FINANCIAL CAPITAL FLOWS AND ECONOMIC GROWTH: THE TURKISH CASE

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ABSTRACT

FINANCIAL CAPITAL FLOWS AND ECONOMIC GROWTH: THE TURKISH CASE

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This study analyzes the effect of capital outflows on economic growth though the channels described in sudden stop literature. Using the autoregressive distributed lag (ARDL) bounds testing approach; it is found that there is a cointegration between capital inflows, real exchange rate and real GDP. The results show that there is a significant positive long-run relation between capital inflows and growth. It is also found that capital inflows affect real output in the short run. The results show that real exchange rate is not a significant determinant of real output both in the short run and long run. Moreover, in order to capture the dynamic responses, a vector autoregressive (VAR) methodology has been employed. The results show that a negative innovation in capital inflows causes real exchange rate depreciation and output contraction.

Keywords: Capital inflows, Economic growth, Bounds test approach, VAR

ÖZ

FİNANSAL SERMAYE HAREKETLERİ VE EKONOMİK BÜYÜME: TÜRKİYE ÖRNEĞİ

Kömürcüoğlu Muammer

Yüksek Lisans, İktisat Bölümü

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Bu çalışma sermaye çıkışlarının ekonomik büyümeye olan etkisini ani çıkış literatüründe anlatılan kanallar yoluyla incelemektedir. Sınır testi yaklaşımı kullanılarak sermaye girişleri, reel döviz kuru ve reel GSYH arasında eşbütünleşme bulunmuştur. Sonuçlar sermaye girişleri ve büyüme arasında anlamlı pozitif bir uzun vade ilişkisinin olduğunu göstermektedir. Ayrıca, sermaye girişlerinin kısa dönemde reel üretimi etkilediği bulunmuştur. Sonuçlar reel döviz kurunun hem kısa dönemde hem de uzun dönemde reel GSYH'nın belirleyicilerinden biri olmadığını göstermektedir. Ayrıca, dinamik tepkileri gözlemlemek için vektör otoregresyon metodu (VAR) kullanılmıştır. Sonuçlar sermaye girişlerindeki negatif bir inovasyonun ekonomide daralmaya ve reel döviz kurunda değer kaybına yol açtığını göstermektedir.

Anahtar Sözcükler: Semaye girişleri, Büyüme, Sınır testi yaklaşımı, VAR

To my family

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CHAPTER 1

INTRODUCTION

The global financial crisis started in the wake of Lehman Brothers collapse, ended the strong wave of capital inflows to developing countries occurred during 2003-2007. Total capital inflows to developing countries fell to 780 billion USD in 2008 (4.5 percent of GDP) and further declined to 523 billion USD (3 percent of GDP) in 2009 from historical high level of 1.2 trillion USD (8.5percent of GDP) in 2007 (Figure 1.1). According to World Bank Global Development Finance report (2009), developing countries harvested enormous economic and financial benefits from the growing integration to the world economy in the past decade. However, this integration brought more dependency to international capital inflows. About one quarter of domestic capital formation in developing countries was funded from foreign capital (World Bank, 2009). Because of this dependence, a capital flight or a reduction in net capital inflows become the main reason of contraction in domestic investment and makes developing countries more vulnerable to global financial markets sentiment (World Bank, Global Economic Prospects, 2003).

