

It is crucial to analyze the external borrowing behaviors of domestic banks and other sectors, since the residents' loan drawings from abroad have been effective in determining the path of net other investments. According to the figure of monthly annualized bank loans, given below, the borrowing maturity for banks used to be

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[32] Assets items in balance of payments refer to assets of residents abroad. Outflow in this item, shown with minus sign, means assets of residents are increasing abroad.

predominantly short term until mid-2011 and they were net short term loan payers to abroad between mid-2008 and third quarter of 2009. Since January 2012, banks in Brazil have become net long term borrowers from abroad and net short term loan payers to abroad.
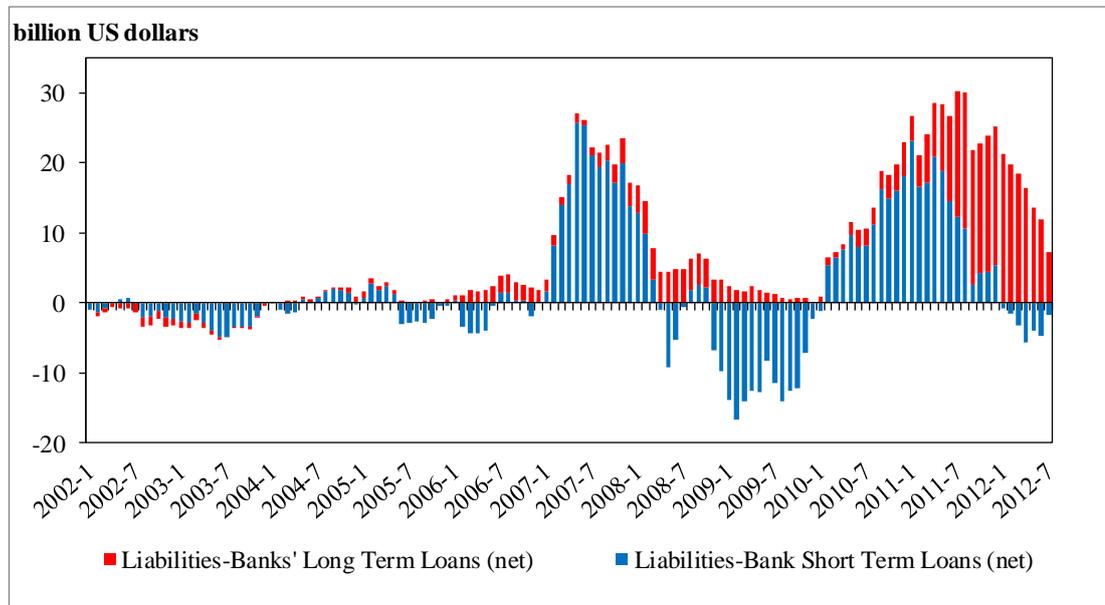
Figure 12: Monthly Annualized Bank Loans in Brazil's BOP

On the other hand, other sectors in Brazil were net loan payer to abroad until November 2005. According to the figure below, other sectors have become net loan drawers from abroad since 2007 and the general maturity of their loans has been long term. Long term borrowing behaviors of type of other sectors may have caused them not to be affected by 2008 crisis as banks were affected by repaying their short term loans to abroad.
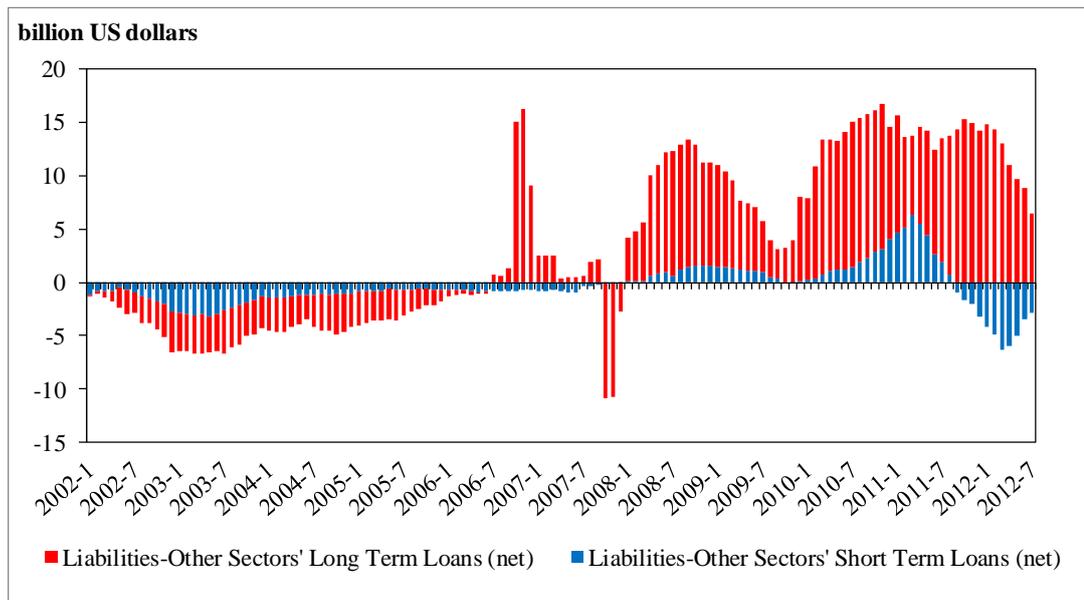
Figure 13: Monthly Annualized Other Sectors' Loans in Brazil's BOP

Figure 14 shows how net drawings of total domestic credits, current account balance, direct investments, portfolio investments and net other investments have changed on a quarterly basis since 2002. Changes in total domestic credit stock have been significantly high, even more than twice of the absolute values of the current account deficit in almost all quarters.
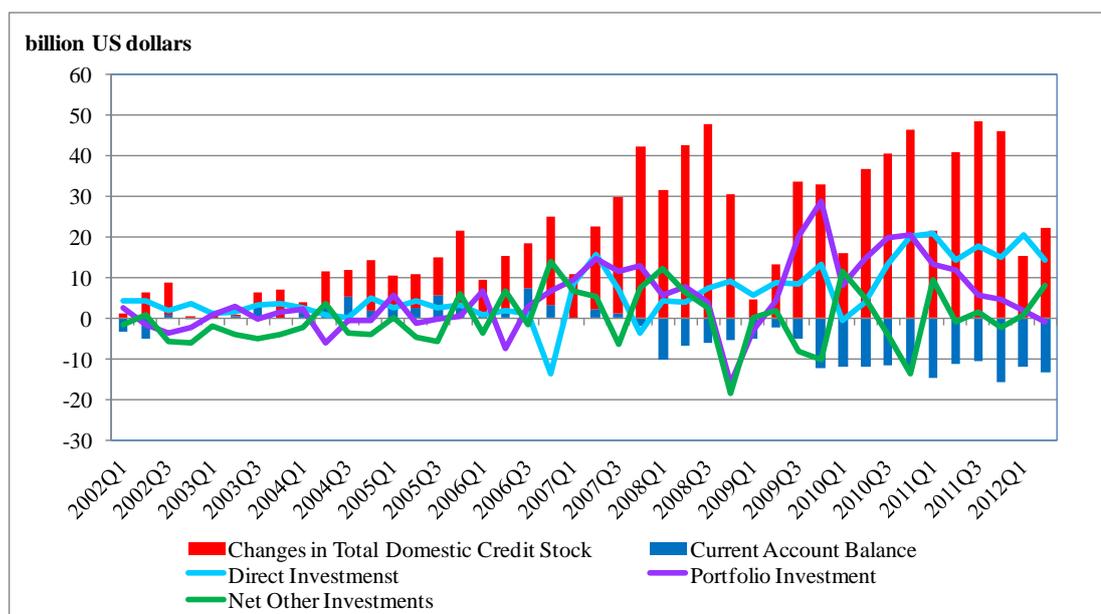
Figure 14: Current Account Balance, Sub-Items of Financial Account and Changes in Total Domestic Credit Stock of Brazil on a Quarterly Basis

Figure 15, given below, similar to previous but different in showing portfolio and net other investments as total, displays that the capital inflows under these items and changes in total domestic credit stock do not rise or fall simultaneously in the same quarter, but the changes in these capital flows seem to be reflected to total domestic credit stock in the subsequent quarters. A sharp outflow of capital in the last quarter of 2008 was followed by a high contraction in the new opened domestic credits in the first quarter of 2009. Moreover, a decrease in capital inflows in the last quarter of 2010 relative to the previous quarter was followed by a decrease in net drawings of total domestic credits in the next quarter, 2011Q1. In addition, the slowdown in the capital inflows during 2011 was followed by a decrease in the newly opened domestic credits in the first quarter of 2012.
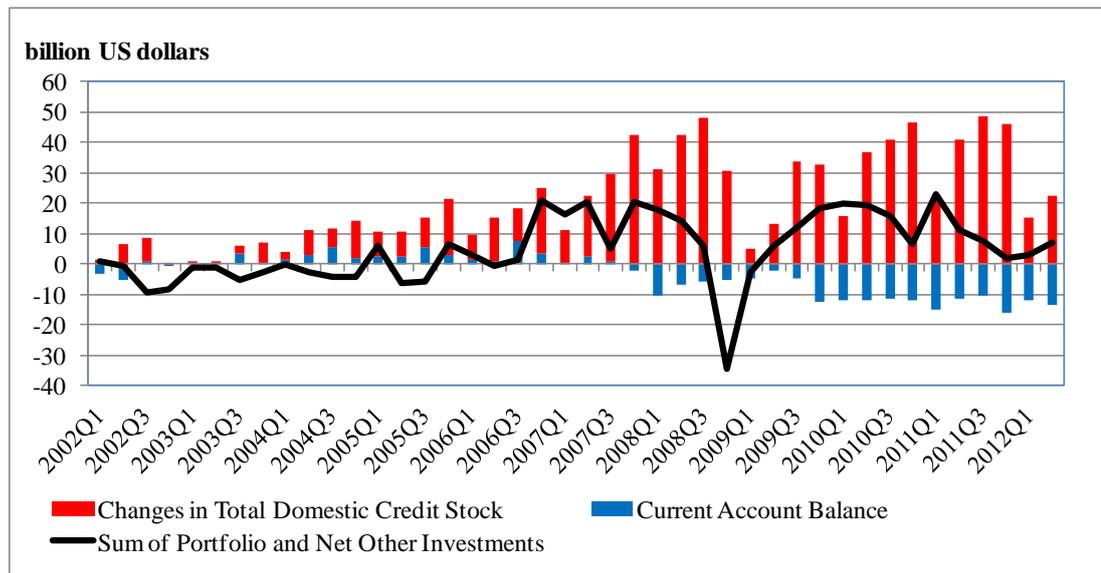
Figure 15: Current Account Balance, Sum of Portfolio and Net Other Investments, and Changes in Total Domestic Credit Stock of Brazil on a Quarterly Basis

Figure 16 shows the evaluation of REER, the capital flows under portfolio investment and current account balance. REER appreciated in most of the time since the last quarter of 2002 until the second half of 2011, but depreciated considerably in the second half of 2008. Continual appreciation of REER should be one of the factors leading to deteriorations in current account balance since mid-2009. On the other hand, foreign capital inflows under these items should have caused continual appreciation of REER.

Furthermore, it is obviously noticed that a sudden capital outflow in the second quarter of 2009 led REER to depreciate seriously.
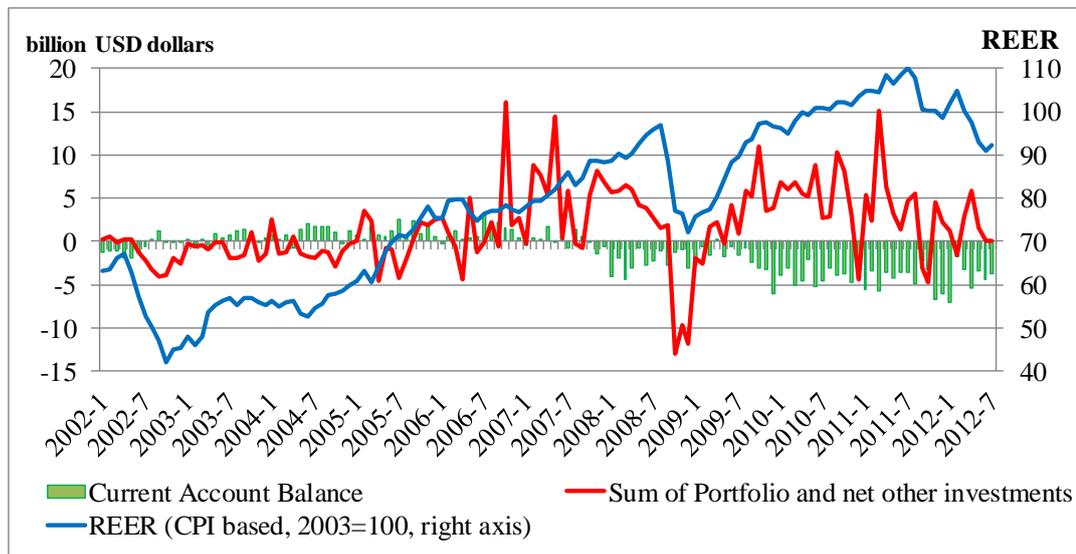
Figure 16: Current Account Balance, Sum of Portfolio and Net Other Investments, and Real Effective Exchange Rate (REER) of Brazil on a Monthly Basis

Changes in REER of Brazil, in fact, have been closely related with the flows stemming from the portfolio investments, as the figure below clearly presents. Banks' foreign borrowings or payments also have contributed to the changes in REER, but sharp inflows and outflows realized by other sectors' loan drawings in 2006-10 and repayments in 2006-12 and 2007-1 seem to have not been influential on REER. In addition to capital flows, a survey in OECD Economic Surveys-Brazil (2011) reports that growing oil production also contributes to appreciation of local currency of Brazil, the Real, of which overvaluation was estimated to be between 3 to 20 percent depending on the approach. In the same survey, Behavioral Equilibrium Exchange Rate (BEER) approach forms real effective exchange rate as a function of productivity differentials between Brazil and its trade partners, capital flows and oil exports. Overvaluation of the Real is stated to be about 4-6% in 2009 and 10-20% in 2010 these estimations.
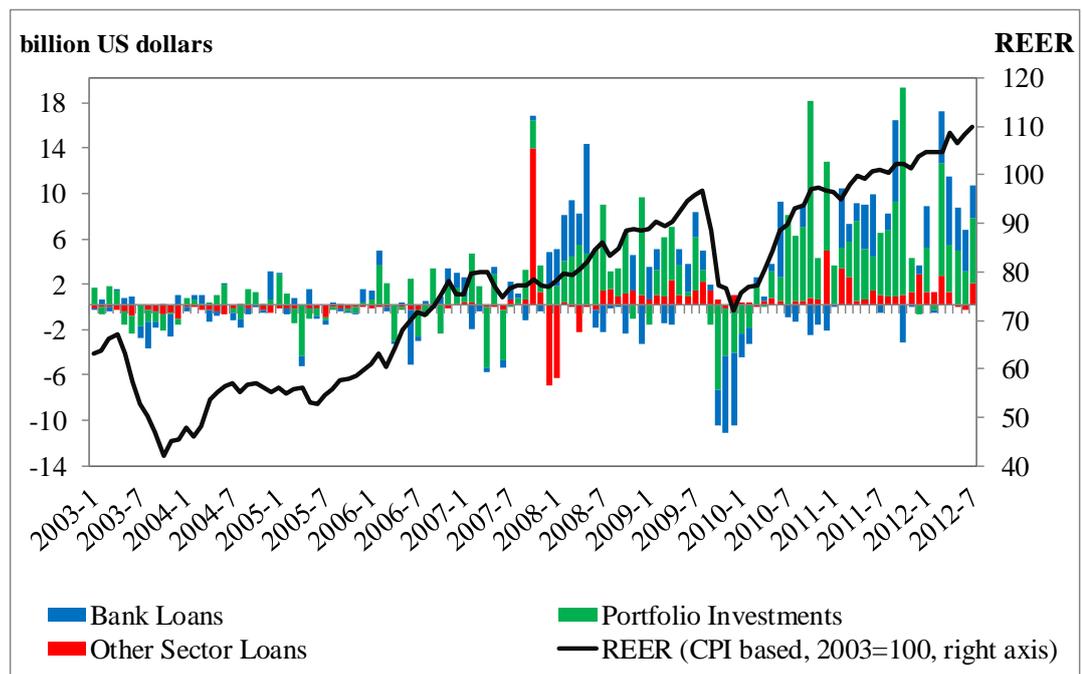
Figure 17: Portfolio Investments, Bank and Other Sector Loans and Real Effective Exchange Rate (REER) of Brazil on a Monthly Basis

The relative yield spreads, Embi + Brazil, Embi + and their difference, are presented in the figure below. The highest spread was recorded in July 2002 before the elections in October 2002. Favero and Giavazzi (2004) states that in 2002, public debt to GDP ratio was above fifty percent and an increase in the yields of debt securities to meet this deficit was totally anticipated as an increase in default probability. Blanchard (2004) also supports this finding and he states that an increase in interest rate does not affect the exchange rate when debt to GDP ratio is 13%, but it leads 8.57% of deprecation when debt to GDP ratio is 63%, the latter was experienced in 2002. These writers both underline the fact that if a country is in high debt burden, an increase in interest rate for lowering inflation rate or attracting foreign capital ends with completely undesirable consequences, foreign investors anticipate that the country risk is increasing and leave the country causing domestic currency to depreciation. Public debt even worsens due to large portion of is denominated in foreign exchange. Moreover, monetary policy becomes dominated by fiscal policy, since increasing interest rate for reducing inflation causes capital flight and this leads to high depreciation of the domestic currency which increases not only public debt further, but also inflation through the pass through effect of exchange rate.

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According to a panel regression formed with 21 countries between 1998 and 2004, Çulha et al (2006) assert that long run determinants of Embi spreads for Brazil are US Corporate bond spread, debt to GDP ratio and net foreign assets to GDP ratio. Moreover, Bellas et al (2010) also claims that public debt to GDP ratio, amortization to reserves ratio and financial stress index are main determinants of Embi spreads of Brazil.

The Embi + spread of Brazil reached its historical peak during 2002 due to its debt burden problems and later decreased gradually. According to the figure given below, since the second month of 2007, Embi + spread of Brazil have been lower than Embi+. This shows despite of a lower return of Brazilian debt securities, the country is less risky and attracts foreign capital flows.
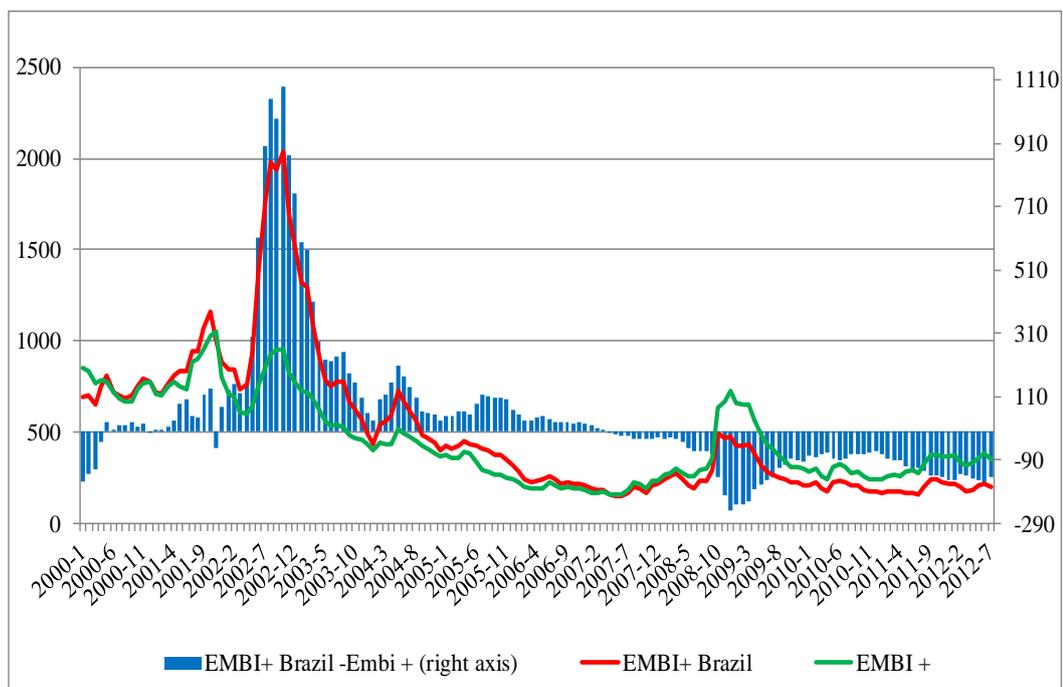
Figure 18 : Embi + and Embi + Brazil on a Monthly Basis

3.2 OVERVIEW OF TURKEY'S DATA

This section attempts to give a point of view about how the variables used in the VAR models of Turkey have changed since 2000. Table 4 presents very clear picture of annual values of main items in balance of payments and total domestic credit stock, nominal GDP and some of the variables are also given in terms of percentages of nominal GDP.