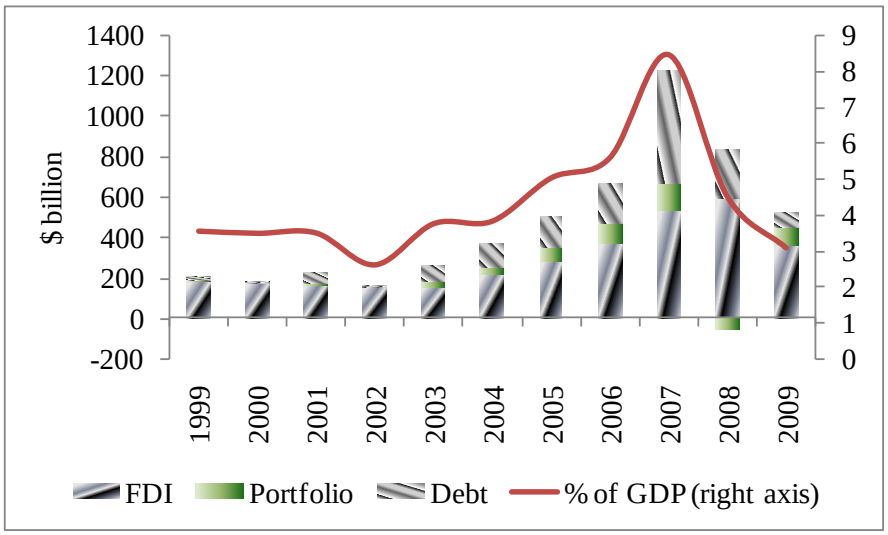

Figure 1.1: Net Capital Inflows to Developing Countries

Like other emerging markets, Turkey has also been exposed to large amounts of capital inflows since the beginning of 2002 accompanied with a high growth performance. However, with recent crises in 2001 and 2008-2009, capital inflows exhibited sharp falls, followed by a substantial contraction in private investment and overall economic activity, which led to lower average growth rate over 2000s compared previous decade.

Turkey faced with very volatile growth pattern in the last 20 years. 1994 currency crisis, the contagion effects of East Asian and Russian crisis, 1999 Marmara Earthquake, 2001 banking crisis and 2008-2009 global economic crisis are the main interruptions in economic growth in the last two decades. These sharp output contractions were always followed by a rapid expansion (Figure 1.2). After 2001,

Turkey achieved a strong and rather sustained growth performance, with an almost 7 percent annual growth for the period 2002-2007.

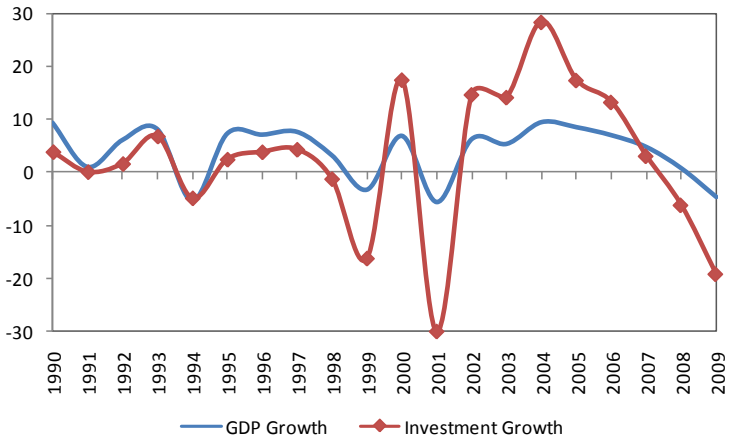

Figure 1.2: Growth Rates (*)
(*) Growth rates after 1998 are based on revised National Accounts series

Volatility in growth has been largely driven by investment, especially after 2000s (Figure 1.2). Following low investment performance in period of 1998-2001, investments performed strongly. Investment growth has played a leading role in the strong recovery of 2002-2005 period. However, starting from the second half of 2006, investment growth has slowed down significantly and contracted by -6 percent in 2008 from 13 percent in 2006. Contraction of investments in 2009 reached to 19 percent with a -4.5 percent contribution to growth.

In Turkey, private investments constitute the major part of investments. The share of private investment in total investments is over 80 percent in 2009, which

increased from around 68 percent in the last two decades. In other words, private investment growth during 2002-2007 was mostly driven by machinery and equipment investment which is made up of over 60 percent of total private investments. Figure 1.3 shows the relation between capital inflows and private and machinery investment. These series are mainly moving together, supporting the idea that there is a strong association between private machinery investment and capital inflows.