Table 4: Summary of Balance of Payments Statistics, Domestic Credits and Nominal GDP

(Billion US Dollars)	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Current Account Balance	-9.9	3.8	-0.6	-7.5	-14.4	-22.3	-32.2	-38.4	-41.5	-13.4	-46.6	-77.1
% of GDP	-3.7	1.9	-0.3	-2.4	-3.7	-4.6	-6.1	-5.8	-5.6	-2.2	-6.3	-9.9
Net Financial Account*	9.6	-14.6	1.2	7.2	17.7	42.7	42.7	49.3	34.7	10.1	58.9	66.6
% of GDP	3.6	-7.2	0.5	2.3	4.5	8.8	8.1	7.5	4.7	1.6	8.0	8.6
Direct Investment	0.1	2.9	0.9	1.2	2.0	9.0	19.3	19.9	17.0	6.9	7.6	13.4
% of GDP	0.0	1.4	0.4	0.4	0.5	1.9	3.6	3.0	2.3	1.1	1.0	1.7
Portforlio Investments	1.0	-4.5	-0.6	2.5	8.0	13.4	7.4	0.8	-5.0	0.2	16.1	22.0
% of GDP	0.4	-2.2	-0.3	0.8	2.0	2.8	1.4	0.1	-0.7	0.0	2.2	2.8
General Government	1.0	-3.7	1.9	3.1	8.0	9.3	9.5	-2.4	-4.5	0.1	14.8	17.3
Banks	-0.5	-0.3	-1.9	-1.1	-0.7	-1.6	-3.8	-1.8	-0.4	-2.0	0.0	6.2
Other Sectors	0.1	-0.5	-0.6	-0.4	-0.7	0.1	-0.2	-0.1	-0.9	-0.7	-2.2	-0.5
Net Other Investments**	8.5	-12.9	0.8	3.5	7.7	20.3	16.0	28.5	22.8	3.0	35.3	31.2
% of GDP	3.2	-6.4	0.4	1.1	2.0	4.2	3.0	4.3	3.1	0.5	4.8	4.0
Loan Drawings(net)***	9.6	-10.4	-1.3	0.4	10.3	17.1	23.2	32.4	28.0	-13.2	11.4	21.1
General Government***	0.1	-2.0	-0.7	-2.2	-1.2	-2.2	-0.7	0.1	1.7	1.6	3.6	2.0
Banks	4.5	-8.8	-1.0	1.6	6.3	9.4	5.1	5.7	2.8	-4.7	12.5	11.8
Other Sector	5.0	0.4	0.4	1.0	5.1	9.9	18.8	26.6	23.4	-10.1	-4.6	7.3
Deposits	-1.7	0.1	0.9	2.1	-5.3	0.1	-5.7	-6.8	-8.9	16.8	22.5	8.6
Reserve Assets	-0.4	2.7	-6.2	-4.0	-0.8	-17.8	-6.1	-8.0	1.1	-0.1	-12.8	1.8
Total Domestic Credits****	-	-	-	30	46	73	114	156	246	242	264	364
% of GDP	-	-	12.7	15.1	18.5	23.6	29.5	37.7	32.7	42.6	46.8	46.8
Mortgage Credits % of Total Credits			0.6	0.8	2.1	7.7	10.0	10.5	9.6	10.7	11.2	10.7
Nominal GDP	266	200	232	307	393	484	529	653	741	619	733	777

*Net loan drawings from IMF and reserve assets are subtracted from the Financial Account

**Net loan drawings from IMF are subtracted from the Other Investments Item in Financial Account

***They do not include net loan drawings from IMF
****Mortgage credits are not excluded

Current account balance has been recorded to give deficits in all years except in 2001. The financial banking crises experienced in 2001 was reflected to current account balance as a surplus of 3.8 billion US dollars, 1.9% of nominal GDP. The negligible

deterioration in current account in 2002 deepened continually until 2009. The effects of the recent global financial crisis were felt severely in real sector of Turkey in 2009. When it is compared with 2008, current account deficit decreased from 41.5 billion US dollars (5.6% of nominal GDP) to 13.4 billion dollars (2.2% of nominal GDP) in 2009. However, current account deficit exceeded its value of 2008 in 2010, both in nominal value and as a percentage of nominal GDP. In 2011, a yearly increase in current account deficit was 65% relative to previous year. In fact, such a high increase is alarming and gets the attentions to deal with its reasons, possible consequences and required policy responses.

The figure below displays how the composers of current account balance have changed since 2000. As it is clearly observed, trade deficits have dominated the current account balance. Positive contributions of services account and the distorting effects of income account in current account balance seem to have been negligible when the amount of imports of goods has been considered. In fact, it is also worth to mention that trade deficit which is almost zero in the first quarter of 2009 was recorded due to 2008 crises. The real sector in Turkey contracted as a result of sharp fall in export demand, decline in overall production and an increase in the unemployment. In the subsequent periods,
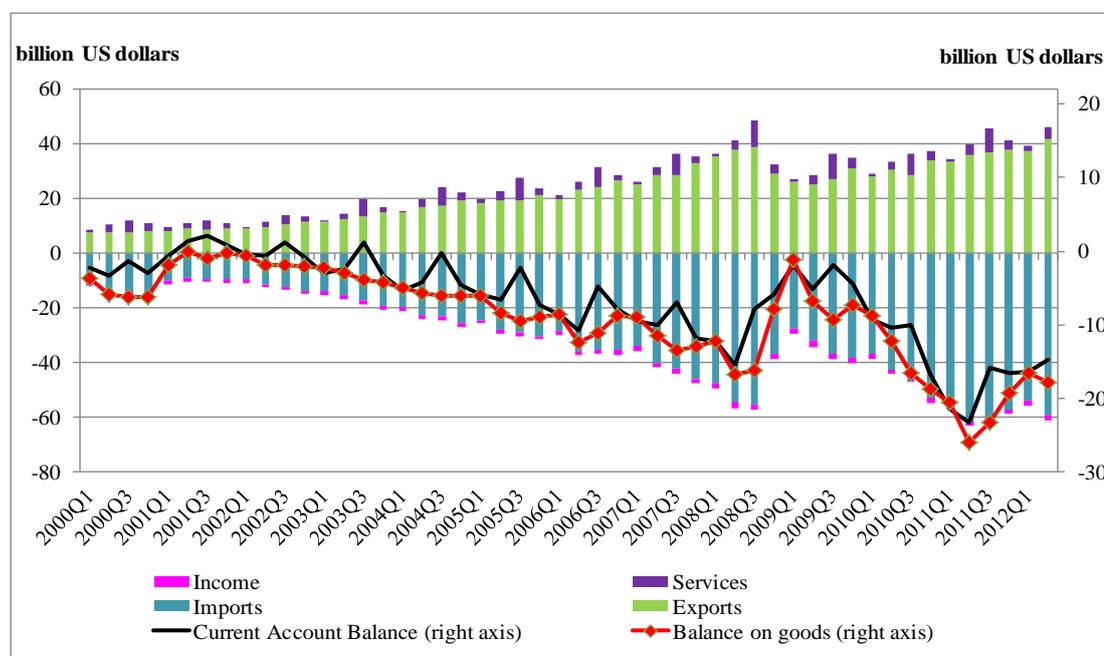
Figure 19 : Current Account Balance and its Sub-Items of Turkey on a Quarterly Basis

relatively rapid recovery of import demand relative to export demand has kept worsening the current account balance.

In Turkey, imports of mineral fuels, minerals oils and product of their distillation have composed a significant portion of the total imports. Therefore, energy trade balance, net exports of these goods, has always had a distorting effect on current account balance. As the figure given below shows, energy trade balance has recorded deficits since 2000 and current balance-energy excluded has always been above the current account balance.
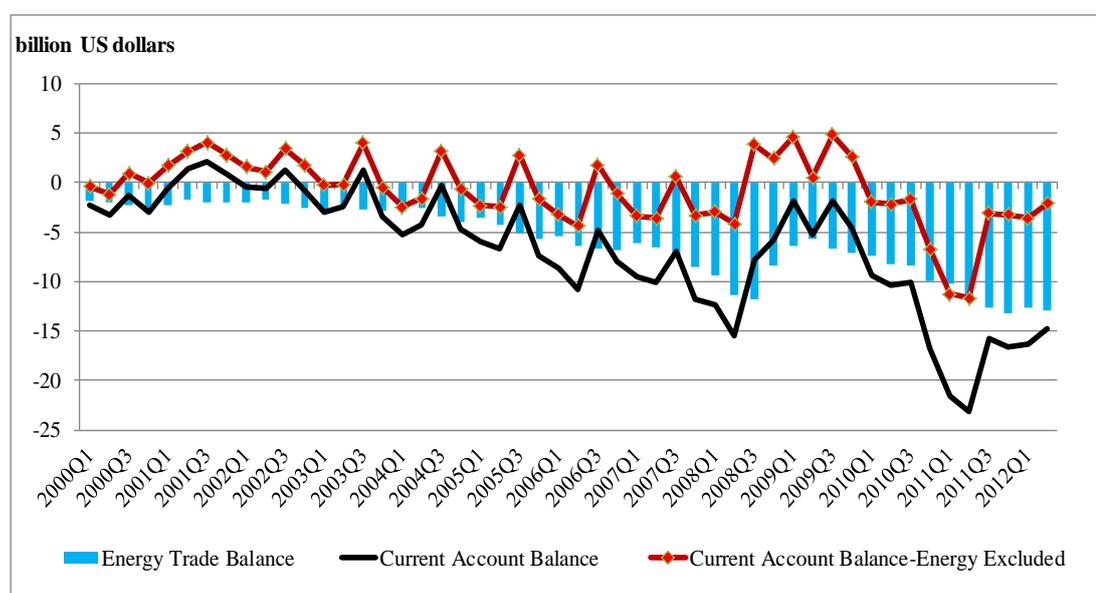
Figure 20: Current Account Balance, Energy Trade Balance and Energy Excluded Current Account Balance of Turkey on a Quarterly Basis

After a brief analysis of Turkey's trade balance, informing about its trade partners is thought to be beneficial. Table 5 is formed with the consideration of top ten trade partners of Turkey in 2011 and it shows Turkey has mainly traded with European Union countries. Germany has been the major trade partner of Turkey in exports in the overall period covered in the table while Russia has had the highest share in Turkey's imports since 2004. China did not take place in top ten countries in exports of Turkey in 2011, but it has been the third country from which Turkey imported the most since 2006. It is also worth to mention that imports from all these countries are higher than the exports to these countries which also implies dominance of high trade deficit in current account balance as mentioned above.

Table 5[33]: Trade Partners of Turkey

Top 10 Export Partners in 2011 (billion US dollars)

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Germany	5,9	7,5	8,7	9,5	9,7	12,0	13,0	9,8	11,5	14,0
Iraq	-	0,8	1,8	2,7	2,6	2,8	3,9	5,1	6,0	8,3
UK	3,0	3,7	5,5	5,9	6,8	8,6	8,2	5,9	7,2	8,2
Italy	2,4	3,2	4,6	5,6	6,8	7,5	7,8	5,9	6,5	7,9
France	2,1	2,8	3,7	3,8	4,6	6,0	6,6	6,2	6,1	6,8
Russia	1,2	1,4	1,9	2,4	3,2	4,7	6,5	3,2	4,6	6,0
US	3,4	3,8	4,8	4,9	5,1	4,2	4,4	3,4	3,8	4,6
Spain	1,1	1,8	2,6	3,0	3,7	4,6	4,0	2,8	3,5	3,9
U.A.Emirates	0,5	0,7	1,1	1,7	2,0	3,2	8,0	2,9	3,3	3,7
Iran	0,3	0,5	0,8	0,9	1,1	1,4	2,0	2,0	3,0	3,6

Top 10 Import Partners in 2011 (billion US dollars)

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Russia	3,9	5,5	9,0	12,9	17,8	23,5	31,4	19,5	21,6	24,0
Germany	7,0	9,5	12,5	13,6	14,7	17,5	18,7	14,1	17,5	23,0
China	1,4	2,6	4,5	6,9	9,7	13,2	15,7	12,7	17,2	21,7
US	3,1	3,5	4,7	5,4	6,3	8,1	12,0	8,6	12,3	16,0
Italy	4,1	5,5	6,9	7,6	8,7	10,0	11,0	7,7	10,2	13,5
Iran	0,9	1,9	2,0	3,5	5,6	6,6	8,2	3,4	7,6	12,5
France	3,1	4,2	6,2	5,9	7,2	7,8	9,0	7,1	8,2	9,2
India	0,6	0,7	1,0	1,3	1,6	2,3	2,5	1,9	3,4	6,5
Korea	0,9	1,3	2,6	3,5	3,6	4,4	4,1	3,1	4,8	6,3
Spain	1,4	2,0	3,2	3,5	3,8	4,3	4,5	3,8	4,8	6,2

The second main item in balance of payments, net financial account, formed by the subtraction of net payments to IMF and reserves from financial account, have been recorded to give surplus value in all years except in 2001. Similar to the current account balance, net financial account balance was also affected by 2001 and 2008 crisis. In 2001, Turkish economy contracted dramatically with significant capital outflows which reached to 14.6 billion US dollars, 7.2% of nominal GDP. After 2002, considerable capital inflows under net financial account were recorded until 2008. After experiencing inflows of 49.3 and 34.7 billion US dollars in 2007 and 2008, respectively, a sharp decrease in capital inflows in 2009 was observed with capital inflows of 10.2 billion US dollars. In 2010 capital inflows increased more than pre-crises period and in 2011 they reached to 8.6% of nominal GDP with 66.6 billion US dollars.

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[33] Source: IMF, Direction of Trade Statistics (DOTS)

To have a better understanding of the behavior of capital inflows, the sub-items under net financial account are analyzed separately. Sub-items under the financial account have followed different paths since 2000, except the crises periods.

Firstly, direct investments have been recorded the highest with 19.9 billion US dollars in 2007, but as a percentage of nominal GDP, it was the highest in 2006 with 3.6%. In the subsequent years, it decreased and in 2011 it was recorded as 13.4 billion US dollars which was 1.7% of nominal GDP.

Portfolio investments, with the highest record in 2011, experienced increasing inflows between 2003 and 2006. However, in addition to considerable fall in 2007, the effects of 2008 on portfolio investments were observed immediately in 2008 and an outflow of 5 million US dollars was realized. Inflows in portfolio investments exceeded the inflows under this item recorded in pre-crises period in 2010 (16.1 billion US dollars) and 2011(22.0 billion US dollars).

The figure below formed with the monthly annualized data shows how portfolio investments and the liabilities in this item have changed since 2002. Portfolio investments (net)[34] in Turkey have been annually positive in each month since May 2003, except the period between December 2007 and October 2009. The analyses of sub-items show that government's debt securities issued in Turkey have covered large part of the portfolio investments and therefore, overall changes in the portfolio investments have been dominated by this item. An outflow of 4.5 billion US dollars in government's debt securities issued abroad and in Turkey worsened portfolio investments in 2008 while an inflow amounting to 14.8 and 17.3 billion US dollars in the same item improved portfolio investments in 2010 and 2011, respectively. Moreover, smooth inflows due to equity securities as shown in the same figure, are also one of the considerable liabilities under portfolio investments. On the other hand, since half of 2010, inflows stemming from banks' debt securities issued abroad have been recognizable but banks' debt securities issued in Turkey have been very low to be noticed in the figure. Furthermore, flows in debt securities of other sector under portfolio investments are not given in the

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[34]Since an increase in assets is recorded with minus sign but an increase in liabilities is recorded with positive sign in balance of payments, adding assets and liabilities under the items gives net values. Therefore, '(net)' is used with variables to imply that assets and liabilities under the item are added.

figure due to their negligible values. In fact, one can notice that in Table 4 other sectors' portfolio investments are considerable; this is due to relatively high values of assets of other sectors' under portfolio investments which were recorded as 2.2 billion outflow in 2010. As Figure 21 displays, liabilities have dominated the portfolio investments, therefore, assets under portfolio investments are not graphed
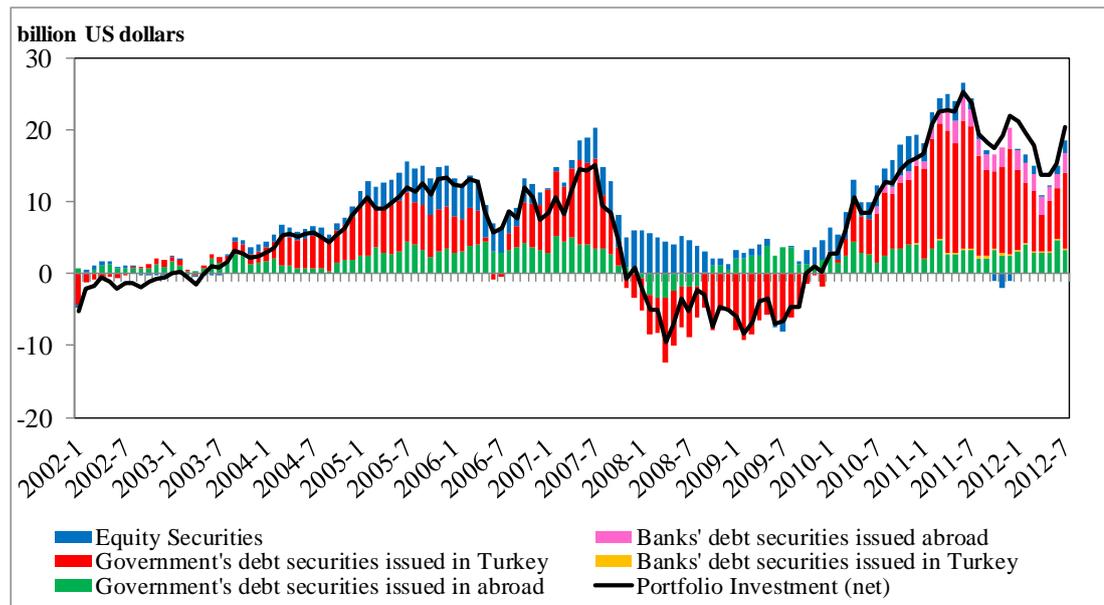
Figure 21: Monthly annualized portfolio investments in Turkey's BOP

The item of net other investments is formed by the subtraction of net payments to IMF from other investments item. In general, flows under this item mainly composed of trade credits, loans and, currency and deposits. Table 4 shows that, in 2001, financial account recorded an outflow of 14. 6 billion US dollars with net loan payments of 10.4 billion US dollars On the other hand, net other investments item was significantly high between 2005 and 2008 due to other sector's loan drawings from abroad. Moreover, unlike portfolio investments' quick response to 2008 crises, the impact of the crises on net other investments item was observed later with the considerable loan payments of other sectors and banks in 2009.

As the figure given below presents, loans in the liabilities of net other investment item dominate the overall flows in this main item. Trade credits drawn abroad are relatively small and smooth in whole period. Furthermore, inflows under currency and deposits

item reached very high values; 16.8 and 22.5 billion US dollars in 2009 and 2010.Foreign exchange deposits item in assets side was high in both years whereas foreign banks' Turkish Lira deposits in liabilities side was recorded to be about 8 billion US dollars in 2010. In addition, since the minus sign in balance of payments refers to increase for assets, according the figure, the residents' assets abroad increased most of the time until May 2009, but have decreased since then.
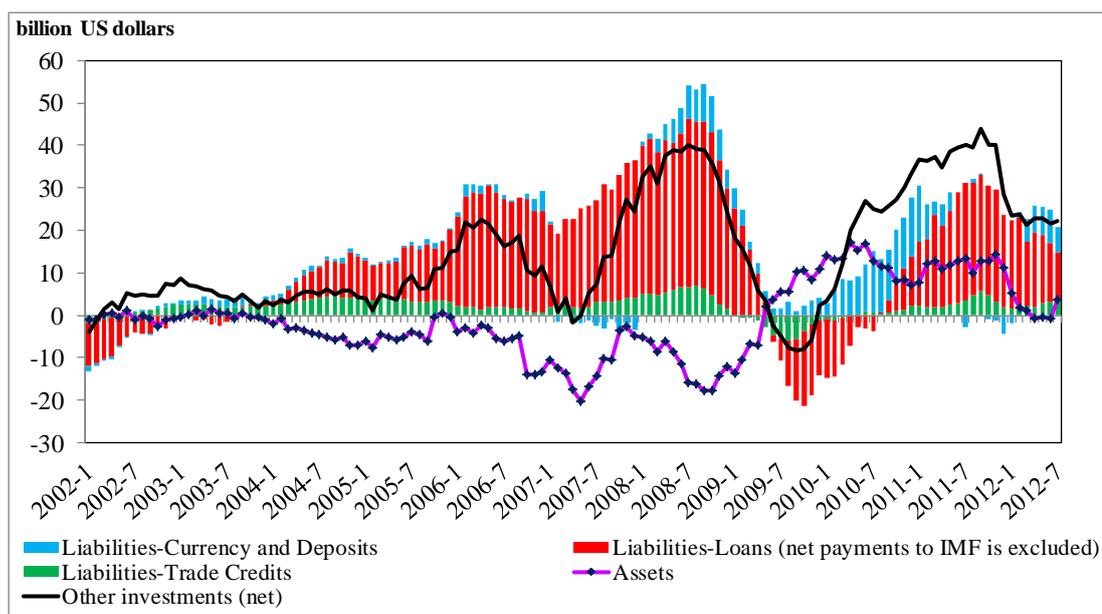
Figure 22: Monthly annualized Other Investments in Turkey's BOP

The figure below presents how bank loans under the liabilities of other investments have changed since 2002. Domestic banks were net short term loan payments to abroad during 2002. It is clear to notice that long term borrowing tendency of banks before 2008 crisis changed significantly after net loan payment period of 2009. Banks have largely borrowed in short term from abroad until at the end of 2011. In last months of 2012, foreign borrowings of banks have decreased and net long term borrowing almost reached to net short term borrowing. Moreover, except the crises and their recovery periods of 2001-2002 and 2008-2009, debt rollover ratio of banks have been more than one, meaning that banks borrow more than they pay or banks pay their loans by re-borrowing.
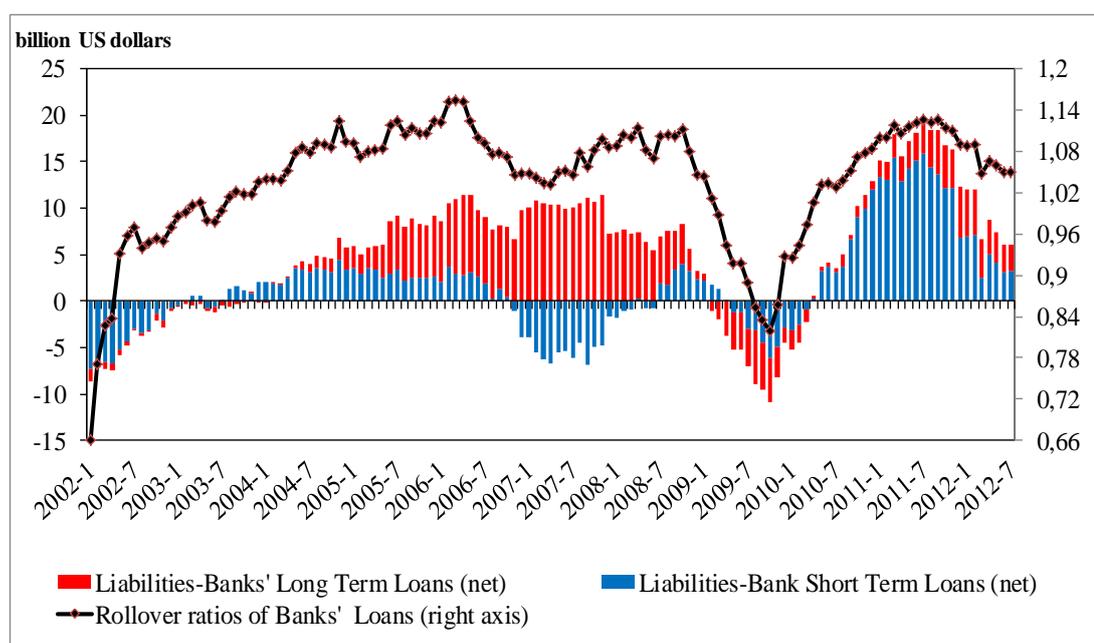
Figure 23: Monthly annualized bank loans in Turkey's BOP

Other sectors' foreign borrowings have surpassed banks' borrowing from abroad in some periods; therefore, it is essential to focus on this item too. As the figure below clearly displays, other sectors' borrowing become apparent in 2004 and reached dramatic levels in 2008 with loan drawings of 31 billion US dollars in July 2008. In 2009 and 2010, other sectors became net long term loan payers to abroad. Debt roll over ratio has fallen considerably since half of 2009; it was more than one, even two, in other periods. Liquidity squeeze in 2008 crises should have restrained other sectors' to reach foreign lendings and they had to pay with their resources other than new foreign borrowings. Moreover, short term borrowings of other sector have become recognizable since 2010 and exceeded long term borrowing in March 2012. The change in the maturity of other sectors' foreign borrowing is attributed to the amendments made in Decree No. 32 regarding the maintenance value of Turkish currency in June 2009. The borrowing conditions in foreign exchange from domestic banks have been facilitated for firms not having foreign exchange income and therefore, other sectors have changed the type of borrowing maturity from abroad. (Balance of Payments Report, 2010-IV)
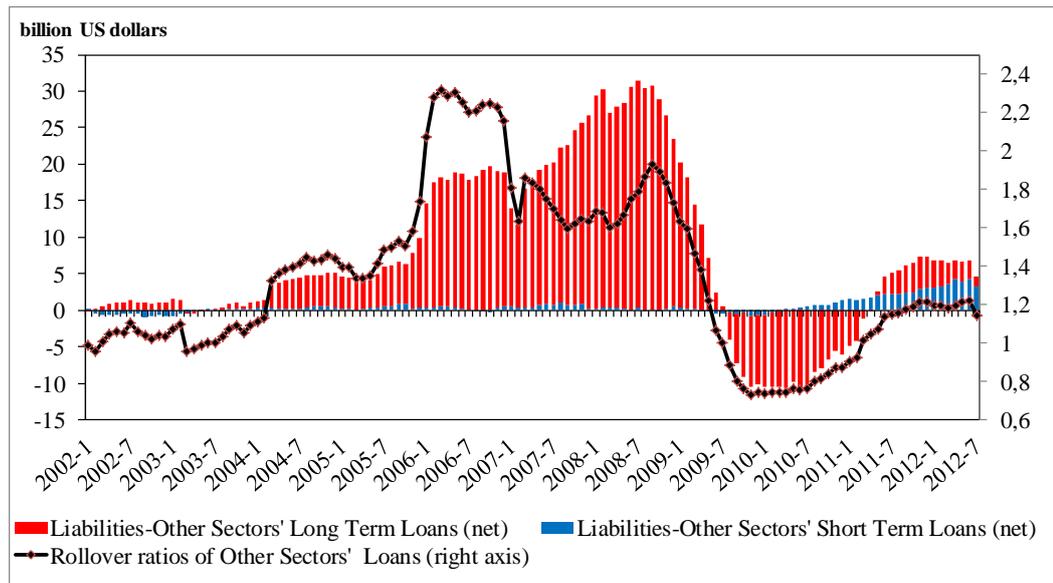
Figure 24: Monthly annualized other sectors' loans in Turkey's BOP

The inverse symmetric changes in current account balance and monthly changes in total domestic credit stock attract attention when the figure given below is observed in detail. Rises and falls in domestic total credits on a quarterly basis seem to be reflected directly in current account deficit. The seasonality observed in current account balance in the third quarters of years of due to the increases in the travel income is also observed in quarterly opened net total domestic credits. The distorting effects of 2008 crisis on both variables disappeared in 2010Q1 and the continual and alarming increases in those variables have taken place. Furthermore, flows under the sub items in financial account have changed differently. Direct investments have been positive and the inflows in this item followed a smooth path. Portfolio investments as being more sensitive to the global liquidity and risk levels, recorded considerable outflows in 2006Q2 due to increase in risk anticipation, in 2007Q3-Q4 with the initial effects of mortgage crisis and in 2008Q4 because of the global banking crises. On the other hand, inflows in net other investments have been positive, except the period between 2008Q4 and 20009Q2 in which loan payments of banks and other sector were dominant.
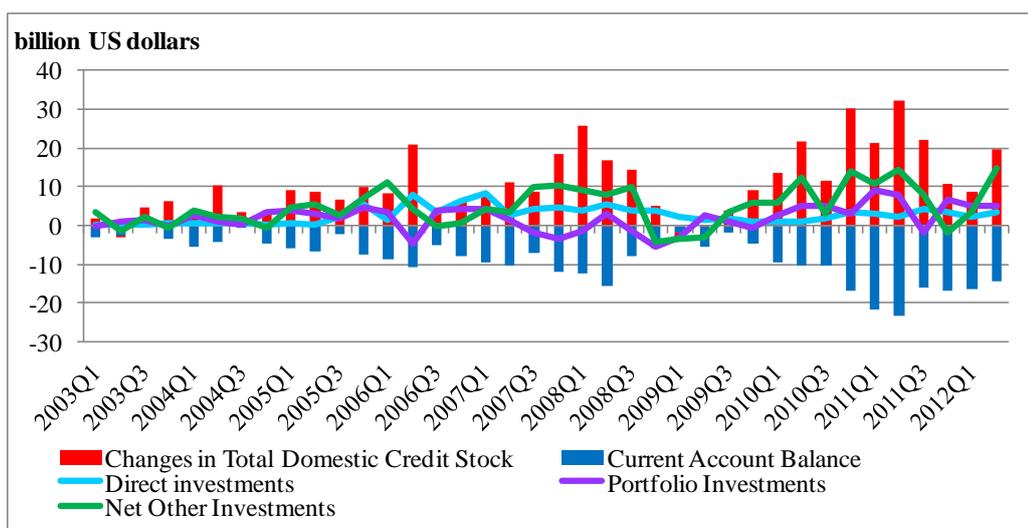
Figure 25: Current Account Balance, Sub-Items of Financial Account and Changes in Total Domestic Credit Stock of Turkey on a Quarterly Basis

Figure 26 is similar to previous figure but it presents the sum of portfolio and net other investments. Sharp falls in the sum of these two financial account items in the quarters of 2006Q2, 2008Q4, 2011Q3were followed by significant falls in current account deficit and monthly changes in total domestic credit stock in the subsequent quarters. These observations motivate to find out whether there is a casualty from portfolio and net other investment flows towards domestic credits and current account balance, and if there exists, what the degree of these interactions between these variables are
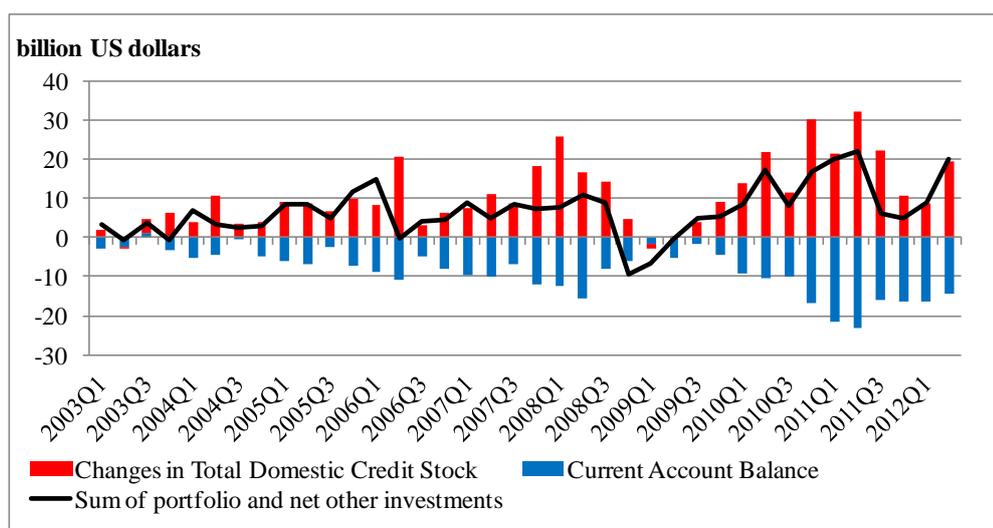
Figure 26: Current Account Balance, Sum of Portfolio and Net Other Investments, and Changes in Total Domestic Credit Stock of Turkey on a Quarterly Basis

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Balance of Payments Report (2011-IV, Box 1) states that Banks Loan Tendency Survey[35]indicates some important facts regarding the changes in supply and demand of domestic credits and the changes in current account balance. In the periods such as when domestic credit standards are tightened with stricter criteria requirements from borrowers, supply of credits is restricted or when the demand for domestic credits decreases, credit growth also falls which affects current account balance positively in the following period or vice versa. In fact, when the credit types are concerned, it is asserted that vehicle credits and current account balance have the strongest correlation.

> "Particularly from 2009 onwards, the demand for vehicle loans increased progressively on the back of eased standards for this type of loan by banks, whereas this trend reversed after the second quarter of 2011. It is observed that the current account balance also displayed an inverse trend in the quarter following these changes in the loan market" (Balance of Payments Report, 2011-IV).

In fact, the changes in the standards of other consumer loan supply and the demand for this type loans, and changes in credit standards of loans to enterprises are stated to be strongly effective in current account balance.

The figure given below displays current account balance, sum of portfolio and net other investments, and CPI based real effective exchange rate. It can be easily observed that as the capital inflows under these two items increased real effective exchange rate (REER) increased as well. Moreover, as REER increased, the appreciation of Turkish Lira worsened the current account balance. Theory consistent interactions of these variables support the inclusion of real exchange rate variable in the econometric analyses.

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[35]"….has been published by the CBT since the second quarter of 2005 facilitates the monitoring of the actual and potential changes in conditions that affect the supply of loans, and factors believed to play a part in these changes as well as the determinants of the demand for loans. In the Survey, which compiles the views of representatives of the top 15 banks that provide nearly 80 percent of loans on aggregate, the credit standards, as set by the regulations and/or criteria that steer the Bank's loan policy, are questioned as one of the factors that affect the supply of loans"(Balance of Payments Report, 2011-IV, 7).
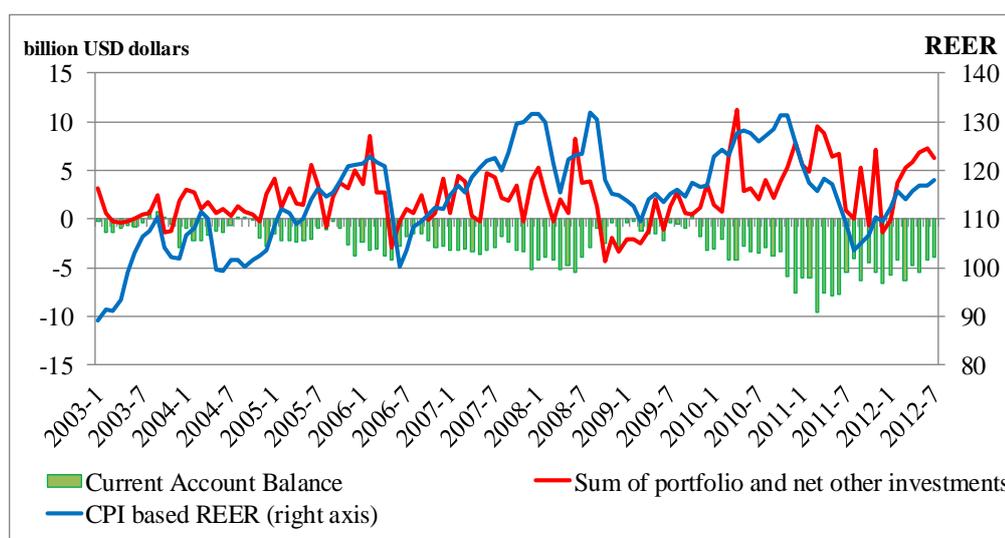
Figure 27: Current Account Balance, Sum of Portfolio and Net Other Investments, and Real Effective Exchange Rate (REER) on a Monthly Basis

In the figure below, real effective exchange rate is graphed with bank and other sector loans, and portfolio investments. The appreciation of REER between September 2004 and August 2008 may be attributed mainly to loans drawings of other sectors and portfolio investments. Outflows under portfolio investments in May 2006 were directly reflected in REER as a sharp depreciation. Moreover, depreciation of REER between August 2008 and April 2009 should have been caused by large outflows under these items. After the first quarter of 2009, loan drawings of banks in other investments item and portfolio investments seem to have caused the appreciation of REER until October 2010. After this period up to August 2011, REER depreciated significantly despite of the continual inflows in bank loans and portfolio investments. In fact, central bank's withdrawal of foreign exchange reaching to 10 billion US dollars with foreign exchange buying selling auctions between November 2010 and July 2011 should be the main factor for the depreciation of real effective exchange rate despite of the considerable capital inflows during this period.
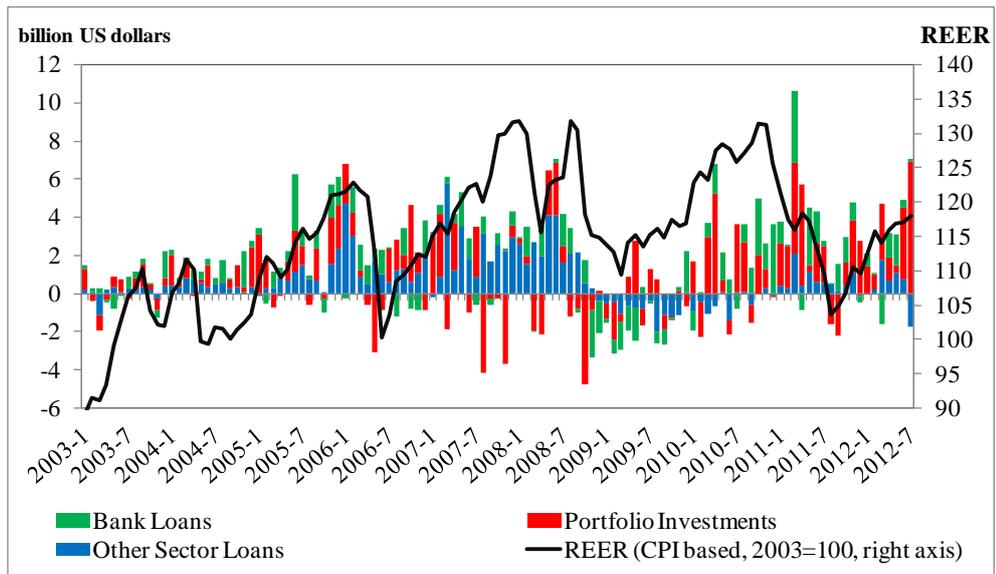
Figure 28: Portfolio Investments, Bank and Other Sector Loans and REER of Turkey on a Monthly Basis

The figure below displays Embi +, Embi +Tukey and their difference since 2003. Çulha et al (2006) points out that institutional investor rating, debt to GDP ratio, net foreign assets to GDP ratio and exports to GDP ratio are long term determinants of Embi spreads of Turkey.
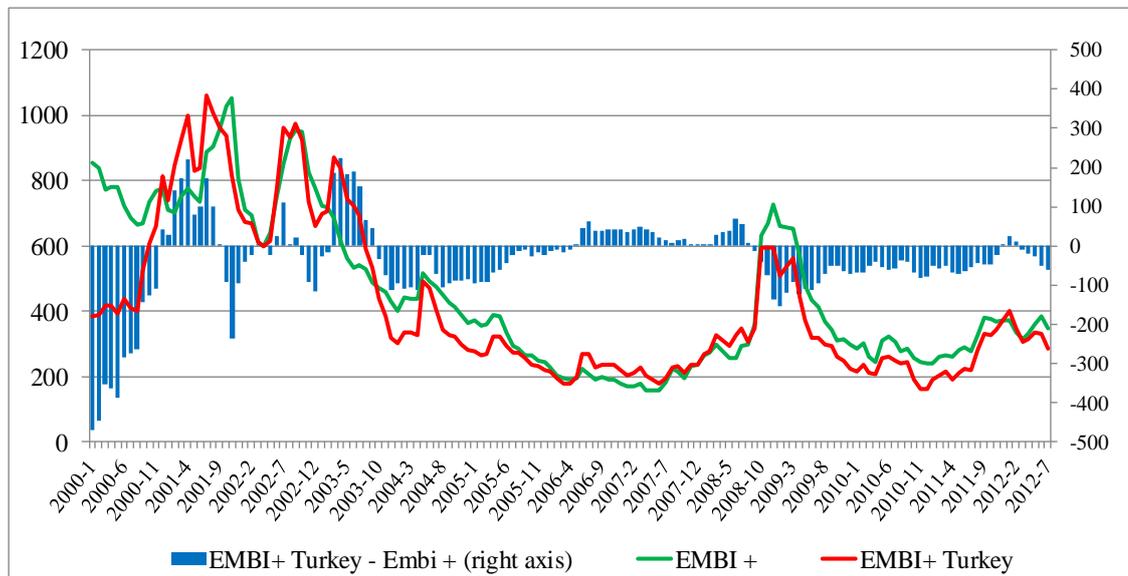
Figure 29: Embi + and Embi + Turkey on a Monthly Basis

Furthermore, Bellas et al (2010) states that external debt to GDP, public debt to GDP, short term debt to reserves ratio, fiscal balance to GDP ratio and political risk index in Turkey are important determinants of its Embi spreads.

Higher Embi + Turkey means Turkish government bonds pay higher interest than US Treasury bonds, in other words, cost of borrowing with riskless debt security is expensive for Turkish government which is also interpreted as the country risk is high. The relative interest rates of Turkish bonds have decreased smoothly since 2003, except the significant increases in the second half of 2008. Moreover, the relative yield spread of Turkey was lower than the between November 2003 and June 2006, between October 2008 and November 2011, and March and July 2012.

CHAPTER 4

VECTOR AUTOREGRESSIVE MODELS

In this section, after introducing data properties and analyzing the changes in the variables during 2000s in the previous section, three Vector Autoregressive (VAR) models are analyzed. First and second models are estimated by quarterly flow variables of Brazil and Turkey, respectively. These models are comparable within each other due to the selection of data type and similar time period. However, the time period for empirical analysis changes for the first model due to availability of data. The VAR model of Brazil is estimated between April 2002 and March 2012 while the VAR models of Turkey cover the time period between January 2003 and March 2012. The availability of monthly nominal GDP of Turkey which is transformed from quarterly nominal GDP with the technique developed by Fernandez (1981) allowed third model to be formed. This extrapolation technique is useful to enlarge the data set, such as quarterly data from annually data or monthly data from quarterly data with the help of existing related series in the same period. To transform quarterly Turkish nominal GDP, monthly industrial production index was used.

The variables in the model are not seasonally adjusted, but several dummies are tried for all seasons and 2008 crisis period and the dummies of which coefficients are statistically significant and have the correct sign are used in the VAR models.

The variables of the VAR models are shown in the following abbreviations:

ca: current account balance divided by nominal GDP.

cr: changes in domestic total credit stock divided by nominal GDP.

no.inv: net other investments divided by nominal GDP.

portf: portfolio investments divided by nominal GDP.

embi: ln((Embi +Brazil)/(Embi +)) for the VAR model of Brazil and
ln((Embi + Turkey)/(Embi +)) for the VAR models of Turkey.

reer: ln(REER); REER is real effective exchange rate.

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4.1 BRAZIL'S VAR MODEL

4.1.1 Data Properties

Balance of payments variables and changes in total domestic credit stock are divided by nominal gross domestic product (GDP) and the frequency of data is formed as quarterly time periods covering three months.

The correlation matrix table given below clearly informs about the high inverse correlation between the variables of *embi* and *reer*. The figure presented below also shows that the yield spreads between Brazilian debt securities and bonds of developed countries have decreased since September 2002 while real effective exchange rate has increased, in other words, Brazilian Real appreciated during this period. In fact, Favero and Giavazzi (2004) demonstrate that the fluctuations in Embi + Brazil are transmitted to exchange rate through capital flows. An increase in Embi + Brazil, in other words, an increase in the country risk premium, is stated to cause a sudden capital outflow leading a depreciation of the currency which is also needed to create trade surplus to cover the loss in capital inflows. On the other hand, inclusion of *reer* and *embi* together in the VAR model as endogenous variables does not give statistically significant results and even reduces the explanatory power of other variables due to their high inverse correlation. Therefore, *reer* is excluded from VAR analysis of Brazil, but its effects on other variables can be deducted through its relation with *embi*.

Table 6: Correlation Matrix of the variables

	ca	*cr*	*no.inv*	*portf*	*embi*	*reer*
ca	1.00	-0.29	-0.20	-0.23	0.67	-0.62
cr	-0.29	1.00	0.27	0.18	-0.52	0.56
no.inv	-0.20	0.27	1.00	0.26	-0.35	0.47
portf	-0.23	0.18	0.26	1.00	-0.34	0.50
embi	0.67	-0.52	-0.35	-0.34	1.00	-0.88
reer	-0.62	0.56	0.47	0.50	-0.88	1.00
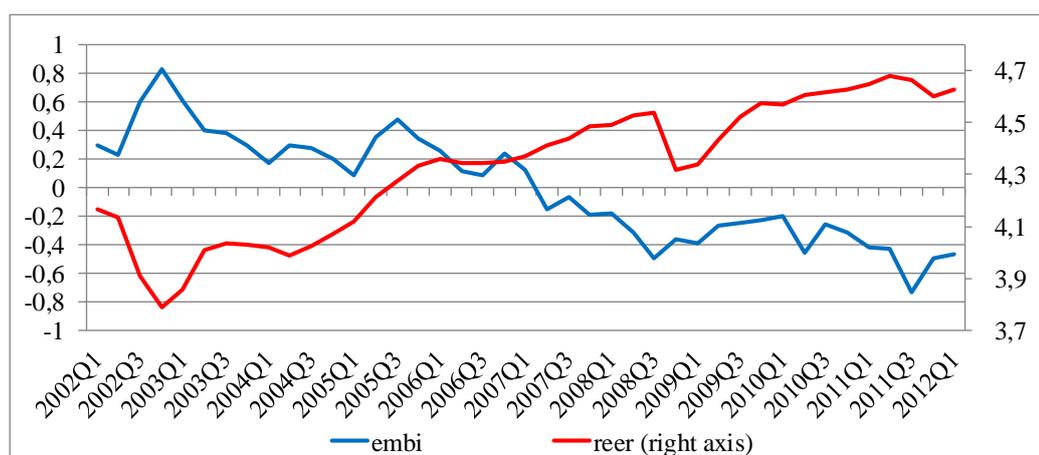
Figure 30: *embi* **and** *reer*

Since the study is dealing with time series variables, their stationarities are tested as a first stage of statistical work. As it can be seen from the table given below, *ca* is stationary with no intercept or trend term at 95% confidence interval and with intercept and trend term at 99% confidence level. On the other hand, *cr* does not have a unit root at 99 percent confidence level with intercept term only while *no.inv* and *portf* are stationary at 99 percent with no intercept or trend term. Moreover, *embi* and *reer* are stationary with trend and intercept term at 99% confidence level.