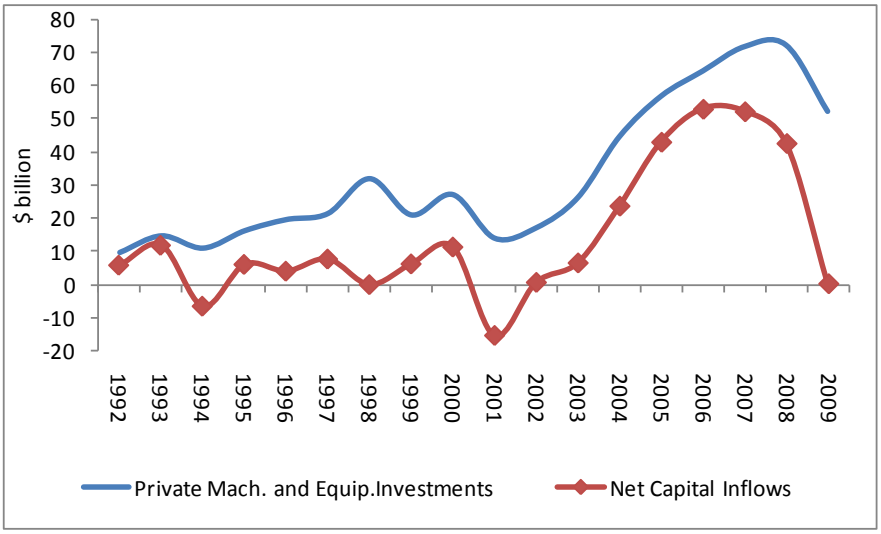

Figure 1.3: Private Investments and Capital Inflows

This is not a coincidence for an economy where domestic savings are low. The average current account deficit, which is the mirror image of saving-investment gap, increased from 1 percent of GDI in 1990s to 3.4 percent in 2000-2008 (Figure 1.4). This rise in current account was mainly led by investment increase and

domestic saving drops. Under this high investment low saving condition, this investment-saving gap was increasingly financed by foreign capital which exposes Turkey to the risk of capital reversal.

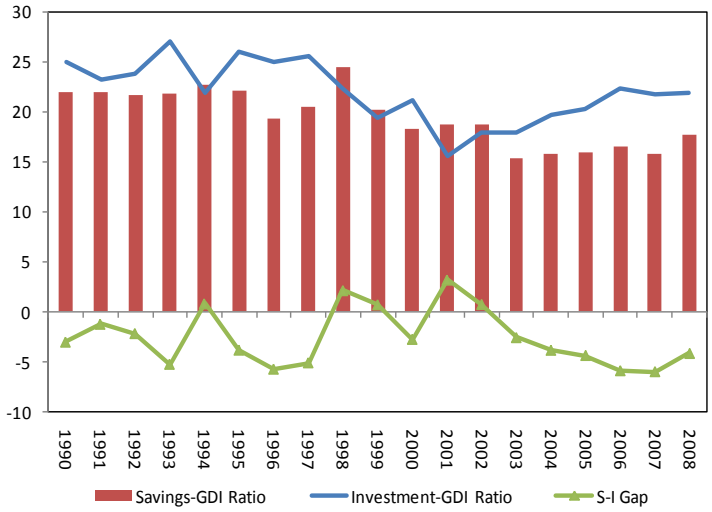

Figure 1.4: Saving-Investment Gap as percent of GDI

Economic literature contains sizable amount of discussion on the growth and capital inflows association. More specifically, strong capital waves in early 1990s and 2000s, each ended with recessions have inspired to a growing literature on the economic benefits and costs of capital inflows. Neoclassical economists, often support the view that capital inflows generate the necessary funds for capital accumulation and thus enhance growth for the countries facing capital shortages. Moreover, Mishkin (2009) argues that financial integration with increased capital inflows is essential for the countries to upgrade form lower to middle income