Table 7: Augmented Dickey Fuller Test Results

Variable	Lags	Calculated ADF	Included terms	Confidence levels %	No intercept or trend	With intercept only	With trend and intercept
ca	0	-2.41	no intercept or trend				
	0	-3.78	with trend and intercept				
cr	0	-4.03	with intercept	99	-2.62	-3.60	-4.20
no.inv	0	-4.81	no intercept or trend				
portf	0	-3.51	no intercept or trend	95	-1.94	-2.94	-3.53
embi	0	-3.83	with trend and intercept				
reer	1	-5.10	with trend and intercept	90	-1.61	-2.61	-3.19

4.1.2 VAR Model Specification

After several trials of different model specifications, *embi* is decided to be used as an exogenous variable in the model, since it is not affected by the lag values of other variables and the lag values of *embi* also do not affect other variables. Embi + indexes are published daily and overall changes in the domestic country and global economy are directly transmitted to these indexes in a short period of time. Therefore, expectations of close interactions between other variables' lag values and *embi* may not be satisfied by the models when the time gap between original frequencies of these data (which are determined in a quarterly and a daily basis) is considered. The remaining variables are all endogenous. In addition to these variables, one dummy variable is included as an exogenous variable. The effects of the 2008 crisis are felt deeply through high capital outflows in the last quarter of 2008. As the following figures show, sharp falls in *portf* and *no.inv* draw are obviously recognized in this quarter. Dummy (d1) can be named as a crisis dummy indicating the time period of the last quarter of 2008, 2008Q4.
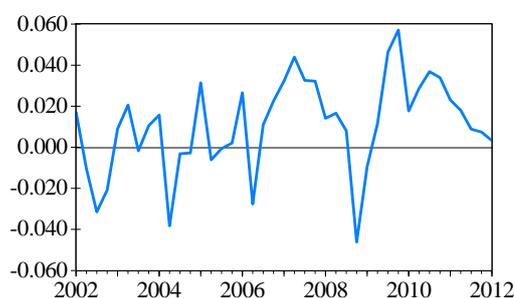
Figure 31: *portf*
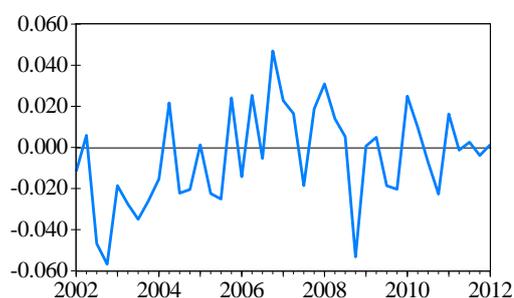
Figure 32: *no.inv*

4.1.2.1 Lag Length Selection

Table 8 presents the lag length orders offered by different VAR lag length selection criteria. Sequential Likelihood Ratio test (LR), Final Prediction Error (FPE), Akaike Information Criterion (AIC) and Hannan-Quinn Information Criterion (HQ) give second lag order as an optimal lag order. Wald lag exclusion test also supports this lag order. A VAR model with the selection of two as an optimal lag length is formed which also passes from the residual tests and stability test.

Table 8: VAR Lag Length Selection Criteria

Lag	LL	LR	FPE	AIC	HQIC	SBIC
0	404.7546	-	1.24×10^{-14}	-20.6713	-20.4873	-20.15416*
1	433.7632	47.32971	6.35×10^{-15}	-21.35596	-20.92664	-20.14931
2	461.9188	40.01071*	3.52×10^{-15}*	-21.99573*	-21.32109*	-20.09958
3	474.8235	15.62143	4.64×10^{-15}	-21.83282	-20.91286	-19.24715

Wald Lag Exclusion Test Probabilities					
Lag	*ca*	*cr*	*no.inv*	*portf*	*All*
1	28.48522	6.429808	4.816708	5.123943	42.10389
	$[9.94 \times 10^{-6}]$	[0.169267]	[0.306627]	[0.274815]	[0.000381]
2	15.50253	8.556907	13.00018	5.470881	48.55958
	[0.003765]	[0.073181]	[0.011275]	[0.242301]	$[3.88 \times 10^{-5}]$

The Vector Autoregressive Model for Brazil can be represented as the following:

$$
\begin{matrix} ca \\ cr \\ no.inv \\ portf \end{matrix} = \begin{matrix} c_1 \\ c_2 \\ c_3 \\ c_4 \end{matrix} + d1. \begin{matrix} q_1 \\ q_2 \\ q_3 \\ q_4 \end{matrix} + embi \begin{matrix} r_1 \\ r_2 \\ r_3 \\ r_4 \end{matrix} + \begin{matrix} \alpha_{11} & \alpha_{12} & \alpha_{13} & \alpha_{14} \\ \alpha_{21} & \alpha_{22} & \alpha_{23} & \alpha_{24} \\ \alpha_{31} & \alpha_{32} & \alpha_{33} & \alpha_{34} \\ \alpha_{41} & \alpha_{42} & \alpha_{43} & \alpha_{44} \end{matrix} \cdot \begin{matrix} ca_{t-1} \\ cr_{t-1} \\ no.inv_{t-1} \\ portf_{t-1} \end{matrix} + \begin{matrix} \beta_{11} & \beta_{12} & \beta_{13} & \beta_{14} \\ \beta_{21} & \beta_{22} & \beta_{23} & \beta_{24} \\ \beta_{31} & \beta_{32} & \beta_{33} & \beta_{34} \\ \beta_{41} & \beta_{42} & \beta_{43} & \beta_{44} \end{matrix} \cdot \begin{matrix} ca_{t-2} \\ cr_{t-2} \\ no.inv_{t-2} \\ portf_{t-2} \end{matrix}
$$

d1: It is the dummy variable which gives 1 for 2008Q4 and 0 otherwise.

Table below presents the estimation results for the exogenous variables of the model. The coefficients of *d1* are statistically significant for *no.inv* and *portf* with expected signs. In 2008Q4 it is observed that *no.inv* and *portf* decrease.

It is important to notice that *embi* has statistically significant and theory consistent coefficients for *ca, no.inv* and *portf*. An increase in *embi* improves *ca* but causes capital outflows and *no.inv* and *portf* decrease. The interpretation of this negative impact of *embi* on foreign capital is attributable to investors' risk anticipation which outweighs the yield they earn. As *embi* increases, the country risk is anticipated to increase for Brazil and this leads foreign investors to withdraw their assets from the country and this capital flight depreciates the local currency. The high negative correlation between *embi* and *reer* was mentioned before and statistical results of this model prove it once more; an increase in *embi* also increases *ca* through depreciation of *reer* (*reer* decreases).

Moreover, the figure below displays how *embi, ca, no.inv and portf* have changed since 2002.

Table 9: Test statistics of exogenous variables: constant (*c*), dummy (*d1*), and *embi*.

Exogenous Variables	Dependent Variables			
	ca	*cr*	*no.inv*	*portf*
	0.017335	0.052831	-0.022007	0.017934
	(0.00430)	(0.01189)	(0.01025)	(0.01070)
c	[4.03069]	[4.44383]	[-2.14679]	[1.67559]
	0.005755	0.019094	-0.064182	-0.06057
	(0.00788)	(0.02179)	(0.01879)	(0.01962)
d1	[0.73012]	[0.87634]	[-3.41628]	[-3.08787]
	0.013446	-0.01948	-0.026289	-0.030393
	(0.00515)	(0.01423)	(0.01227)	(0.01281)
embi	[2.61135]	[-1.36861]	[-2.14205]	[-2.37187]
Note that the values in the brackets '()' are standard errors and'[ ]' are t ratios of the variables				

Figure 33: *embi, ca, no.inv and portf*

4.1.2.2 Residual Diagnostic Test Results

The test results of residuals of the VAR model are given below. According to Jarque Bera normality test, residuals are normally distributed and do not have a skewness or kurtosis problem. White heteroscedasticty test results prove that residuals are

homoscedastic. Furthermore, LM test results show that residuals are not serially correlated.

Table 10: Results of Residual Test Statistics

Normality Test						
	Skewness		Kurtosis		Jarque-Bera	
	Value	Probability	Value	Probability	Value	Probability
ca	-0.201	0.6075	2.3167	0.3837	1.022471	0.5998
cr	0.188	0.6312	2.5753	0.5882	0.523511	0.7697
no.inv	0.320	0.4151	3.6722	0.3915	1.398617	0.4969
portf	-0.619	0.1146	2.8040	0.8027	2.551998	0.2792
ALL		0.4557		0.7636		0.7034

Heteroskedasticity Test		
Dependent	Chi-sq	Prob.
No cross terms	184.3803	0.6014

Serial Correlation Test		
Lag	LM-stat	Probability
1	16.6693	0.4073
2	20.10799	0.2154
3	9.57329	0.8879
4	9.784937	0.8776

The VAR model should also be checked for stability and stationarity of the residuals to make sure impulse-response analyses give safe results. As the following tables show, all roots of characteristic polynomial are less than one ensuring that the VAR model is stable and the residuals are stationary at 99 % confidence level with no intercept or trend term.

Table 11: VAR Stability Test Results

Root	Modulus	Root	Modulus
-0.080767 - 0.738796i	0.743198	0.580753	0.580753
-0.080767 + 0.738796i	0.743198	-0.487307	0.487307
0.650712	0.650712	0.308094 - 0.340220i	0.458989
-0.63184	0.63184	0.308094 + 0.340220i	0.458989

Table 12: Augmented Dickey Fuller Test Results of Residuals

Variable	Lags	Calculated ADF	Included terms	Critical values	
				Confidence levels %	No intercept or trend
residual 1	0	-6.55	no intercept or trend		
residual 2	0	-6.69	no intercept or trend	99	-2.63
residual 3	0	-6.73	no intercept or trend	95	-1.95
residual 4	0	-5.40	no intercept or trend	90	-1.61

The VAR model of Brazil with lag length two gives desirable results in terms of residuals satisfying normality, homoscedastic characteristics, being serially uncorrelated and as well as complete model being a stable system with stationary residuals.

4.1.2.3 Impulse Response Analyses

VAR models provide the researchers with an analysis how structural shocks in one of the variable affect other variables. Using Cholesky decomposition sensitive to ordering of variables in a VAR model, impulse response analyses are made with the help of figures. The response standard errors are determined by Monte Carlo technique with hundred simulations. This technique calculated by Hamilton (1994) chooses a random sample from the asymptotic distribution of VAR coefficients and by using these coefficients impulse-response coefficients are found. Repetition of this simulation by a chosen number of times provides a sample distribution of the coefficients for impulse-response functions of which standard errors are response standard errors.

Cholesky ordering determines the effect of any variable on other variable by ranking the variables from the most exogenous to the less. To determine the exogenity degree of the variables, granger causality test is a useful method. Granger causality tests show which variable is effective in prediction of the other variable. If the lagged values of one variable, say x variable, are found to be statistically significant in the regression of another variable, y, than it is possible to forecast the future values of y by looking at the current values of x. On the other hand, if y is not explained by the lagged values of x and z, third variable in a VAR model, but x and z are explained by the lag values of at least one of the variable, y is stated to be the most exogenous variable.

According to granger causality test results given in table below, *portf* is the most exogenous variable; it is not affected from other variables. According to significance levels of individual p values of the variables, exogenity order of the remaining variables are; *cr, no.inv,* and *ca.*

Table 13: p Values of Granger Causality Test Results

Regressors	Dependent Variables			
	ca	*cr*	*no.inv*	*portf*
ca	0.0000	0.4078	0.0050	0.3639
cr	0.0002	0.0000	0.0060	0.1411
no.inv	0.0062	0.0098	0.0000	0.9141
portf	0.0003	0.2577	0.3243	0.0000
ALL	0.0000	0.0047	0.0012	0.3109

The sizes of all shocks are chosen to be one positive standard deviation of the error term of each variable in impulse response analyses. The table below gives the sizes of shock of all endogenous variables. The highest response to its own positive shock comes from *cr* while the lowest is from *ca*.

Table 14: Sizes of Shocks

Variable	Size of a shock as a result of one standard deviation increase in the variable itself		Variable	An Increase in the Variable
ca	0.007 units	→	Current account balance	0.7% of quarterly nominal GDP
cr	0.020 units	→	Changes in total domestic credit stock	2.0% of quarterly nominal GDP
no.inv	0.017 units	→	Net other investments	1.7% of quarterly nominal GDP
portf	0.018 units	→	Portfolio investments	1.8% of quarterly nominal GDP

Impulse response analyses based on Cholesky decomposition are presented with the following figures. Note that the left axis of all impulse response figures of three VAR models are in percentage terms. The following figures present responses of the variables to their own shocks.
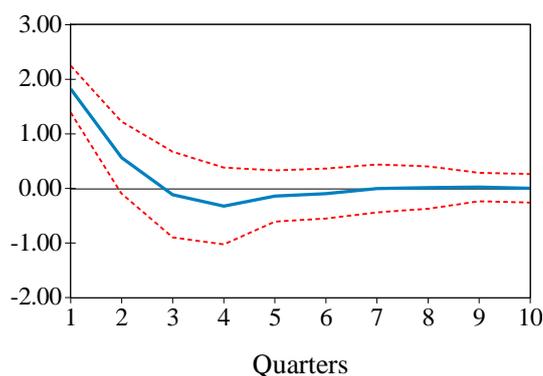
Figure 34: Response of *portf* to its own shock
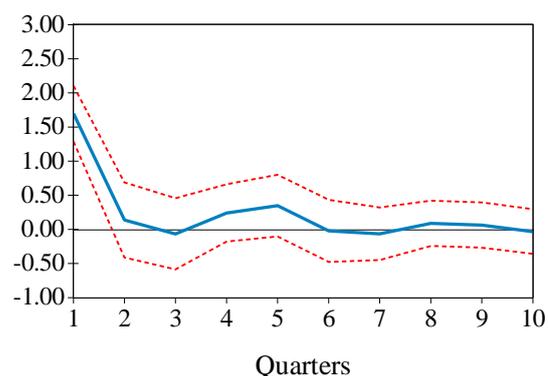
Figure 36: Response of *no.inv* to its own shock
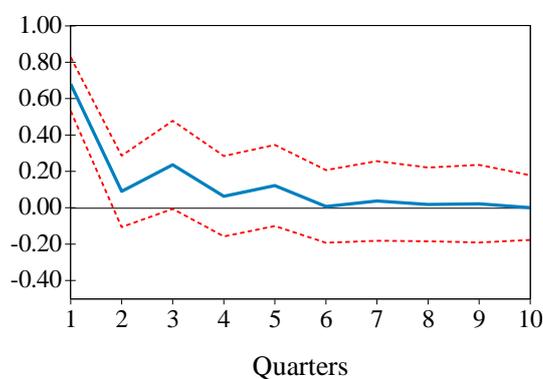
Figure 35: Response of *ca* to its own shock
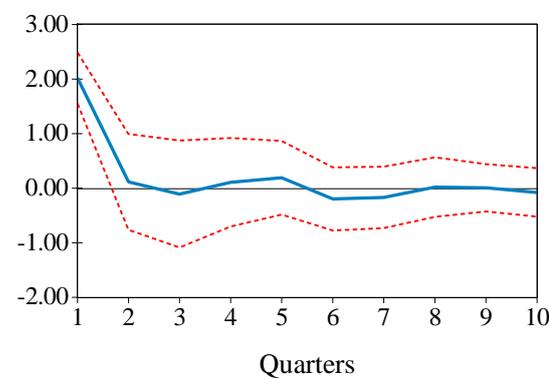
Figure 37: Response of *cr* to its own shock

As the figure below shows, *cr* is highly affected by a shock occurred in *no.inv*. In the third quarter after a shock in *no.inv* is realized, the peak response of *cr* is observed with an increase of 0.008 units. In other words, one positive standard deviation shock in *no.inv* causes net other investments to increase by 0.8% of nominal GDP in the third quarter. The accumulated response of *cr* reaches to 1.6% in 10th quarter.
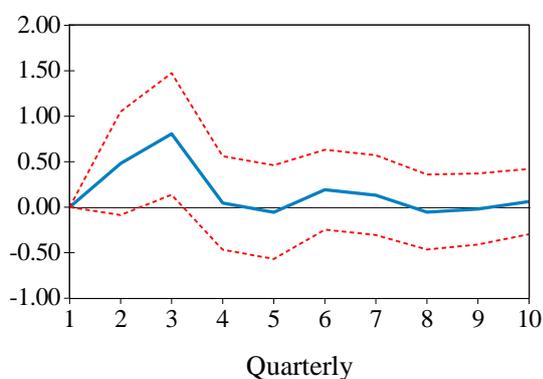
Figure 38: Response of *cr* to a shock in *no.inv*

A shock in *cr* causes *ca* to decrease by 0.4% in the second quarter, and the accumulated response of *ca* reaches to 0.8% in the 10th quarter, as the figure below shows. On the other hand, a shock in *portf* worsens *ca* with 0.4% decrease in the second quarter and the fall in *ca* accumulates to 1.3% in the 10th quarter. Inflows under portfolio investments affect current account balance through two channels; one is exchange rate and the other is liquidity. Capital inflows appreciate the exchange rate and this leads to expensive exports and cheaper imports and worsens trade balance. Moreover, portfolio investment inflows increase the liquidity in the economy and bank lending which triggers the domestic credits, *cr*. A rise in *cr*, as mentioned above, increases demand for imports and worsens current account balance.
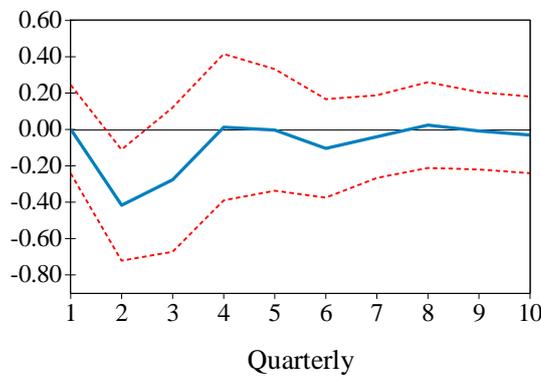
Figure 39: Response of *ca* to a shock in *cr*   **Figure 40: Response of *ca* to a shock in *portf***
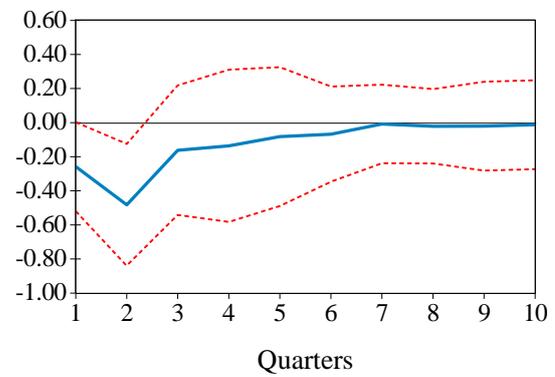
The figure below displays that *no.inv* increases as a result of a shock in *ca*. *no.inv* increases by 0.3% in the second quarter and its accumulated response is found to be 1.4% in 10th quarter. Improvement in current account balance may decrease the country risk and foreigner may increase their lendings or currency and deposits in Brazil.
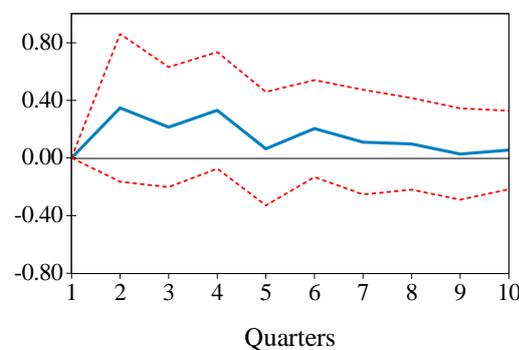
Figure 41: Response of *no.inv* to a shock in *ca*

According to granger causality test results, *cr* is a granger cause of *no.inv*. A shock in *cr*, leads an accumulated increase in *no.inv* about 0.8% in the third quarter.
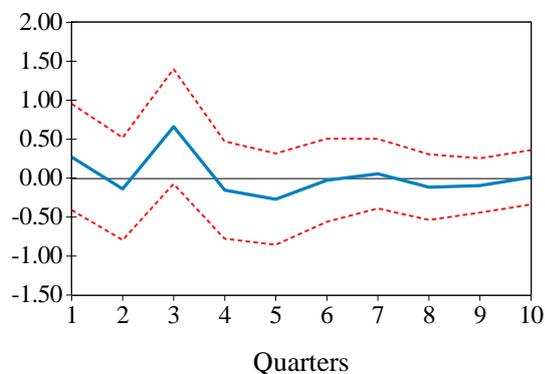
Figure 42: Response of *no.inv* to a shock in *cr*

4.1.2.4 Variance Decomposition of the Variables in VAR Model

Stock and Watson (2001) define variance decomposition as "The forecast error decomposition is the percentage of the variance of the error made in forecasting a variable (e.g. inflation) due to a specific shock (e.g. the error term in the unemployment equation) at a given horizon (e.g. 2 years). Thus, the forecast error decomposition is like a partial R^2 for the forecast error, by forecast horizon". Variance decomposition tables of the variables are given below.

According to variance decomposition table of *ca,* its variance is affected the most by a shock in *portf* and then by a shock in *cr,* after its own shock. Increases in *portf* and *cr* deteriorate *ca* through an appreciation of *reer* which and an upward pressure on import demand, respectively.