status. On the other side, opponents of the capital inflows such as Rodrik and Subramanian (2009) claims that financial openness and increased capital inflows creates a serious problem for global financial stability. According to this view, capital inflows may also create room for loss of competitiveness, over-heating and vulnerability to crises (Cardelli et al., 2009). According to Prasad et al. (2007), there is a positive correlation between current account surplus (which summarizes the net amount of capital flowing out of the country in a given period) and growth among nonindustrial countries. In other words, they claim that a reduced reliance on foreign capital is associated with higher growth. Reinhart and Reinhart (2008), claims that capital inflow bonanzas mostly end with sudden stop or reversal and economic crises such as debt defaults, banking, inflation or currency crash. They found out that real GDP growth and equity prices are higher during the heavy capital inflow but turns to be lower after the inflow episode.

Analyzing the relation between capital inflows and growth in Turkey has become more important based on the recent developments in Turkey and recent literature. This study is an attempt to analyze this relation by using recent Turkish data.

The effect of capital inflows on economic growth will be examined mainly through the channels described in sudden stop literature. Two methodologies are used in this study. The first one is autoregressive distributed lag (ARDL) bound testing approach of Pesaran Shin and Smith (2001) followed with ARDL approach of

Pesaran and Shin (1999) to test the existence of long run and short run relation. The other one is vector autoregressive (VAR) modeling approach in order to capture the dynamic responses.

This study contributes to the literature in two dimensions. First, to the best of our knowledge, this is the first empirical study uses both ARDL and VAR approaches together to investigate the affect of capital inflows on growth for Turkey. Second, this study covers the recent global economic crisis.

The rest of the study structured as follows. Chapter 2 presents a review of the literature in two parts. First international theoretical and multi-country studies focusing on the sudden stop literature will be given. Then Turkey specific studies will be reviewed. Chapter 3 introduces the variables used in the analyses, presents the sources of the data and provides a general look into raw data characteristics and gives some descriptive statistics. Chapter 4 explains the econometric technique used and presents the empirical results. Chapter 5 provides a review of the findings and restates important conclusions.

CHAPTER 2

LITERATURE REVIEW

The literature review starts with the international studies mainly through sudden stop studies. There are ample studies about the capital inflows and its macroeconomic effects. Since the aim of this study is investigating the affects of capital inflow reversals on economic activity, consequences of the capital inflow reversals will be discussed mainly through sudden stop literature in detail in international literature part. After giving the international studies, chapter continues with Turkey specific studies.

2.1 International Theoretical and Multi-Country Studies

The term "sudden stops" of international capital inflows was inspired by a bankers' motto "it is not speed that kills, it is the sudden stop," in Dornbush et al (1995) (as cited in Calvo, 1998, p. 2). Calvo developed the first analytical structure in 1998. In his model, sudden stops resulted possibly with a bankruptcy because of the change in relative prices of non-tradables and tradables. Moreover, the negative

effects of sudden stops are likely to increase under the higher marginal propensity to spend on non-tradables and short term financing.

Calvo and Reinhart (2000) sketched the simple analytics of sudden stops through national accounting framework. They defined sudden stops as large swings in capital inflows. In national accounting, excluding net errors and omissions, capital inflows equal to current account deficit plus the accumulation of international reserves. Thus sudden stops will be met either from reserve losses or current account deficit reduction. They thought that both occur in practice, while the former increases the country's vulnerability, the latter brings serious affects on output and employment. The authors again explain the pass through from current account deficit to output by national accounting. As current account deficit equals to the difference between aggregate demand and GNP, a sudden contraction in current account deficit is likely to cause a sharp decline in aggregate demand. Decline in demand lowers both the demand for tradables and non-tradables in the economy. The resulting affect is mostly real exchange rate depreciation because the relative price of non-tradables fell since the excess supply of non-tradables cannot be shipped abroad. Calvo and Reinhart identified two channels to go from here to output and employment loss. These channels are Keynesian and Fisherian. In the first channel under the assumption of downwardly inflexible prices/wages, a fall in aggregate demand leads to an output and employment loss. Fisherian channel links the fall in output and sudden stop through banking sector. As real interest rates

possibly increase after sudden stops, possibility of nonperforming loans increases. In this environment banks become more cautious and cut their loans, especially to small and medium sized firms, trade credit dry up which contributes a major and long-lasting recession. Finally, they concluded that sudden stops have more serious affects on emerging markets and banking crises were more harmful and closely related to sudden stops than currency crises.

Guidotti, Sturzenegger and Villar (2004), looked at the consequences of capital account reversals on growth. They defined sudden stop episode as capital account contractions which exceeds one standard deviation of country's sample mean and which is at least five percent of GDP. Moreover sudden stop episodes filtered with whether they need current account deficit adjustment or not. They found that 265 sudden stop cases out of 313 require current account deficit reduction (at least 2 percent GDP) and reached the conclusion that sudden stop cases most likely to lead current account improvement. They assumed that current account adjustments may come with large real exchange rate adjustments, and banking and currency crises (twin crises) seem to coincide. The conclusion of the paper was that; economies with higher dollarization suffer more in terms of output contraction coming with sudden stop. Having a floating exchange rate regime helps to grow faster after the episode since exports grow faster.

Calvo, Izquierdo and Mejia (2004) analyzed the empirical characteristics of sudden stops of capital inflows using a sample consist of 32 developed and developing countries for the period 1990-2001. They defined sudden stop as unusual reversals of capital flows which causes a contraction in output. The measure for the outflow is year on year fall in capital flows is at least two standard deviations below the sample mean of the country. The pass-through from sudden stop of capital inflows to output contraction is defined clearly in the study. As a result of sudden stop, current account deficit (which is generally positive before the episode) goes down to zero. They construct an equation to find a proxy for the real exchange rate depreciation as a result of the fall in current account deficit. According to this equation, the relative change in real exchange rate is proportional to initial current account deficit relative to absorption of tradables. Giving reference to other authors, they explain the way though real exchange rate depreciation to output contraction. Models from Izquerda (1999), Arellano and Mendoza (2002) explains the effect of exchange rate depreciation on output growth from credit contraction. Aghion, Bacchetta, and Banerjee (2001) show that under the incomplete pass-through from exchange rates to domestic prices a depreciation in currency cause a fall in net worth of domestic firms which have foreign currency denominated debts. As a result of fall in net worth, these constrained firms reduce their investments causing a contraction in output. They conclude that large exchange rate fluctuations resulted from sudden stops are an emerging market phenomenon. Damaging effect

of exchange rate depreciation on balance sheet and output depends on the ratio of initial current account deficit to demand for tradables and liability dollarization.

Calvo, Izquierdo and Mejia (2008) updated their 2004 study. In this study they worked with a sample of 110 countries 89 of which were developing countries for the period of 1990-2004. Addition to their previous study, in systematic sudden stop episodes they focused on capital account reversals coinciding with sharp increase in aggregate spreads, meaning that sudden stops with exogenous trigger. Moreover, they dropped the requirement of capital outflows coincide with output drop to reduce the potential influence of domestic factors and focus more on external factors. Their conclusions are parallel with the ones from 2004, such as sudden stop is an emerging market phenomena, comes with large real exchange rate fluctuations, domestic liability dollarization increase the bad effects and sudden stop comes in bunches together with other countries.

Edwards (2004) analyzed current account deficit reversals, its connection with sudden stops and the effect of current account reversal on output. He defined sudden stop episode as the country have received an inflow larger than it's region's third quartile in two years before the sudden stop episode and net capital inflows decline must exceed 5 percent of GDP in one year. He found that sudden stops and current account reversals are strongly associated. Moreover, the negative effect of current account reversal on growth mainly comes through the investment channel.