Table 15: Variance decomposition of *ca*

Forecast period	Forecast Standard Error	*ca*	*cr*	*no.inv*	*portf*
1	0.007317	86.234	0.000	1.298	12.466
3	0.010741	45.540	21.665	4.571	28.222
6	0.011104	44.142	21.172	5.853	28.832
9	0.011136	44.063	21.230	5.959	28.745

According to the variance decomposition of *cr*, as shown in table below, a shock in *no.inv* affects the volatility of variance of *cr* the most among other variables which is also consistent with the granger causality test results and impulse-response analyses.

Table 16: Variance decomposition of *cr*

Forecast period	Forecast Standard Error	*ca*	*cr*	*no.inv*	*portf*
1	0.020227	0.000	99.668	0.000	0.332
3	0.022728	2.264	79.419	17.061	1.255
6	0.023543	5.172	75.589	16.659	2.579
9	0.024000	5.459	74.873	16.756	2.911

Shocks realized in *no.inv*, as shown in table below, explains the fluctuations in its variance in a great extent and lower contributions of shocks of *cr* to the volatility of variance of *no.inv* are also observed.

Table 17: Variance decomposition of *no.inv*

Forecast period	Forecast Standard Error	*ca*	*cr*	*no.inv*	*portf*
1	0.017	0.000	2.421	94.702	2.877
3	0.019	4.474	14.246	77.933	3.346
6	0.020	7.664	14.973	73.432	3.930
9	0.020	8.013	15.241	72.176	4.569

Finally, *portf*, as being the most exogenous variable, is almost totally affected from its own shock; other variables are less effective in changing the volatility of variance of *portf*.

Table 18: Variance decomposition of *portf*

Forecast period	Forecast Standard Error	*ca*	*cr*	*no.inv*	*portf*
1	0.018	0.000	0.000	0.000	100
3	0.020	1.920	6.349	0.301	91.431
6	0.021	2.111	8.272	0.932	88.685
9	0.021	2.146	8.325	0.952	88.577

4.2. TURKEY'S VAR MODELS

The second and third models formed with Turkish data cover the period between January 2003 and March 2012. The reason behind the selection of this period is the restricted domestic credit data published at the end of month. There are several distinguished statistical data of domestic credits for larger time horizon, but they are generally released on a weekly basis and not comparable with the remaining monthly or quarterly data. Banking Regulation and Supervision Agency (BRSA) publishes monthly stock domestic credit data since December 2002 and its decomposition by type allowed excluding mortgage credits from total credits, since they are believed to have no effect on current account balance. In fact, Telatar (2011) also used consumer credits data of BRSA in his econometric study which was mentioned before. The second model with quarterly data is estimated with the purpose of comparing it with the VAR model of Brazil. However, the observation number is very restricted for quarterly formed models. Therefore, depending on significantly high correlations between monthly variables and with the claim of interactions between variables take place in a shorter period of time, third model with monthly data is also estimated.

Turkey's VAR models are consistent with each other in terms of cause-effect directions between the variables. The only difference is that *embi* is included as an exogenous variable in the model formed with quarterly data, similar to the Brazil's model, but as an endogenous variable in the model formed with monthly data. On the other hand, unlike the VAR model of Brazil, *reer* is included as an exogenous variable in both models of Turkey.

4.2.1 Turkey's VAR Model Formed with Quarterly Data

4.2.1.1. Data Properties

To grasp some perspective about the relations between variables, a table of correlation matrix of variables is presented below. Existence of high correlations between *ca* and *cr*,-0.67, and between *cr* and *no.inv, 0.63,* draw attention. *portf* also moves in a reverse path with *ca*, their correlation is -0,33. According to these basic statistics, it can be claimed that as, *no.inv* and *portf* increase, *cr* increases which also distorts *ca*. In short, the significantly high correlations between these variables motivate this empirical research to be made. It is expected to find out that capital inflows cause credit expansion and increases in domestic credits deteriorates current account balance of Turkey. Moreover, increasing current account deficit may lead to increase in foreign finance or discourage the foreign investors to invest in because of the concern of current account deficit sustainability.

In addition, *embi* has a positive correlation with *ca* and negative correlation with *no.inv*. The relation between these variables may be basically interpreted as: An increase in the yield spread between Turkish bonds and US bonds, creates an upward pressure on the probability of default risk for the borrowings of Turkey which discourages foreigners to lend and forces the domestic agents become net loan payers to abroad. As *embi* increases, capital inflows under *no.inv* decrease and even outflows take place. On the other hand, capital outflows lead liquidity squeeze in the country and cause banks to call back their lendings or decrease the amount of newly opened domestic credits. The reflection of an increase in *embi* in current account balance is realized through domestic credit channel with a reduction in import demand. In brief, as *embi* increases, *no.inv* decreases causing *cr* to fall with a positive impact on *ca*.

The correlation of *reer* with other variables is supportive for the economic theory. An increase in *reer*, an appreciation of Turkish Lira, worsens the relative prices of trade and this deteriorates *ca*. On the other hand, appreciation of the local currency makes the import goods relatively cheaper and this will trigger the domestic credits with which domestic agents like to benefit from this price advantage; a positive correlation between *reer* and *cr* exists. Furthermore, an increase in the capital inflow under *no.inv* item

causes local currency to appreciate in real terms; *reer* and *no.inv* are positively correlated.

In fact, although the correlation degree between *reer* and *portf* is considerably small, its sign is not in the expected form. As *portf* increases, appreciation of *reer* is expected. However, *reer* is not only affected by *portf* in any period of time, one case may be given as: An increase in *embi*, due to its small but positive correlation with *portf*, may increase *portf*, although an increase in *embi* is anticipated as higher yields by portfolio investors, foreign lenders may anticipate it as an increase in the country risk and call back their loans and withdraw their deposits. Capital outflows under *no.inv* item, due to its negative correlation between *embi*, may outweigh the inflows taken place under *portf*, as a result *reer* will decrease, and local currency depreciates; although *porft* increases, *reer* decreases. In addition, the interventions of central bank to foreign exchange market may also hinder the real cause effect relation between *portf* and *reer*.

Table 19: Correlation Matrix of the variables

	ca	*cr*	*no.inv*	*portf*	*embi*	*reer*
ca	1.00	-0.67	-0.44	-0.33	0.21	-0.27
cr	-0.67	1.00	0.63	0.02	-0.42	0.40
no.inv	-0.44	0.63	1.00	0.21	-0.25	0.42
portf	-0.33	0.01	0.21	1.00	0.03	-0.01
embi	0.21	-0.42	-0.25	0.03	1.00	-0.23
reer	-0.27	0.40	0.42	-0.01	-0.23	1.00

The VAR analyses start with testing whether variables have a unit root or not. According to the Augmented Dickey Fuller Test results, all variables are stationary in levels. The following table gives a detailed summary for at which confidence levels and with which included terms the variables are stationary. *ca* is stationary at confidence level of 95% with intercept term.*cr, no.inv* and *portf* do not have a unit root at 99% confidence level with intercept term. Moreover, the hypothesis of non-stationarity of *embi* and *reer* are rejected at confidence level of 99% with no intercept or trend term.

Table 20: Augmented Dickey Fuller Test results for the levels of variables

Variable	Lags	Calculated ADF	Included terms	Confidence levels %	No intercept or trend	With intercept only	With trend and intercept
					Critical values		
ca	0	-3.10	with intercept				
cr	0	-4.05	with intercept	99	-2.63	-3.62	-4.23
no.inv	0	-4.36	with intercept				
portf	0	-4.44	with intercept	95	-1.95	-2.94	-3.54
embi	0	-2.72	no intercept or trend				
reer	0	-3.21	no intercept or trend	90	-1.61	-2.61	-3.20

4.2.1.2. VAR Model Specification

Similar to the VAR model of Brazil, *ca, cr, no.inv* and *portf* are included as endogenous variables in Turkey's VAR model formed with quarterly data. It is found that neither the lag values of *embi* and *reer* are explanatory for other variables, nor the lag values of other variables help forecasting *embi* and *reer*. On the other hand, as exogenous variables *reer* and *embi* give theory consistent and statistically significant results for *cr* and *portf*, and *ca*, c*r* and *no.inv*, respectively. Therefore, they are included in this VAR model as exogenous variables. In addition, the VAR model includes two dummy variables to increase the explanatory power of the model for *ca*. As the figure of *ca* given below clearly shows, third quarters of the years are peaked due to seasonal effect of tourism income and the first dummy is used for these periods.ca falls sharply in the last quarter of 2010 and follows a lower path since then and the second dummy is used for the period between the last quarter of 2010 (2010Q4) and the first quarter of 2012 (2012Q1).
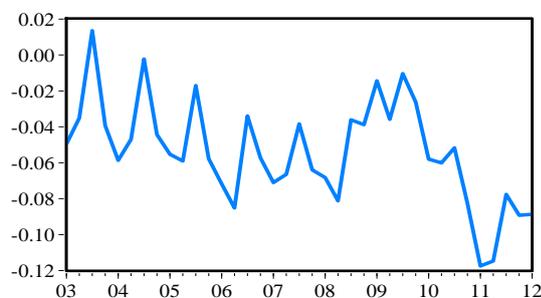

Figure 43: *ca*

4.2.1.2.1. Lag Length Selection

To form a proper model with significant statistical and theoretical test results, different lag orders are tried in accordance with them offers of different lag length selection criteria which are given in the table below. Lutkepohl (2007) states that the ordered estimates of SC criteria are consistent and they converge approximately surely to the true VAR model. Therefore, depending on sequential modified LR, Schwarz Information Criterion (SBIC) and Wald lag exclusion test results, lag order is decided to be 1 for an optimal model which passes from basic diagnostic tests.

Table 21: VAR Lag Length Selection Criteria

Lag	LL	LR	FPE	AIC	HQIC	SBIC
0	335.94	-	5.73×10^{-14}	-19.15	-18.84	-18.24
1	375.26	57.19*	1.46×10^{-14}	-20.56	-20.01	-18.92*
2	393.61	22.25	1.43×10^{-14}	-20.70	-19.91	-18.35
3	410.47	16.35	1.76×10^{-14}	-20.75	-19.72	-17.67
4	435.46	18.18	1.66×10^{-14}*	-21.30*	-20.02*	-17.49

Wald Lag Exclusion Test Probabilities					
Lag	*ca*	*cr*	*no.inv*	*portf*	*Joint*
1	55.01 [3.23×10^{-11}]	27.86 [1.33×10^{-5}]	16.95 [0.002]	14.90 [0.005]	93.67 [5.24×10^{-13}]

Vector Autoregressive Model for Turkey with quarterly data can be represented as:

$$
\begin{matrix} ca \\ cr \\ no.inv \\ portf \end{matrix} = c \begin{matrix} \beta_1 \\ \beta_2 \\ \beta_3 \\ \beta_4 \end{matrix} + d1 \begin{matrix} \gamma_1 \\ \gamma_2 \\ \gamma_3 \\ \gamma_4 \end{matrix} + d2 \begin{matrix} q_1 \\ q_2 \\ q_3 \\ q_4 \end{matrix} + embi \begin{matrix} r_1 \\ r_2 \\ r_3 \\ r_4 \end{matrix} + reer \begin{matrix} s_1 \\ s_2 \\ s_3 \\ s_4 \end{matrix} + \begin{matrix} \alpha_{11} & \alpha_{12} & \alpha_{13} & \alpha_{14} \\ \alpha_{21} & \alpha_{22} & \alpha_{23} & \alpha_{24} \\ \alpha_{31} & \alpha_{32} & \alpha_{33} & \alpha_{34} \\ \alpha_{41} & \alpha_{42} & \alpha_{43} & \alpha_{44} \end{matrix} \cdot \begin{matrix} ca_{t-1} \\ cr_{t-1} \\ no.inv_{t-1} \\ portf_{t-1} \end{matrix}
$$

d1: dummy variable which gives 1 for the third quarters and 0 otherwise.

d2: dummy variable which gives 1 for the period between 2010Q4 and 2012Q1 and 0 otherwise

Table 22: Test statistics of exogenous variables: constant (*c*), dummy (*d1*), dummy (*d2*) *embi* and *reer*.

Exogenous Variables	Dependent Variables			
	ca	*cr*	*no.inv*	*portf*
c	0.332	-0.622	-0.946	-0.007
	-0.115	-0.306	-0.236	-0.205
	[2.88045]	[-2.03518]	[-4.00683]	[-0.03317]
d1	0.041	-0.027	-0.010	-0.015
	-0.005	-0.012	-0.009	-0.008
	[8.87914]	[-2.21823]	[-1.03943]	[-1.80961]
d2	-0.025	0.004	-0.014	0.011
	-0.007	-0.018	-0.014	-0.012
	[-3.73096]	[0.23550]	[-0.98523]	[0.89458]
embi	-0.011	-0.070	-0.024	0.035
	-0.011	-0.029	-0.023	-0.020
	[-1.03525]	[-2.37928]	[-1.08538]	[1.79006]
reer	-0.077	0.139	0.201	0.004
	-0.024	-0.065	-0.050	-0.043
	[-3.14209]	[2.14512]	[4.01335]	[0.08711]
Note that the values in the brackets '()' are standard errors and '[ ]' are t ratios of the variables.				

The coefficients of *d1* for *ca, cr* and *portf* and *d2* for *ca* are statistically significant and theoretically consistent. In third quarters in which improvement in tourism income dominates, *ca* is observed to increase while *cr* and *portf* decrease. On the other hand, the values of *ca* are lower since 2010Q4 compared to previous quarters.

embi has statistically insignificant coefficient for *ca* and *no.inv*. On the other hand, its coefficients for *cr* and *portf* which are negative and positive, respectively, are statistically significant and theory consistent. As *embi* increases, the contraction in net drawings of total domestic credits may be attributed mainly to two reasons. First reason is that an increase in the country risk due to higher probability of default risk causes foreign capital to leave from the country which decreases the financial resources transmitted to domestic credits. The negative correlation between *embi* and *no.inv,* and negative but insignificant coefficient of *embi* in determining *no.inv* support this case. Second reason is that the changes in *embi* may be reflected in domestic borrowing rates

in the same direction. Therefore, an increase in *embi* may lead the cost of domestic borrowing to be expensive and reduce *cr*. On the other hand, an increase in *embi* is anticipated as an increase in the relative yield for portfolio investors in Turkey and they are attracted with higher returns and *portf* increases. In VAR model of Brazil, an increase in *embi* is anticipated as an increase in country and cause *portf* to decrease.

The figure below displays how *embi*, *cr* and *portf* have changed over time. It is easily noticed that when *embi* decreases considerably compared to previous period, *cr* also increase in the same period compared to the previous quarter or vice a versa. In the quarters of 2006Q3, 2008Q2, 2010Q3, 20110Q4, 2011Q1 and 2011Q4, the inverse change of *cr* with respect to *embi* is clearly observed. In addition, *portf* does not seem to be affected considerably by the changes in *embi* as *cr* is affected. In the quarters of 2006Q3, 2008Q2, 2009Q2, 2010Q4, 2011Q4, *portf* increases slightly when *embi* increases.
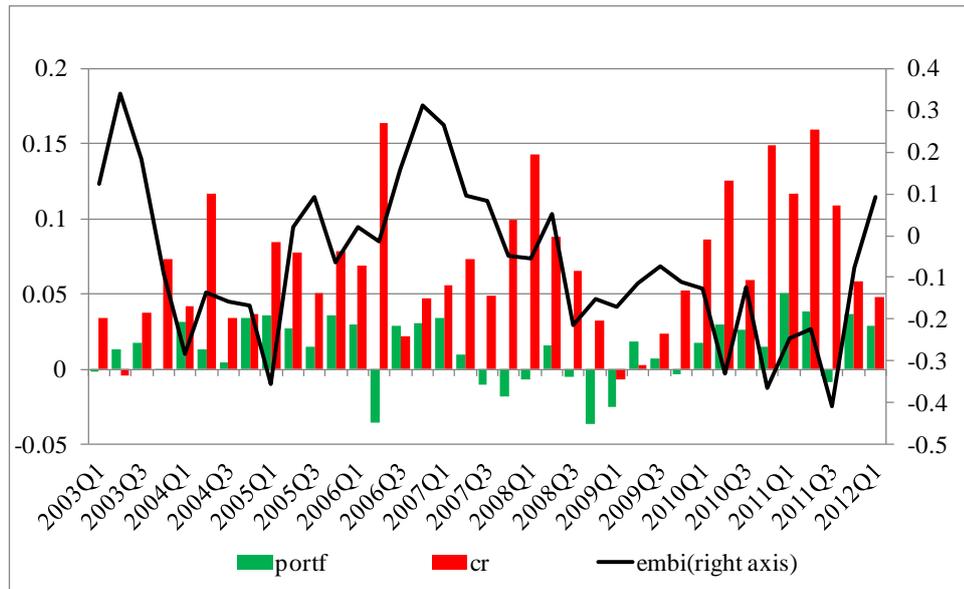
Figure 44: *portf, cr* and *embi*

The coefficients of *reer* for *ca, cr* and *no.inv* are statistically significant and consistent with the theory in economics. Appreciation of Turkish Lira in real terms reduces prices of foreign goods and this triggers import demand and worsens *ca*. An increase in *reer* makes imports cheaper and domestic agents may increase their credit drawings to benefit from this price advantage. In fact, an increase in *cr* deteriorates *ca* further in the

following quarters, this cause effect is evaluated in the impulse response analyses of this model. Moreover, appreciation of Turkish Lira decreases the cost of foreign borrowing encouraging loan drawings from abroad; therefore, *no.inv* increases as *reer* increases.

The figure below is given to show how *ca*, *cr* and *no.inv* have changed with the corresponding changes in *reer*. Despite of the certain exceptions, in general, inverse relation between *ca* and *reer* and positive relation between *cr* and *reer* is easily noticed. As *reer* increases, appreciation of the currency worsens *ca* and causes *cr* to increase as a response to cheaper imports. On the other hand, the increases in *reer* are reflected in*no.inv* as increase. In the quarters of 2005 Q3-Q4, 2009Q3-2010Q2 and 2012Q1, *reer* appreciates and *no.inv* increases.
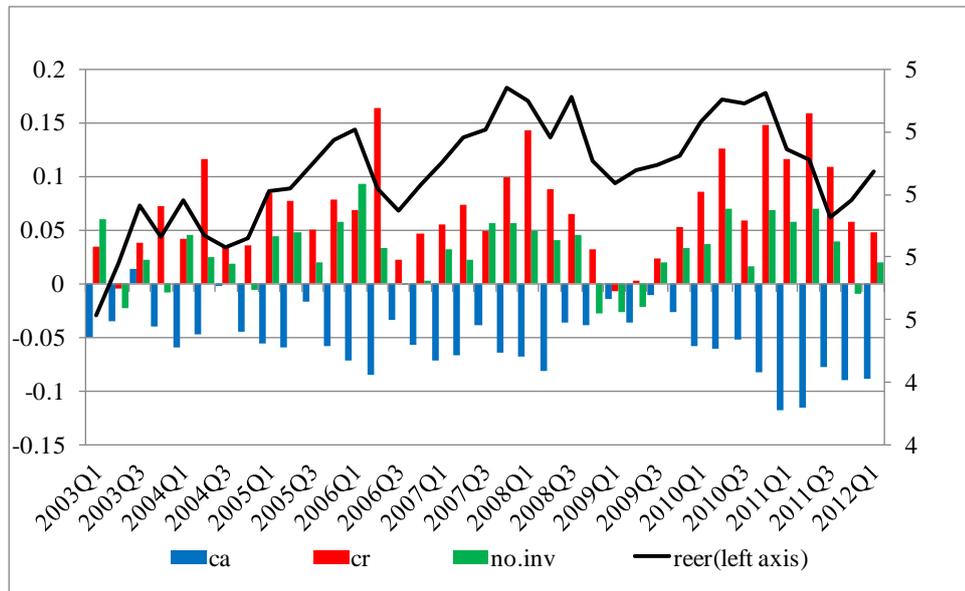
Figure 45: *ca, cr, no.inv* and *reer*

4.2.1.2.2. Residual Diagnostic Test Results

The residuals of the VAR model are found to be normally distributed according to Jarque Bera normality test. Residuals are also safe from heteroscedasticity and serial correlation according to white heteroscedasticity and LM test results, respectively, of which results are summarized in the following tables.

Table 23: Results of Residual Test Statistics

	Normality Test					
	Skewness		Kurtosis		Jarque-Bera	
	Value	Probability	Value	Probability	Value	Probability
ca	0.219	0.5912	2.040	0.239	1.673	0.433
cr	0.320	0.433	2.800	0.803	0.677	0.713
no.inv	0.309	0.449	3.822	0.314	1.587	0.452
portf	-0.260	0.525	1.880	0.170	2.284	0.319
ALL		0.758		0.362	6.221	0.623

Heteroskedasticity Test		
	Chi-sq	Prob.
No cross terms	154.003	0.198

Serial Correlation Test		
Lag	LM-stat	Probability
1	16.965	0.388
2	22.672	0.123
3	13.768	0.616
4	13.661	0.624

The stability check of the VAR model shows that there is no characteristic polynomial root lying outside the unit circle, in other words, as the following table displays, all characteristic polynomial roots are less than one, so the model passes from its stability test.

Table 24: VAR Stability Test Results

Root	Modulus
0.453157 - 0.170773i	0,484267
0.453157 + 0.170773i	0,484267
-0.222756 - 0.247085i	0,332673
-0.222756 + 0.247085i	0,332673

Stationarity of residuals of the VAR model is also crucial for the validity of impulse response analyses as well as stability requirement for the model. The following table shows that the residuals of this VAR model do not have a unit root at 99% confidence level with no intercept and trend term. Therefore, impulse response interactions of the variables can be analyzed safely.

Table 25: Augmented Dickey Fuller Test Results of Residuals

Variable	Lags	Calculated ADF	Included terms	Critical values	
				Confidence levels %	No intercept or trend
residual 1	0	-6.50	no intercept or trend		
residual 2	0	-6.10	no intercept or trend	99	-2.63
residual 3	0	-4.89	no intercept or trend	95	-1.95
residual 4	0	-6.39	no intercept or trend	90	-1.61

The stable VAR model for Turkey formed with quarterly times series with lag length 1 is believed to have desirable results in terms of normally distributed and homoscedastic and serially uncorrelated and stationary residuals.