Since current account deficit is the difference between investment and savings, a reversal in current account tends to lower the investment.

Hutchison and Noy (2004) investigated the output effects of financial crises in emerging markets through sudden-stop crises and questioned their effect on output collapse. They explained the consequences of a sharp reversal in capital inflow through exchange rate depreciation, sharp drop in domestic investment, domestic production and employment. Using a panel data set for the period 1975-97 for 24 emerging market economies it is found that sudden stop crises have a large, negative impact on output growth but short lived than currency crises. Giving in numbers, a currency crises leads to an output contraction around 2-3 percent, whereas the contraction is about 6-8 percent in a sudden stop episode in the crises year. Moreover, cumulative loss for sudden stop is given around 13-15 percent over the three year period.

Jeasakul (2005) summarized the negative effects of sudden stop on growth through two main channels. The first channel is lowering the production capability and the second one is making the output fall below its full capacity. Production capability is declining due to four factors, which are (a) unavailability of foreign funds to finance investment, (b) lower domestic savings as a result of decreased investment returns, (c) lower productivity of capital stock after the adjustment in relative prices between tradables and non-tradables and (d) resource reallocation costs to bring the

economy back to the most efficient factor allocation. In the second channel, output falls below the full capacity as a result of fall in domestic absorption. Consumption is expected to decline due to fall in autonomous consumption (mainly because of decreasing consumer sentiment), fall in income and fall in wealth (wealth is generally held in the form of non-tradables and price of non-tradables fall after sudden stop). Investment is falling due to increased interest rates, decreased loanable funds and worsened investment environment. Finally, it is claimed that although demand for exports increased as a result of depreciation, increase in exports was limited due to financing difficulties for imported goods used in exports.

To sum up, international studies agreed on the contractionary growth effect of sudden stops of capital inflows. Moreover, capital inflow reversals cause a significant depreciation of the real exchange rate. Finally, cross country studies found out that sudden stop episodes and negative effects of sudden stops are generally emerging market phenomena.

2.2 Turkey Specific Studies

Celasun, Denizer and He (1999) analyzed the relationship between capital inflows, macroeconomic management and vulnerability in the financial system in Turkey for the period 1989-97. They found that capital inflows contributed to economic

growth mainly through affecting private consumption and investment. Fiscal imbalances in this period also play an important role in exchange rate depreciation and high real interest rates. Finally, they assert that banking system and the economy is vulnerable to capital flow reversals and external shocks under an environment of chronic and high fiscal deficits with an inconsistent financial sector regulatory framework.

Yentürk and Ulengin (2001) discussed the effects of foreign savings (capital inflows) on consumption and investment. Using the quarterly data for the period 1987-1997, they constructed a VAR model with the foreign savings, private consumption and private investment variables. Their results suggest that foreign savings effect private consumption and private consumption effect investment in long-run by accelerator effect of consumption. This accelerator effect is explained as follows: capital inflows increase the consumption of non-tradables thus raises the production and investment of non-tradable goods. This accelerator affect is not working affectively in the tradable sector since imports of tradable goods increases as a result of appreciation of the currency with capital inflows.

Alper and Saglam (2000) investigated the real effects of capital outflows on economy during the four episodes of financial crises, three of which are internationally originated, in 1990's. They employed two methodologies, the narrative approach and VAR approach. Results of the narrative approach suggest

that real output losses of the financial crises were more effective in 1994 crisis and 1998 crisis. Moreover using the VAR methodology, they tested the effectiveness of three channels transmitting the financial shocks into real economy. These channels are interest rate channel, other asset prices channel and credit channel. In interest rate channel, under the assumption that capital outflows unsterilized, money supply tightens. Contraction in money supply accompanied with increased risk premium and capital scarcity causes the real interest rate increase. Investment spending declines since cost of capital increases and demand and thus investment for durable goods decrease as the present value of goods fall. Other asset prices channel explains the contraction though decline in asset prices. As money supply declines after sudden stop, people sell their stocks causing a fall in stock prices. Firms market value declines because of lower equity prices, thus they decrease their investment. Moreover, lower asset prices also decreases the financial wealth of households and they reduce their consumption. Finally, in the credit channel, banks supply less credits due to their lower reserves and deposits and decreased ability to borrow from abroad after capital outflows. Shortage in the supply of credits causes a decline in investment and spending of potential borrowers. With the VAR methodology, Alper and Saglam tested and found out that these three channels were effective for Turkey during 1990's. Finally they showed from the VAR analyses that reserve money and exchange rate were stabilized by central bank during the crises which lessen the effects of capital outflows. It is claimed that the contraction in output through real interest rate hike came from lack of capital

availability, financial panic and pessimistic investor sentiment and increased risk aversion.

Berument and Dincer (2004) studied the effects of capital inflows on macroeconomic variables using a monthly data for the period 1992-2006 with VAR methodology. The variables used in the study are net international reserves of the central bank to represent capital flows, central bank overnight interbank interest rate, real exchange rate, broad money (M2 money), industrial production index as a proxy for output and consumer price index. Their empirical results suggest that an increase in capital inflows improves economic activity. Moreover, a positive shock to capital inflows leads to lower prices, decreases interest rates, appreciates real exchange rate and causes a higher money supply. Finally they claim that higher capital outflows could lead to a recession and a large real depreciation which may cause a financial crisis.

Kilinc (2006) examined the effects of sudden stops on economy in the presence of sectoral asymmetries and currency mismatch. He constructed a micro data set for Turkey and showed that both tradable and non-tradable sectors are borrowing constrained. Moreover, it is found that non-tradable sector's investments are more responsive to their internal funds and there is a sizable currency mismatch in the non-tradable sector. Using these facts, he constructed a two-sector small open economy model with borrowing constrained tradable and non-tradable sectors and

currency mismatched non-tradable sector. Under a scenario of current account reversal, associated with a sudden stop, domestic currency depreciates causing a net worth decrease for firms. Coming with currency mismatch, depreciation causes balance sheet problems for firms since their net worth decreases and debt burden increases. The corresponding firms' investments fall since they cannot borrow as before as a result of net worth decline. Thus as response to sudden stops there is a large output movement through investment and it is claimed that most of the adjustment occurs in the non-tradable sector.

Turkey specific studies generally support the findings in international studies. Real exchange rate depreciation and output contraction is the common findings. More specifically, some studies found the effective channels as private investment and consumption. Some studies look the relation from the positive impact of capital inflows and summarized the expansionary effect on economy and appreciation of the currency. Finally, some studies found out under the existence of sectoral asymmetries between tradable and non-tradable sectors, investment and thus output will decline with depreciation of exchange rate coming with a sudden stop.

CHAPTER 3

DATA AND DESCRIPTIVE STATISTICS

3.1 Introduction of the Variables and the Data Sources

Based on the results of previous studies in literature it is decided to select *capital inflows, real exchange rate* and *real gdp* as the variables to analyze the effects of capital inflows on growth. The data set used in the analyses is quarterly and covers the period 1998Q1 to 2009Q4. The number of the variables is limited to three to get a parsimonious equation under this narrow time period. Through the channels explained in the previous chapter, it is expected that capital inflows cause a real exchange rate appreciation and real growth. Looking from the other way, as a result of capital outflow, a significant depreciation of currency and an output contraction is expected.

The first variable is *net capital inflows* which is calculated with the same methodology used in balance of payments report of Central Bank of Turkey. According to this method, net capital inflows are the sum of net foreign direct investment, net portfolio investment, net use of credits (excluding IMF), deposits

of banks and central bank. Use of IMF credits is excluded because the credits coming from IMF are independent from market conditions, does not follow the trend in the market, mainly determined by stand by agreements. Moreover, changes in reserve assets of banking sector and change in official reserves are also excluded since the