4.2.1.2.3. Impulse Response Analyses

According to granger causality test results, individual p values of endogenous variables, summarized in table below, are used to determine the exogenity degree of the variable. The most exogenous variable is *no.inv* and the order from exogentiy to endogenity for the rest is *cr, ca, and portf.*

Table 26: p Values of Granger Causality Test Results

Regressors	Dependent Variables			
	ca	*cr*	*no.inv*	*portf*
ca	0.000	0.410	0.731	0.140
cr	0.002	0.000	0.198	0.001
no.inv	0.490	0.009	0.000	0.002
portf	0.005	0.020	0.001	0.000
ALL	0.000	0.000	0.002	0.005

The table below gives the sizes of the responses of variables to their own shock which is just one positive standard deviation change in their own level. The highest change occurs in *cr* when it is subject to its own shock; an increase by 0.025 units means that a shock in *cr* causes net drawings of total domestic credits to increase by 2.5% of nominal GDP in a quarterly period. The second highest response to its own shock is observed in *no.inv* with 0.021 units and the sizes of shocks in *portf and ca* follow them, respectively.

Table 27: Sizes of Shocks

Variable	Size of shock as a result of one standard deviation increase in the variable itself		Variable	An Increase in the Variable
ca	0.010 units	→	Current account balance	1.0% of quarterly nominal GDP
cr	0.025 units	→	Changes in total domestic credit stock	2.5% of quarterly nominal GDP
no.inv	0.021 units	→	Net other investments	2.1% of quarterly nominal GDP
portf	0.017 units	→	Portfolio investments	1.7% of quarterly nominal GDP

The following figures show how the endogenous variables in the model react to their own shock. The highest response comes within the first quarter for all variables and the effects last longer in *cr* than others.
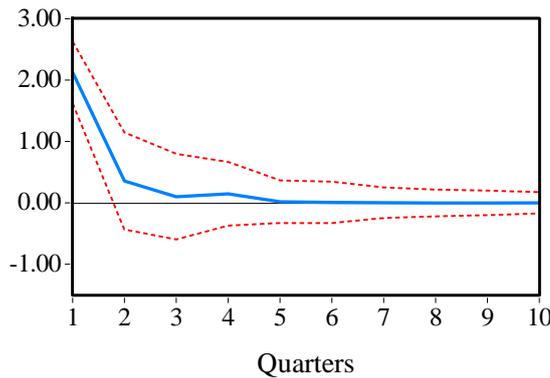

Figure 46: Response of *no.inv* to its own shock
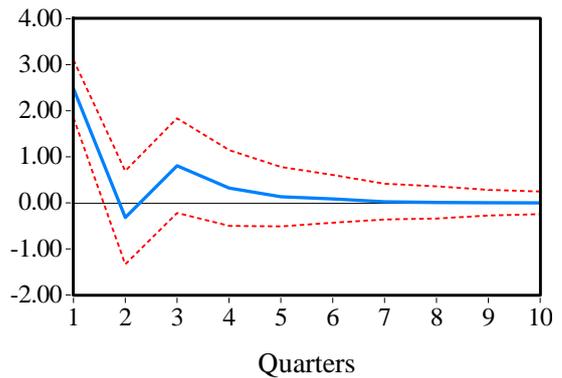
Figure 48: Response of *cr* to its own shock
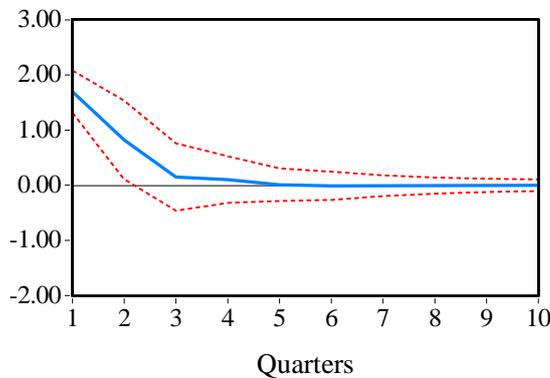
Figure 47: Response of *portf* to its own shock
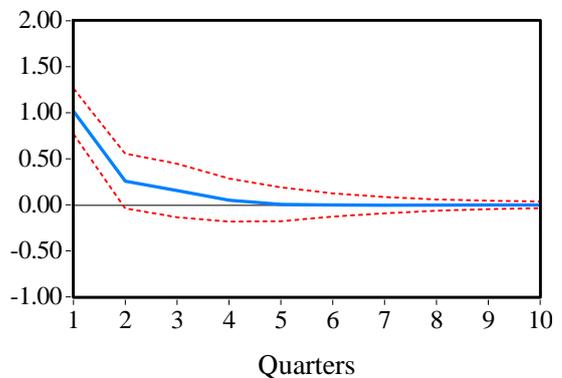
Figure 49: Response of *ca* to its own shock

The figures below show how *cr* responds to positive shocks realized in *no.inv* and *portf*. The peak response of *cr* to a shock in *no.inv* is observed in the second quarter with an increase of 1.5% of nominal GDP. A shock in *no.inv* leads quarterly net drawings of total domestic credits to increase by 3% of nominal GDP at the end of 6th month. On the other hand, *cr* increases 1.2% by a shock in *portf* in the third quarter and its accumulated response reaches to 3.3% in 7th quarter.
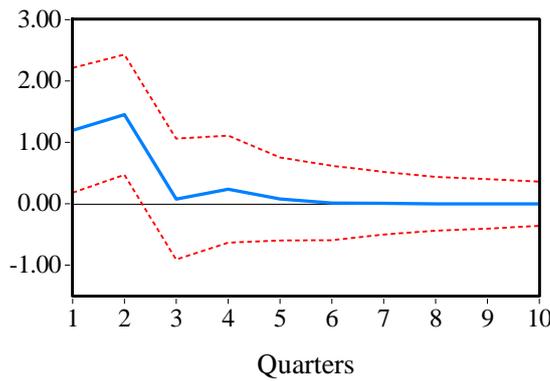
Figure 50: Response of *cr* to a shock in *no.inv*   **Figure 51: Response of *cr* to a shock in *portf***
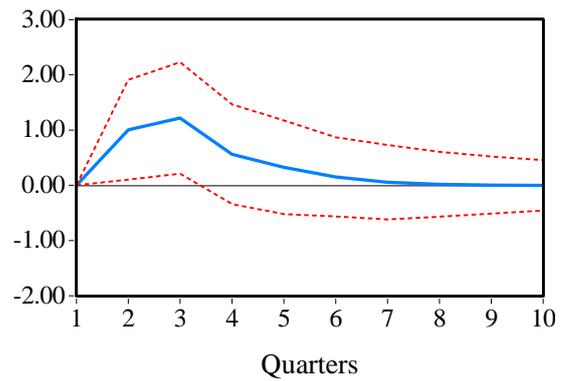
The figures below show how *ca* responds to shocks in *cr* and *portf*. Consistent with the pre-estimation expectations, a shock in *cr* worsens *ca* by 0.44% in the second quarter and the accumulated response of *ca* is found to be 1.4% in 9th month. An expansion in domestic credits increases the import demand and the current account deficit of Turkey. On the other hand, a shock in *portf* deteriorates *ca* the most in the third quarter with a decrease of 0.6% and total distortion on *ca* is found to be 1.9% at the end of 9th month. Capital inflows under portfolio investments worsen current account balance through an increase in domestic liquidity which triggers domestic credit expansion and then import demand.
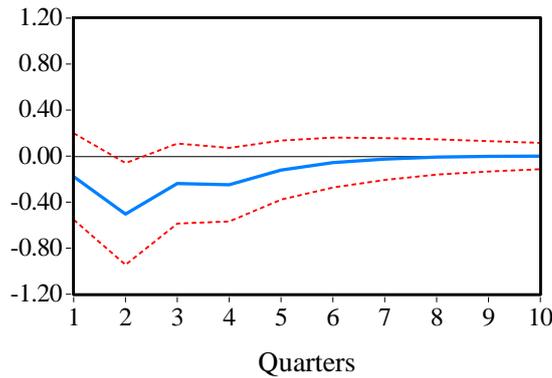
Figure 52: Response of *ca* to a shock in *cr*
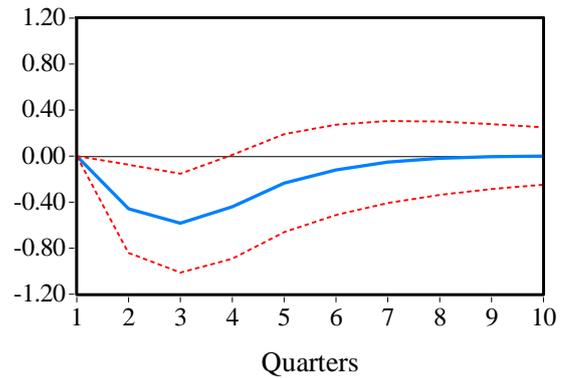
Figure 53: Response of *ca* to a shock in *portf*

According to the following figures, a shock in *portf* causes *no.inv* to increase by 1.1 % in second quarter and the accumulated increase in net other investments reaches to 2.5% of nominal GDP in 8th month. This impulse response interaction may be attributed to the global liquidity conditions and the anticipation of lower country risk. Since increases in capital inflows under portfolio investments may imply that country risk is low and foreign investors lend safely to residents, so as *portf* increases *no.inv* also increases in the following quarters.
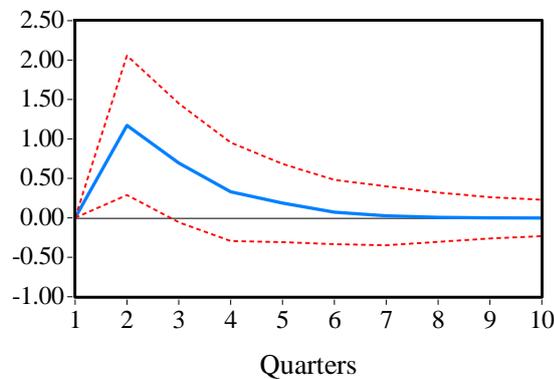
Figure 54: Response of *no.inv* to a shock in *portf*

A shock in *no.inv* increases *portf* in the first quarter but decreases it in the second quarter. The accumulated response of portfolio investments is observed to be an increase of 0.24% of nominal GDP at the end of the 10th quarter.
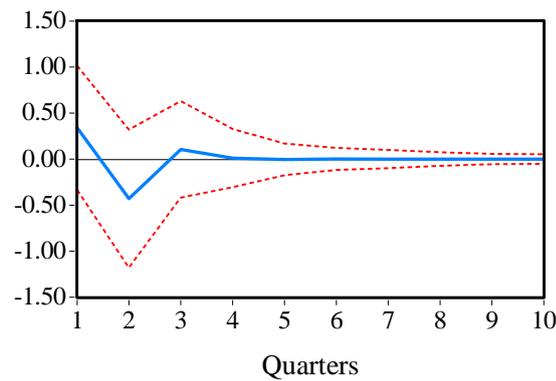
Figure 55: Response of *portf* to a shock in *no.inv*

A shock in *cr* causes *portf* to increase in the first quarter, but decrease in the second quarter, as the figure below clearly shows. This may be explained as; an increase *cr* leads to concerns about fulfilling debt liabilities and increases the country risk. This way of anticipation may not attract foreign investors. However, if the global liquidity, especially as it is experienced after 2008 crises, is high enough to rise the risk anticipation of the investors or a country is relatively less risky, it may attract *portf* despite of an increase in *cr*. In fact, a rise in *cr* also signals globally favourable liquidity conditions, especially to the growing economy in which portfolio investments are expected to be high. Furthermore, *cr* will also have an upper limit to start discouraging inflows under *portf* and increase in *cr* until this limit with other favourable macroeconomic conditions may attract *portf*. Therefore, although *cr* is a significant factor for the determination of the risk level of the country and its increase is anticipated to have negative impacts on inflows of *portf*, other macroeconomic indicators of the country, international liquidity and risk anticipation levels also matter for *portf*. The positive accumulated response of *portf* to a positive shock in *cr* reaching to 0.5% at the end of 10th quarter may be attributed to other conditions.
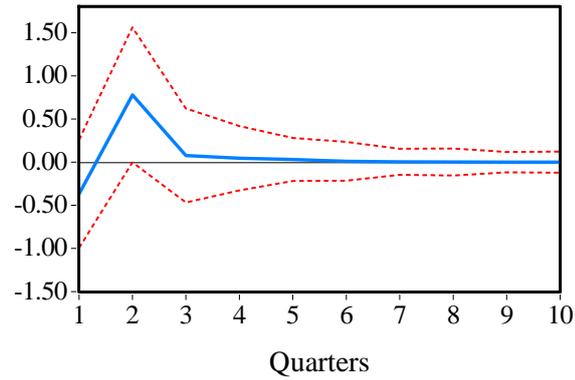
Figure 56: Response of *portf* to a shock in *cr*

4.2.1.2.4. Variance Decomposition of the Variables in VAR Model

The variance of *ca,* after its own shock, is affected the most by a shock in *portf* during nine quarters. Shocks in*no.inv* and *cr* also have significant influences on the variance decomposition of *ca*, as shown in table below.

Table 28: Variance decomposition of *ca*

Forecast period	Forecast Standard Error	*ca*	*cr*	*no.inv*	*portf*
1	0.0104	96.18	2.94	0.88	0.00
3	0.0156	46.23	14.08	17.04	22.65
6	0.0167	40.29	15.11	15.47	29.13
9	0.0167	40.23	15.12	15.45	29.20

According to the variance decomposition of *cr*, given in the table below, the variance of *cr,* after its own shock*,* is mostly affected by a shock in *no.inv* and then by a shock in *portf* which is consistent with the granger causality results.

Table 29: Variance decomposition of *cr*

Forecast period	Forecast Standard Error	*ca*	*cr*	*no.inv*	*portf*
1	0.0275	0.00	81.13	18.87	0.00
3	0.0364	2.35	52.09	26.72	18.84
6	0.0373	2.25	50.63	25.94	21.18
9	0.0373	2.25	50.62	25.93	21.20

Variance decomposition table of *no.inv* proves that *no.inv* is the most exogenous variable once more, since the fluctuations in the variance of *no.inv* are determined only by its own shock in the first quarter. In the subsequent quarters, shocks in *portf* become relatively more influential in changing the variance of *no.inv*.

Table 30: Variance decomposition of *no.inv*

Forecast period	Forecast Standard Error	*ca*	*cr*	*no.inv*	*portf*
1	0.0213	0.00	0.00	100.00	0.00
3	0.027	2.19	5.17	66.24	26.41
6	0.027	2.13	5.39	64.73	27.74
9	0.027	2.13	5.39	64.73	27.75

After its own shock, a shock in *cr* increases the most the volatility of variance of *portf*. As it is discussed in the impulse response figures *portf* is highly but positively affected by a shock in *cr* of which reason is believed to be related with favourable global liquidity conditions, lower risk anticipation levels and the relatively lower country risk which may outweigh the negative effect of increasing indebtedness ratio on *portf* inflows.

Table 31: Variance decomposition of *portf*

Forecast period	Forecast Standard Error	*ca*	*cr*	*no.inv*	*portf*
1	0.0184	5.94	3.63	5.68	84.74
3	0.0222	4.34	17.18	6.18	72.30
6	0.0222	4.34	17.15	6.20	72.31
9	0.0222	4.34	17.15	6.20	72.31

4.2.2 Turkey's VAR Model Formed by Monthly Data

4.2.2.1 Data Properties

The correlation matrix of the monthly variables is given in the following table. The highest correlations are observed between *no.inv* and *cr*, and *ca* and *cr*. It is important to notice that in the monthly data the correlations of *portf* with other variables, except with *ca*, have changed in terms of the sign.

Table 32: Correlation Matrix of the Variables

	ca	*cr*	*no.inv*	*portf*	*embi*	*reer*
ca	1.00	-0.42	-0.30	-0.18	0.15	-0.22
cr	-0.42	1.00	0.44	-0.23	-0.19	0.26
no.inv	-0.30	0.44	1.00	-0.15	-0.15	0.27
portf	-0.18	-0.23	-0.15	1.00	-0.08	0.02
embi	0.15	-0.19	-0.15	-0.08	1.00	-0.02
reer	-0.22	0.26	0.27	0.02	-0.02	1.00

Since the study is dealing with the time series variables, whether they are stationary or not is tested as a first stage of statistical work. As it can be seen from the figure given below, *ca*, *cr, no.inv* and *portf* are stationary with intercept term at 99 percent confidence level while *reer* and *embi* are stationary with intercept and no intercept or trend term, respectively, at 95 percent confidence level.

Table 33: Augmented Dickey Fuller Test results for the levels of variables

Variable	Lags	Calculated ADF	Included variables	Critical values		
				Confidence levels %	No intercept or trend (for lag 1)	With intercept only (for lag 0)
ca	0	-4.34	with intercept			
cr	0	-8.03	with intercept			
no.inv	0	-9.12	with intercept			
portf	0	-8.37	with intercept	99	-2.59	-3.49
embi	1	-2.52	no intercept or trend	95	-1.94	-2.89
reer	0	-3.08	with intercept	90	-1.61	-2.58

4.2.2.2. VAR Model Specification

In this VAR model, different from the previous quarterly estimations, *embi* is included in the model as an endogenous variable. This differentiation of the model is mainly attributable to original frequency of *embi*, daily variable, getting closer to the monthly frequencies of other variables. On the other hand, *reer* is an exogenous variable similar to quarterly estimated model of Turkey and a dummy variable (d1) indicating the seasonal changes in *ca* due to higher net tourism income in July, August, September and October is also included as an exogenous variable.

4.2.2.2.1. Lag Length Selection and Residual Test Results

Lag length selection statistics for pre-estimation, given in table below, offer different lag orders as an optimal lag for the model. Hannan-Quinn Information Criterion (HQ) and Schwarz Information Criterion (SC) restrict lag order as one while Final Prediction Error (FPE) and Akaike Information Criterion (AIC) allow the lag order choice as three. Selecting these orders based on these criteria does not give desirable results in residual tests. VAR model with three lag is problematic with serially correlated residuals.

Table 34: VAR Lag Order Selection Statistics (Pre-estimation)

Lag	LL	LR	FPE	AIC	HQIC	SBIC
0	812.09	-	1.5×10^{-13}	-15.33	-15.17	-14.95
1	962.30	300.42	1.4×10^{-14}	-17.79	-17.32*	-16.72*
2	990.00	55.36	1.3×10^{-14}	-17.79	-17.12	-16.14
3	1030.00	80.05	9.9×10^{-15}*	-17.08*	-17.15	-15.79
4	1053.27	46.55	1.0×10^{-14}	-18.04	-16.86	-15.12
5	1075.66	44.76	1.1×10^{-14}	-17.99	-16.55	-14.43
6	1092.29	33.28	1.4×10^{-14}	-17.83	-16.13	-13.64
7	1112.77	40.95*	1.6×10^{-14}	-17.75	-15.79	-12.91

On the other hand, increasing lag order to four eliminates the serial correlation at 95% confidence level and residuals of the model are found to be normally distributed and safe from heteroscedasticity. Among the post-estimation lag order selection statistics, LR and Wald lag exclusion test results given in the following tables support the choice of four for optimal lag order.

Table 35: VAR Lag Order Selection Statistics (Post-estimation)

Lag	LL	LR	FPE	AIC	HQIC	SBIC
0	824.409	-	1.7×10^{-13}	-15.223	-15.12	-14.97
1	987.376	325.93	1.3×10^{-14}	-17.80	-17.451*	-16.93*
2	1016.41	58.065	1.2×10^{-14}	-17.88	-17.27	-16.38
3	1058.84	84.868	8.7×10^{-15}*	-18.20*	-17.34	-16.08
4	1079.6	41.514*	9.5×10^{-15}	-18.12	-17.01	-15.38

Wald Lag Exclusion Test Probabilities						
Lag	*ca*	*cr*	*no.inv*	*portf*	*embi*	*Joint*
1	0.031	0.000	0.203	0.002	0.000	0.000
2	0.759	0.000	0.001	0.021	0.031	0.000
3	0.042	0.000	0.002	0.000	0.025	0.000
4	0.107	0.680	0.150	0.459	0.512	0.009

Vector Autoregressive Model for Turkey with monthly data can be represented as:

$$
\begin{bmatrix} ca \\ cr \\ no.inv \\ portf \\ embi \end{bmatrix} = \begin{bmatrix} c_1 \\ c_2 \\ c_3 \\ c_4 \end{bmatrix} + d1 \begin{bmatrix} q_1 \\ q_2 \\ q_3 \\ q_4 \end{bmatrix} + reer \begin{bmatrix} s_1 \\ s_2 \\ s_3 \\ s_4 \end{bmatrix} + \begin{bmatrix} \alpha_{11} & \alpha_{12} & \alpha_{13} & \alpha_{14} \\ \alpha_{21} & \alpha_{22} & \alpha_{23} & \alpha_{24} \\ \alpha_{31} & \alpha_{32} & \alpha_{33} & \alpha_{34} \\ \alpha_{41} & \alpha_{42} & \alpha_{43} & \alpha_{44} \end{bmatrix} \cdot \begin{bmatrix} ca_{t-1} \\ cr_{t-1} \\ no.inv_{t-1} \\ portf_{t-1} \\ embi_{t-1} \end{bmatrix} + .. + \begin{bmatrix} \beta_{11} & \beta_{12} & \beta_{13} & \beta_{14} \\ \beta_{21} & \beta_{22} & \beta_{23} & \beta_{24} \\ \beta_{31} & \beta_{32} & \beta_{33} & \beta_{34} \\ \beta_{41} & \beta_{42} & \beta_{43} & \beta_{44} \end{bmatrix} \cdot \begin{bmatrix} ca_{t-4} \\ cr_{t-4} \\ no.inv_{t-4} \\ portf_{t-4} \\ embi_{t-4} \end{bmatrix}
$$

d1:It is the dummy variable that puts 1 to the months of July, August, September and October, and 0 otherwise.

According to the table below which displays the test statistics for the exogenous variables, the coefficients of the dummy variable (*d1*) for *ca,* and *reer* for *ca* and *no.inv* are statistically significant and theoretically consistent. Current account balance over nominal GDP improves during the summer months due to higher tourism income and appreciation of *reer* worsens *ca* with lowering import prices and rising export prices. Moreover, appreciation of *reer* has a positive effect on *no.inv*; this may be attributed to the decrease in foreign borrowing costs which encourages firms and banks to draw loans from abroad.

Table 36: Test statistics of exogenous variables: constant(*c*), dummy (*d1*), dummy (*d2*) *embi* and *reer*.

Exogenous Variables	Dependent Variables				
	ca	*cr*	*no.inv*	*portf*	*embi*
c	0.235	-0.193	-0.910	0.134	0.485
	-0.144	-0.343	-0.307	-0.224	-0.435
	[1.62708]	[-0.56318]	[-2.96069]	[0.59612]	[1.11522]
d1	0.037	-0.019	0.010	-0.005	0.001
	-0.006	-0.015	-0.013	-0.010	-0.018
	[6.06170]	[-1.29251]	[0.78361]	[-0.54205]	[0.02850]
reer	-0.055	0.048	0.193	-0.026	-0.112
	-0.031	-0.073	-0.065	-0.047	-0.092
	[-1.80034]	[0.66052]	[2.96708]	[-0.54263]	[-1.21817]
Note that the values in the brackets '()' are standard errors and'[ ]' are t ratios of the variables					

4.2.2.2.2. Residual Tests

The test results of residuals of the VAR model are given below. According to Jarque Bera normality test results, residuals of each equation and of joint model are normally distributed and do not have a skewness or kurtosis problem. On the other hand, white heteroscedasticty test results prove that residuals are homoscedastic. Furthermore, LM test results show that residuals are not serially correlated at 95% significance level.

Table 37: Results of Residual Test Statistics

	Normality Test					
	Skewness		Kurtosis		Jarque-Bera	
	Value	Probability	Value	Probability	Value	Probability
ca	-0.103	0.664	3.705	0.137	2.405	0.301
cr	-0.148	0.533	3.360	0.447	0.968	0.616
no.inv	0.286	0.228	3.298	0.529	1.851	0.396
portf	0.295	0.213	2.886	0.809	1.607	0.448
embi	0.262	0.269	3.682	0.150	3.298	0.192
ALL		0.440		0.378	10.129	0.429

Heteroskedasticity Test		
Explanatory variable	Chi-sq	Prob.
Without cross term	633.98	0.614

Serial Correlation Test						
Lag	LM-Stat	Prob		Lag	LM-Stat	Prob
1	36.38662	0.0659		7	17.13365	0.8769
2	31.26152	0.1805		8	27.38746	0.3368
3	20.88821	0.6988		9	18.59472	0.8161
4	20.00315	0.7467		10	24.39265	0.4968
5	21.41272	0.6694		11	17.52846	0.8617
6	32.41913	0.1462		12	28.90399	0.2679

The VAR model should also be checked for its stability to make sure impulse-response functions give safe results. As the table below presents, all roots of characteristic polynomial is less than one, therefore, the VAR model is satisfactory as a stable model.

Table 38: VAR Stability Test Results

Root	Modulus		Root	Modulus
0.876612 - 0.084023i	0,88063		0.121276 + 0.698126i	0,708581
0.876612 + 0.084023i	0,88063		-0.429988 - 0.484747i	0,647973
-0.366075 + 0.772165i	0,854547		-0.429988 + 0.484747i	0,647973
-0.366075 - 0.772165i	0,854547		0.538758 + 0.348638i	0,641723
0,742617	0,742617		0.538758 - 0.348638i	0,641723
-0.363864 + 0.644480i	0,740102		-0.614736 - 0.052316i	0,616958
-0.363864 - 0.644480i	0,740102		-0.614736 + 0.052316i	0,616958
0.545409 - 0.467594i	0,718412		0.193714 - 0.554885i	0,587727
0.545409 + 0.467594i	0,718412		0.193714 + 0.554885i	0,587727
0.121276 - 0.698126i	0,708581		-0,219091	0,219091

The stationarity of residuals in VAR model should also be sustained for impulse response analyses. The table given below shows that all residuals are stationary at 99% confidence level with no or intercept term, therefore, impulse response analysis can be carried out safely.

Table 39: Augmented Dickey Fuller Test Results for Residuals

Variable	Lags	Calculated ADF	Included terms	Critical values	
residual 1	0	-9.66	no intercept or trend	Confidence levels %	No intercept or trend
residual 2	0	-10.24	no intercept or trend		
residual 3	0	-10.63	no intercept or trend	99	-2.59
residual 4	0	-10.82	no intercept or trend	95	-1.94
residual 5	0	-10.00	no intercept or trend	90	-1.61

The VAR model with lag length 4 gives desirable results in terms of residuals satisfying normality conditions, homoscedastic characteristics, being serially uncorrelated and as well as complete model being a stable system with stationary residuals.

4.2.2.2.3. Impulse Response Analyses

To determine the cholesky ordering, granger causality test results are used to find out the exogenity degree of the endogenous variables of VAR model. The exogenity order is determined by individual p values of endogenous variables in granger causality tests which are summarized below. The most exogenous variable is *ca* since only *cr* has the p values less than 10% for *ca,* in other words, *cr* is the only granger cause of *ca.* According to the significance levels of individual p values, the order from exogentiy to endogenity for the rest is *no.inv, embi, cr* and *portf.*

Table 40: p Values of Granger Causality Test Results

Regressors	Dependent Variables				
	ca	*cr*	*no.inv*	*portf*	*Embi*
ca	0.000	0.222	0.233	0.085	0.018
cr	0.024	0.000	0.455	0.196	0.117
no.inv	0.896	0.003	0.000	0.004	0.620
portf	0.121	0.262	0.063	0.000	0.078
embi	0.776	0.001	0.094	0.021	0.000
ALL	0.060	0.000	0.017	0.001	0.043

To be in compliance with other models, the size of a shock is one positive standard deviation of the error term in this model too. The sizes of shocks are given in the following table. The highest response to its own shock comes from *embi* and it is followed by *cr* and *no.inv*. The responses to their own shocks are higher when compared with the sizes of shocks in the previous model. This may stem from the higher volatility of monthly data and the smoothness of the quarterly data.

Table 41: Sizes of Shocks

Variable	Size of a shock as a result of one standard deviation increase in the variable itself		Variable	An Increase in the Variable
ca	0.020 units	→	Current Account Balance	2.0% of nominal GDP
cr	0.043 units	→	Monthly changes in domestic credit stock	4.4% of nominal GDP
no.inv	0.042 units	→	Net Other Investments	4.2% of nominal GDP
portf	0.029 units	→	Portfolio investments	2.8% of nominal GDP
embi	0.059 units	→	Ln(Embi+ Tukey/Embi)	5.90%

The responses of the variables to their own shock are also shown in the following figures. The effect of the response to its own shock lasts longer for *ca* and *embi,* until 30th month.
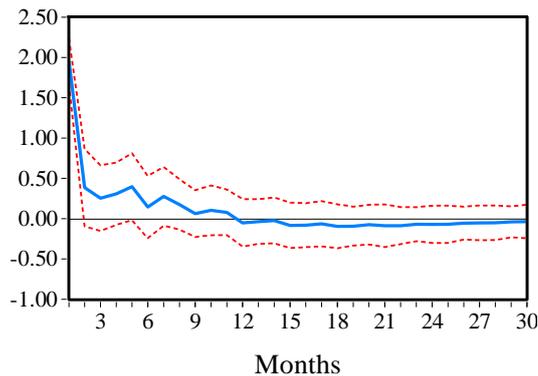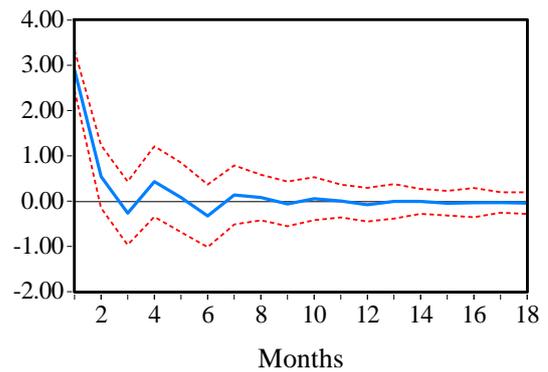

Figure 57: Response of *ca* to its own shock

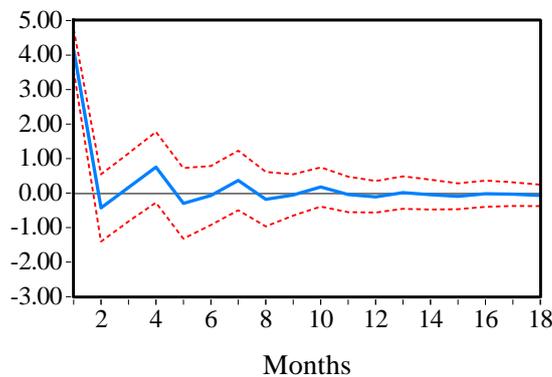**Figure 59: Response of *portf* to its own shock**
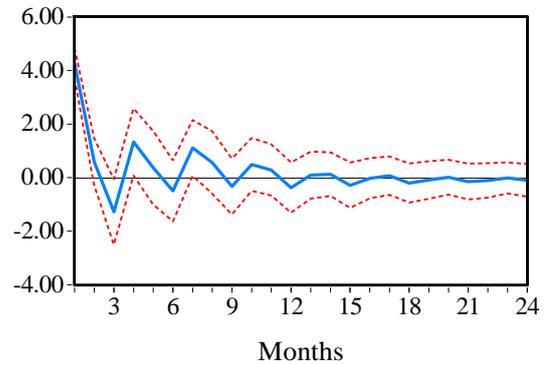

Figure 58: Response of *no.inv* to its own shock

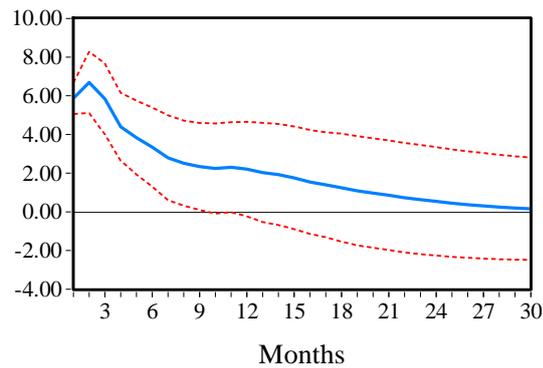**Figure 60: Response of *cr* to its own shock**

Figure 61: Response of *embi* to its own shock

According to figure given below, *cr* is significantly affected by a one positive standard deviation shock in *no.inv*, 0.042 units increase in *no.inv* causes *cr* to increase by 0.01 units in the following month. After a peak response in the third month, the effect of the shock decreases. The accumulated increase in monthly net drawings of total domestic credits in which mortgage credits are not included, is found to be 4.4% of nominal GDP in a years' time.
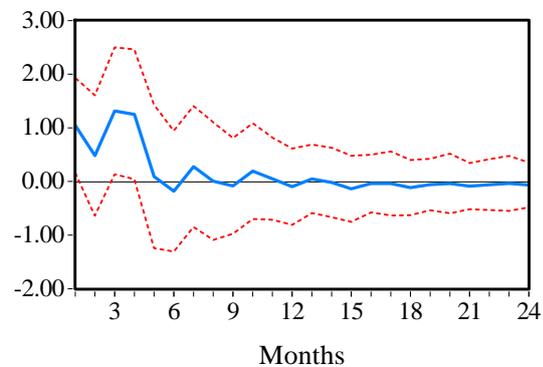
Figure 62: Response of *cr* to a shock in *no.inv*

A shock in *embi* reduces monthly net drawings of total domestic credits about 2 % of nominal GDP in the 2nd month and the accumulated decrease in *cr* is observed to be 3% in two years' time. This negative impact of *embi* on *cr* can be interpreted in the framework of pass through between interest rates. Increases in interest rates of government bonds may be reflected in domestic borrowing rates as an increase; as a result, an increase in the cost of borrowing deters domestic credit.
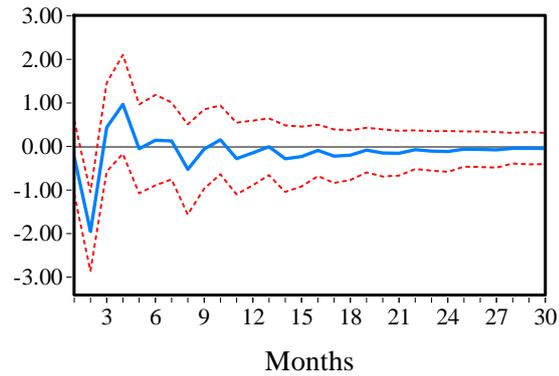
Figure 63: Response of *cr* to *embi*

A positive shock in *cr* deteriorates *ca*, as the figure below displays, the peak response occurs as 0.6 % decrease in 5th month and the accumulated response of *ca* is observed to be a decrease by 2.2% in one and half years' time.
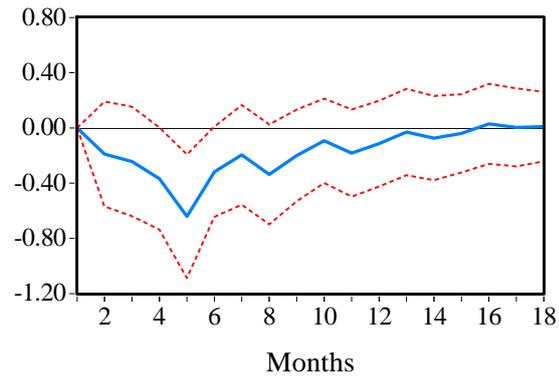
Figure 64: Response of *ca* to a shock in *cr*

A shock in *no.inv* causes *portf to* fall by, as the figure below shows, 0.8 % in 1st and 1.1% in 4th months. These inverse flows in *portf* may be attributed to a decrease in foreign financial need, if *no.inv* increases that is; if banks or other sector draw foreign loans or foreigners increase their deposits, liquidity in the domestic country expands. Government may not issue bond for abroad or the firms may not sell equity securities to reach extra finance. On the other hand, an increase in *no.in*v implies an increase in the foreign liabilities to nominal GDP ratio of the country; this may be anticipated as an increase in the country risk and discourage the portfolio investors. The accumulated

decrease in portfolio investments is found to be 1.5% of nominal GDP in a two years' time.
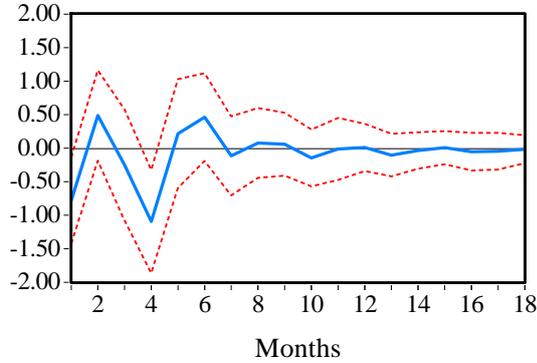
Figure 65: Response of *portf* to a shock in *noinv*

A shock in *embi*, an increase of 5.9% in the relative yield spread of Turkey, attracts portfolio investments in first months and the peak increase in *portf* is found to be 0.6 % in the second month .However, the accumulated response of *portf* is observed to be 0.9% decrease in two years' time. As the figure below shows, the change in the direction of *portf*'s response after 4th month may be interpreted as a change in the risk anticipation which discourages capital inflows after this month.

Figure 66: Response of *portf* to a shock in *embi*

As it is mentioned before, an increase in *embi* is anticipated as an increase of the country risk. Current account balance is one of the main factors determining the country risk level in Turkey. The figure below shows that an increase in *ca* (this may be decrease in the current account deficit over nominal GDP) leading a fall in the country risk. A shock

in *ca* causes *embi* to fall about 2.1% in 5th month and its accumulated response reaches to a decrease of 35 % in two years' time. Bellas and et al (2010) claims that current account deficits may arise the problems about its sustainability and possible defaults in payments. These concerns increase the country risk measured by *embi*. The empirical findings of this model support the claims of Bellas and et al (2010). In Turkey, improvement in *ca* is evaluated as a decrease in the need for foreign financial sources, in other words, a decrease in indebtedness of Turkey, Therefore, an increase in *ca* causes *embi*, country risk, to decrease.
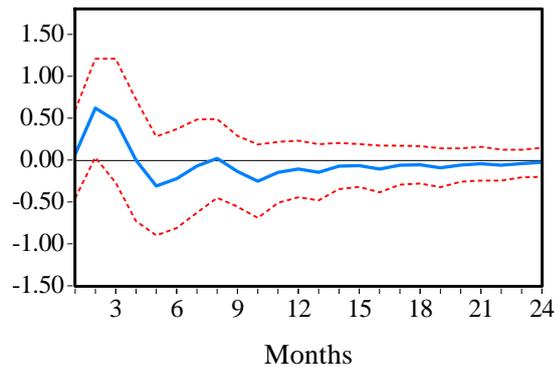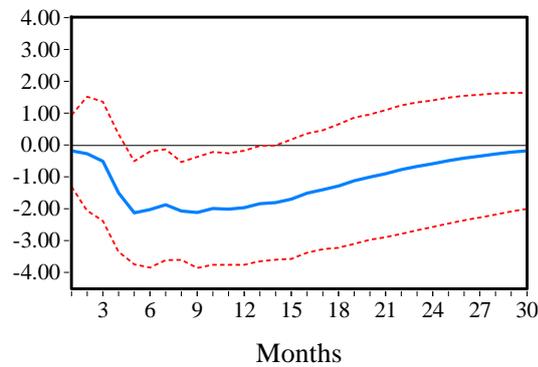

Figure 67: Response of *embi* to a shock in *ca*

4.2.2.2.4. Variance Decomposition of the Variables

Variance decomposition tables of the variables are given below. The most exogenous variable in this VAR model is *ca*; therefore, it is affected the most by its own shock in all periods. After first month, shocks of *cr* are becomes relatively more effective among other variables in explaining the fluctuations of variance of *ca.*

Table 42: Variance decomposition of *ca*

Forecast period	Forecast Standard Error	*ca*	*cr*	*no.inv*	*portf*	*embi*
1	0.0195	100	0.00	0.00	0.00	0.00
6	0.0236	77.27	13.31	2.60	4.91	1.90
12	0.0254	68.95	15.36	3.52	9.99	2.17
18	0.0256	68.22	15.24	3.49	10.11	2.94
24	0.0258	67.68	15.17	3.55	10.06	3.56

The table below shows variance decomposition of *cr*. According to the results, after its own shock, the variance of *cr* is mostly affected by shocks in *embi* and it is followed by the shocks realized in *no.inv* and *portf* which is consistent with the granger causality results.

Table 43: Variance decomposition of *cr*

Forecast period	Forecast Standard Error	*ca*	*cr*	*no.inv*	*portf*	*embi*
1	0.046	2.78	84.78	5.07	7.10	0.27
6	0.063	7.76	56.94	11.84	10.69	12.76
12	0.066	8.57	56.98	11.14	10.66	12.65
18	0.066	8.95	56.47	11.06	10.54	12.98
24	0.066	9.09	56.23	11.04	10.55	13.09

no.inv, as being the second exogenous variable, fluctuates the most due to its own shock and in the subsequent months the shocks in other variables, with lower impacts, also contribute to the variability of variance of *no.inv*.

Table 44: Variance decomposition of *no.inv*

Forecast period	Forecast Standard Error	*ca*	*cr*	*no.inv*	*portf*	*embi*
1	0.0416	0.23	0.00	99.77	0.00	0.00
6	0.0485	6.23	5.95	77.02	6.47	4.33
12	0.0500	6.30	8.51	74.15	6.55	4.50
18	0.0500	6.55	8.70	73.43	6.54	4.78
24	0.0500	6.62	8.75	73.22	6.57	4.84

As the following table shows, after its own shock, the variance of *portf* is affected the most by a shock realized in *no.inv*.

Table 45: Variance decomposition of *portf*

Forecast period	Forecast Standard Error	*ca*	*cr*	*no.inv*	*portf*	*embi*
1	0.0303	2.30	0.00	6.63	91.02	0.051
6	0.0375	6.30	7.21	16.85	64.27	5.37
12	0.0380	6.47	8.00	16.70	62.78	6.05
18	0.0382	6.76	8.11	16.64	62.17	6.32
24	0.0383	6.87	8.16	16.60	61.94	6.44

According to the table below, the variance of *embi* changes the most a result of a shock in *ca,* after its own shock. Deteriorations in *ca* cause the risk premium of the country to increase and negatively affect *embi*.

Table 46: Variance decomposition of *embi*

Forecast period	Forecast Standard Error	*ca*	*cr*	*no.inv*	*portf*	*embi*
1	0.0588	0.10	0.00	0.42	0.00	99.49
6	0.1323	6.44	0.84	0.82	1.29	90.60
12	0.1557	14.63	2.04	2.01	1.60	79.72
18	0.1704	17.55	3.82	2.99	3.31	72.33
24	0.1752	18.07	4.61	3.31	4.21	69.80

4.3. EVALUATION OF VAR MODELS

Brazil's and Turkey's VAR models formed with quarterly data give consistent results with the pre-estimation expectations based on the economic theory. As capital inflows increase, namely when positive shocks occur in *no.inv* in Brazil and *no.inv* and *portf* in Turkey, *cr* rises and an increase in *cr* is followed by a decline in *ca* in the subsequent quarters in both countries. The boom in consumption and/or investment due to domestic credit expansion which is fuelled by capital inflows drives up import demand. As a result, current account balances of both countries are deteriorated. Moreover, *embi* is added as an exogenous variable in these models formed with quarterly data. Since it is not affected by the time lags of other variables or its lagged variables affect other variables in both models. In fact, according to studies in the literature mentioned before, Embi +Brazil and Embi + Turkey are basically determined by the country specific debt indicators such as debt to GDP ratio, external debt ratio, net foreign assets to GDP ratio and short term debt to GDP ratio. Moreover, the impact of a change in Embi + indexes, of which original frequency is daily determined, on other variables, especially on *portf* , is observed in a shorter period of time rather than in time lags of a quarterly period. Therefore, its lagged levels do not affect the variables as well as *embi* is not affected quarterly lag values of other variables.

In Brazil's VAR model, the coefficients of *embi* are found to be statistically significant for *ca, no.inv* and *portf.* In Brazil, an increase of yield spreads relative to previous quarter is anticipated as an increase in country risk which leads capital outflows, decrease in *no.inv* and *portf.* High and negative correlation between *embi* and *reer* was stated before and *reer* was excluded from the equation to prevent multi-collinearity between these variables. In fact, the statically significant positive coefficient of *embi* for *ca* implies the negative effect of *reer* on *ca*, in other words, an increase in *embi* causes foreign capital outflow and the resulting depreciation of Brazil's Real improves current account balance, *ca*.

In Turkey's VAR model formed with quarterly variables, as an endogenous variable *embi* does not have statistically significant coefficients for *ca* and *no.inv* but has statistically significant negative and positive coefficients for *cr* and *portf,* respectively.

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Unlike the case in Brazil, an increase in *embi* causes *portf* to increase in the same time period. An increase in the relative yields may be anticipated as higher earnings for the investors instead of an increase in the country risk or the former outweighs the latter due to global liquidity conditions. On the other hand, the negative effect of *embi* on *cr* may be attributed to the reflections of *embi* to domestic borrowing rate. An increase in *embi* may rise the interest rates for domestic credits which is expected to discourage domestic borrowings also. Furthermore, as an exogenous variable, the coefficients of *reer* are found to be statistically significant and theory consistent for *ca*, *cr* and *no.inv*. As *reer* increases, appreciation of Turkish Lira worsens directly current account balance via increases in export prices and decreases in import prices. Moreover, an appreciation of *reer* decreases the cost of foreign borrowing and as a result, loan drawings of banks, other sectors and state capital from abroad increase *no.inv* and the liquidity in domestic country as well. An appreciation of *reer* and an increase in the liquidity due to an increase in *no.inv* trigger domestic credits, *cr,* therefore*, ca* worsens further.

VAR models, in fact, for these countries differ in some notable points. The most exogenous variable among the endogenous variables is *portf* in Brazil's model while it is *no.inv* in Turkey's model. In Brazil's model *portf* is strongly affected by the changes in relative yield spread, *embi* while *embi* and the lag values of *cr, no.inv* are effective on *portf* in Turkey's model. On the other hand, the least exogenous variable among other endogenous variables is *ca* in Brazil's model while it is *portf* in Turkey's model. It should be noted that a shock in *portf* affects *cr* in Turkey's model but does not have an influence on *cr* in Brazil's model.

Turkey's VAR model formed with monthly variables differs from other models by accepting *embi* as an endogenous variable. *embi* as being announced a daily variable is sensitive to the changes taking place in shorter periods of time. Therefore, it is not affected by quarterly lag values in the second model of which frequency covers larger period of time, but in the model formed with monthly data, the lag values of *ca* are significantly effective in determining *embi*. The deteriorations in current account balance lead the concern of its sustainability to rise and the country risk, *embi*, to increase *embi*. On the other hand, as an exogenous variable, the effect of *reer* on *ca* and on *no.inv* is the same with the empirical findings of the second model. An appreciation of *reer* worsens

ca and leads capital inflows under *no.inv* due to lower cost of foreign borrowing. It should be also stated that *ca* is the most exogenous variable while *portf* is the least exogenous variable among the endogenous variables in Turkey's model formed with monthly data.

CHAPTER 5

POLICY RESPONSES OF CENTRAL BANKS OF BRAZIL AND TURKEY

Global liquidity squeeze with the slowdown of international fund flows during 2008 crises has led central banks to take diversified precautionary measures[36] to prevent the effects of the financial turmoil from becoming more depressing. They developed strategies specific to recession period which were shaped around easing monetary policies of which main aim were to inject liquidity through the uses of variable monetary policy tools. In fact, the fiscal stimulus packages[37-38] of the governments were also worth to mention in eliminating the adverse effects of financial depression on output and employment especially in the countries which already had no room for monetary policy expansion.

The improvements in the global financial climate, considerable rises in capital inflows to emerging countries and macro indicators of the countries returning to pre-crisis levels called for central banks to implement monetary policy exit strategies. Since massive capital inflows have not been preferred due to their inverse impacts on balance sheets with maturity and exchange rate mismatches and current account distortions stemming from exchange rate appreciations and excess domestic credit growth.

Required reserve ratios, common countercyclical monetary tool resorted by many emerging countries were also used intensively by Banco Central do Brasil to manage the liquidity conditions and credit cycle in financial system during the financial depression of 2008. As the effects of global financial turmoil disappeared, Silva et al (2012) assert that Brazil has been subject to manage the massive capital inflows because of its deep capital markets, large interest rate differentials between Brazil and developed countries,

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[36]G-20 Study Group Report on Global Credit Market Disruptions (2009), Box C:Examples of Central Bank Liquidity Actions

[37]Financial Stability Report (May 2009), Box 2: Fiscal Stimulus Packages Announced Against the Crisis

[38]Khatiwada, S.(2009), Stimulus Packages to Counter Global Economic Crisis: A Review

strong fundamentals and economic performance. They describe how the economy of Brazil has been affected severely by the excessive capital inflows as:

> "..... Brazil's credit market was affected by capital inflows and a set of macroprudential measures was consequently adopted to smooth the financial cycle. There was evidence that, there were multiple sources of foreign funding that transmitted into credit markets, in addition to the confidence factors that are associated with periods of abundant liquidity. External funding at low cost, despite tight domestic prudential rules, creates incentives to increase risk taking and usually ends by distorting asset prices, including the exchange rate. In Brazil, excessive capital inflows contributed to the brisk pace of domestic credit growth, which fuelled inflationary pressures associated with domestic demand supply mismatches and created fertile ground for the domestic transmission of pressures stemming from global commodity prices"(Silva et al, 2012).

Moreover, they underline the necessity of a policy response to maintain country's competitiveness and sustain trade account deficits. On the other hand, it is asserted: "… Brazil faces a complex situation whereby inflation pressures need to be tamed without attracting short-term capital inflows that would put pressures on the exchange rate and hamper competitiveness" (OECD, 2011). In the face of this "impossible trinity"[39], macro-prudential polices adopted as responses to adverse effects of 2008 crisis were repealed gradually in 2010. Banco Central Do Brasil (BCB) has tightened its monetary policy further mainly in the framework of reserve and capital requirements which are listed as:

- Required reserve ratios with re-compositions were driven up and turned to pre-crisis levels of 2008.

  > "...in February 2010, under Circular 3485, the rate of reserve requirements on time deposits was increased from 13, 5% to 15% and its compliance demanded exclusively in currency. The rates related to additional requirements on demand and time deposit were increased to 8%, remaining at 10% the rate for savings deposits. The compliance started being demanded exclusively in currency. Both reserve requirement and additional requirement discounts were grouped according to the size of the institution" (BCB Annual Bulletin, 2010).

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[39]It implies impossibility of implementing simultaneously three policies of " maintaining monetary policy independence with a stable exchange rate and free capital movements"(OECD, 2011)

In addition, in March 2010, reserve requirement ratios for time deposits and demand and time deposits were increased from 15% to 20 % and 8% to 12%, respectively.

- New applications were introduced; such as holding reserve requirements for banks' short spot foreign exchange positions and taxation of specific inflows which was believed to correct imbalances in the foreign exchange market and reduce the intensity and volatility of capital flows (Silva and Harris, 2012).

- In December 2010, capital requirements for new consumer credit operations which mainly consist of personal credits and car loans with the maturity[40]over 24 month were increased. The capital requirement for these loans was increased from 8% to 16.5% of Risk-Weighted Assets (Silva and Harris, 2012).

- However, due to concerns regarding the sustainability of debt services in some European countries, easing of some monetary rules such as capital requirements on consumer loans according to their maturity and removal of loan to value criteria were realized, but the reserve requirement ratio were kept the same (Tovar et al, 2012).

- "In December 2011, large banks were authorized to acquire small bank assets using resources locked in required reserves on time deposits, and to stimulate the acquisition of small bank assets, the remuneration on time deposits was decreased" (Tovar et al, 2012).

The success of tightening policies of the Banco Central do Brasil is evaluated as:

"The increases on capital requirements for consumer loans, reserve requirements on demand and term deposits and the IOF tax rate on consumer credit, in conjunction to policy interest rate hikes, were successful in reducing the growth of household credit growth to a more sustainable pace. These measures affected not only the volume of new loans, but also their interest rates and average maturities. The average interest rate rose to 30.4% p.a. in May

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[40]Increases in capital requirement are not applied to the following consumer credits:"...36-month term payroll-deducted loans; rural credit; housing credit; vehicles financing or auto leasing with maturities between 24 and 36 months, in amounts not exceeding 80% of their value; vehicle financing or leasing between 36 and 48 months, in amounts not exceeding70% of their value; vehicle financing or auto leasing with maturities between 48 and 60 months, with contracts not exceeding 60% of their value; cargo vehicles financing or leasing; and financing with resources coming from Federal Government on lendings of special funds and programs"(BCB Annual Bulletin, 2010, 57).

2011, compared to 22.8% p.a. in November of 2010. In the same period, the monthly origination of new loans fell from R$ 11.2 billion to R$ 8.8 billion and the average maturities declined from 45.7 to 43 months" (Silva and Harris, 2012).

In Turkey, the plan for withdrawal of measures taken during the crisis period and normalization of monetary policy operations were discussed in a press release on monetary policy exit strategy published on 14th April 2010. The revival of Turkish economy with the help of strong domestic demand, increasing capital inflows due to on-going expansionary policies of developed countries and the increases in the global risk appetite caused concerns regarding the financial stability. Since appreciation of Turkish Lira due to capital inflows, strong domestic demand but relatively weak foreign demand deteriorated the trade balance. Furthermore, the rapid domestic credit growth increased the concerns about the widening of current account deficit. Başcı and Kara (2011) claim that maintaining interest rates in lower levels would discourage the capital inflows but lower interest rates for longer periods would stimulate the domestic demand and create upward pressure on domestic demand. Therefore, they assert that the interest rates for sustaining internal and external balance may be differentiated and the central bank aiming price stability may need more than one policy tool while sustaining financial stability during the periods of high capital inflows. As a result, in compliance with the monetary policy exit strategies, Central Bank of Republic of Turkey incrementally started to apply a new monetary policy framework in the second half of 2010.

The active use of required reserve ratio to sustain financial stability has constituted the crucial part of this new monetary policy setting. Starting from April 2010, the required reserved[41] for both Turkish Lira and foreign exchange deposits have been increased gradually. In September 2010, the remuneration of Turkish Lira required reserves was ended. Moreover, required reserve ratios[42] were differentiated according to maturity

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[41]Before the changes in reserve ratio were adopted, reserve ratio for Turkish Lira deposits was 5% and foreign exchange reserve ratio was 9%. In a year's time, reserve ratios were recorded to be 16% for demand deposits and deposits up to 1 month maturity, 13% for deposits up to 3 month maturity, 9% for deposits up to 6 month maturity, 6% for deposits up to 1 year maturity, 5 % for deposits with 1 year and longer maturity and 12% for foreign exchange deposits.

[42] The details about the changes in required reserves with explanations are available in Press Releases on Required Reserves at: http://tcmb.gov.tr/yeni/announce/2010/announce/php.
And overall changes in reserve requirement ratios are presented at:
http://tcmb.gov.tr/yeni/bgm/dim/zko.pdf

structures of Turkish Lira and foreign exchange deposits in upcoming periods in order to extend the financial system's liability period and reduce maturity mismatches. To increase the effectiveness of policy of required reserve ratio, the interest rate on demand deposits is not allowed to be more than 0.25 percent annually. It is also worth to mention that banks have to hold required reserves reserve requirement for the funds that they receive through repurchase agreements (repo) they make with residents or non-residents, but they do not have to if they make repo with Central Bank or one of the domestic banks.

Emphasizing the inverse relation between credit expansion and financial stability, Başcı and Kara 2011) point out two main channels in which required reserves are effective on domestic credits. They are direct cost channel, and interest rate risk and liquidity channel. Direct cost channel is calculated with a multiplication of interest paid on deposits and required reserve ratio. On the other hand, according to interest rate and liquidity channel, if the banks prefer to cover their liquidity shortage caused by the increase in required reserves through central bank funding, they are exposed to maturity mismatches, since the maturity period of central bank funding is one week while the average maturity of deposits is fifty days. In addition banks using central bank funding have to undertake the interest rate risk stemming from maturity risk. Banks can reflect this interest rate risk to the credits' interest rate which will discourage domestic borrowing and limit the credit expansion.

In addition to adjustments in reserve required ratios, interest rate corridor, the difference between the overnight borrowing-lending interest rate was expanded to increase the volatility and uncertainty, and reduce the average yield of interest rates which are believed to discourage the foreign investors. However, Özatay (2011) criticizes the expansion of interest rate corridor to reduce the capital inflows. Since he believes that the effectiveness of chosen central bank policy for capital inflows is limited, but restrictions on short term capital inflows may be undertaken as another alternative, but he states that government is strongly against with setting controls to capital inflows.

The new monetary policy context of Turkey considers financial stability as well as price stability. According to Financial Report of CBRT-I (2012), credit growth of which largely driven by corporate loans has significantly slowed down since mid-2011.

Furthermore, the report emphasizes the improvement in current account balance due to positive trend in foreign trade balance and underlines increasing the maturity period of foreign financing for current account deficit.

The following figures show how net drawings of total domestic credits and current account balances have changed in Brazil and Turkey since 2003. Higher net drawings of total domestic credits of Brazil should not be misleading since nominal GDP of Brazil is more than three times of Turkey's nominal GDP; they are given in Table 2 and Table 4. In 2011, the pace of credit expansions in both countries decreased which may be the result of tightening domestic credit policies.
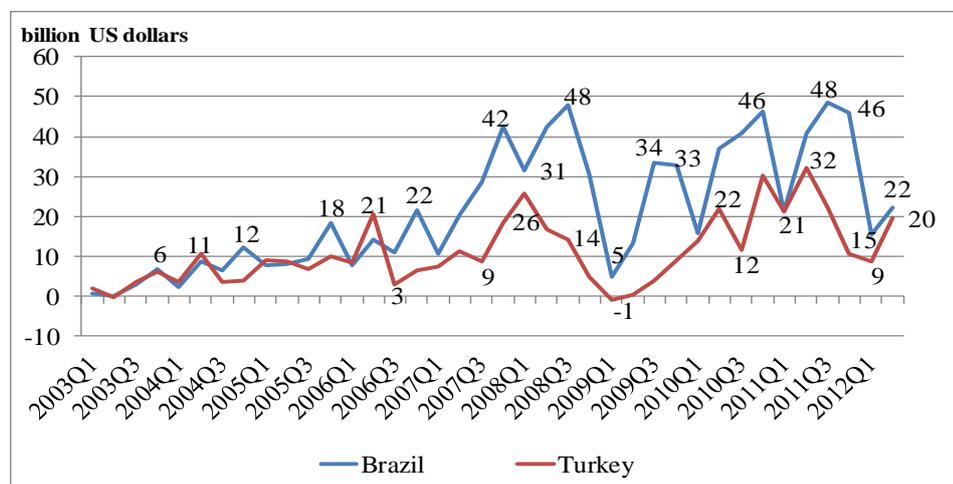

Figure 68: Changes in Total Domestic Credit Stocks of Brazil and Turkey on a Quarterly Basis
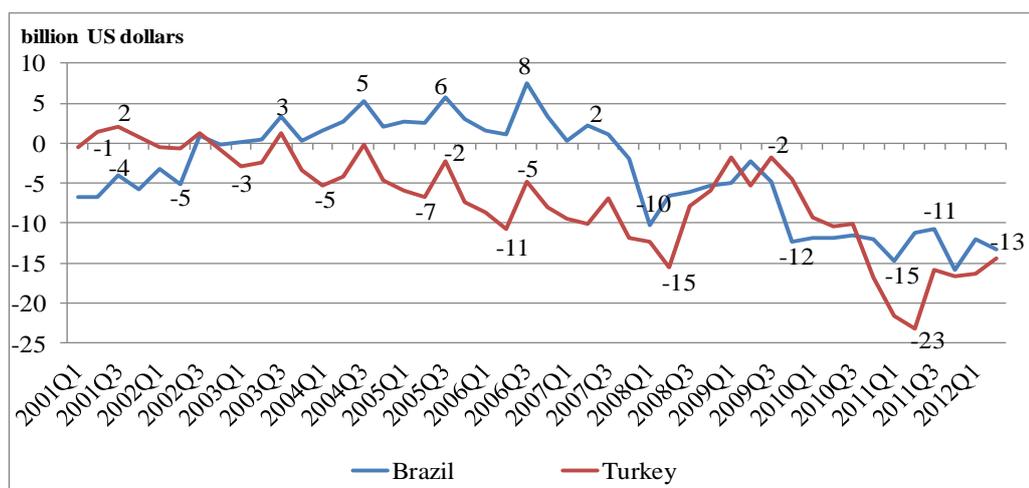

Figure 69: Current Account Balance of Brazil and Turkey on a Quarterly Basis

Considering the relative difference in nominal GDP, better performance of Brazil in its current account balance implies the current account deficit of Turkey is severely problematic. In fact, the comparison of current account balances as a percentage of nominal GDP of two countries shows Turkey has had higher ratios since 2003. As the figure above shows, current account balance of Turkey reached the maximum deficit level of 23 billion US dollars in the second quarter of 2011, and the subsequent decrease in the deficit level may be attributed to the slowdown in domestic credit growth since then. Brazil's current account deficit has not dramatically increased and stayed stable between 10 and 15 billion US dollars since 2010.

CHAPTER 6

CONCLUSION

Accessibility to international markets has been beneficial for the emerging economies lack of financial resources in terms of driving up consumption and investment levels to greater extend. However, integration to global economy has brought an increase in the dependency of them on foreign financial resources together with it. The countries either advanced or emerging ones, following the business cycles sensitive to changes in global and national setting, have undergone through different contraction and expansion periods. The driving factor for global shocks has been unexpected capital outflows for emerging countries since 1990s. These countries have suffered from dramatic falls in their incomes, employment, high debt burden, increases in poverty and loss of confidence. Based on the past experiences of capital outflow shocks resulting in deep recessions, countries have been closely involved in the management of the liquidity in their own economies. Especially, due to surge in capital inflows after 2008 crisis and the severe consequences of this global financial instability, sustainability of financial stability, in addition to the price stability has become one of the major concerns of the central banks in emerging countries.

Financial stability has required one more policy instrument along with the short term interest rate that is being used in inflation targeting monetary policy. Therefore, many emerging countries started to use required reserve ratio actively to control the financial stability through the channel between bank deposits and bank lending. The main motive behind the choice of this instrument is to de-accelerate the rate of the domestic lending of which excess growth causes national economy to be overheated. The control of penetration of foreign financial capital flows to national economy through the tightening domestic credit policy, in fact, become popular in recent years, especially during 2010. Central banks increased and diversified required reserve ratio considering the maturity of deposits in to reduce the domestic growth and encourage long term domestic borrowing. In addition to required reserve ratio, other policy tools are also used to improve the financial stability such as; widening interest rate corridor to discourage the capital

inflows in Turkey and increasing capital requirement ratios for consumer credits in Brazil.

In the literature, the current account deterioration due to domestic credit booms is underlined in many studies, but the empirical analysis of the relation between these variables has not become a subject of any research. In this thesis, based on the above mentioned close relation between capital inflows and expansion of domestic credits, and the question of how they are influential on current account balance, three VAR models are estimated with these variables. Portfolio investments and net other investments item (net loan payments to IMF are excluded) in financial account are included in the estimations as foreign capital flow variables. Domestic credit stock is transformed to a flow variable with taking the difference and the exclusion of the mortgage credits, and it is called as changes in total domestic credit stocks or net drawings of total domestic credits. Current account balance item in balance of payments is not modified but it is divided to nominal GDP as well as capital flow variables and net drawings of total domestic credits. Furthermore, real effective exchange rate and relative yield spreads formed with country specific Embi + and Embi + indexes are also included in the models. First and second estimations carried out with quarterly data of Brazil and Turkey, respectively, and the availability of monthly nominal GDP data of Turkey allowed the estimation of third model in which all variables are monthly.

The empirical findings of the VAR models are analyzed in the context of impulse-response figures and variance decomposition tables which support the pre-estimation expectations for both countries; capital inflows increase the liquidity in national economy and lead domestic credits to increase which trigger the import demand and distort the current account balance. *embi*, the relative yield spread of the countries enters the equations as an exogenous variable in the models estimated with the quarterly data, but in the third model it becomes an endogenous variable which is attributed to its original frequency, published daily, not affected the quarterly time lags of the remaining variables but only affected by monthly time lag of current account balance variable. On the other hand, real effective exchange rate, *reer,* is excluded from the VAR model of Brazil due to its high correlation with *embi*. The statistically significant and theory consistent coefficient of *embi* for *ca* is explanatory for the negative relation between *reer*

and *ca* in Brazil. As an exogenous variable, the coefficients of *reer* are statistically significant and theory consistent for *ca* and *no.inv* in Turkey's quarterly and monthly estimated VAR models. *reer* is also found to be positively effective on *cr* in quarterly model of Turkey.

The policy responses of central banks of Brazil and Turkey to maintain the financial stability after 2008 crisis seem to be influential on domestic credit growth during 2011which is mentioned in the previous section. Furthermore, current account balance of Turkey has also improved since the second quarter of 2011 while relatively lower current account balance of Brazil has not considerably increased.

In summary, the empirical results of this thesis support the strong causality from capital inflows to domestic credits and from domestic credits to current account imbalances for Brazil and Turkey. Tightening credit polices during the periods of capital inflows may be influential on current account through domestic credit channel in these countries. The research topic of this study can be developed by selecting different countries, decomposing the capital flows according to recipients such as the government, domestic banks and other sector and separating the domestic credits as consumer and firm credits. It is found in the third section that trade deficit in Turkey and service and income account deficit in Brazil dominate their current account balances. Therefore, current account balance variable in the VAR models can be replaced with trade balance for Turkey, and service and income balances for Brazil.

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APPENDIX

TEZ FOTOKOPİSİ İZİN FORMU

ENSTİTÜ

Fen Bilimleri Enstitüsü ☐

Sosyal Bilimler Enstitüsü ☐

Uygulamalı Matematik Enstitüsü ☐

Enformatik Enstitüsü ☐

Deniz Bilimleri Enstitüsü ☐

YAZARIN

Soyadı :
Adı   :
Bölümü :

TEZİN ADI (İngilizce) :

TEZİN TÜRÜ : Yüksek Lisans ☐   Doktora ☐

1. Tezimin tamamından kaynak gösterilmek şartıyla fotokopi alınabilir. ☐

2. Tezimin içindekiler sayfası, özet, indeks sayfalarından ve/veya bir bölümünden kaynak gösterilmek şartıyla fotokopi alınabilir. ☐

3. Tezimden bir (1) yıl süreyle fotokopi alınamaz. ☐

TEZİN KÜTÜPHANEYE TESLİM TARİHİ: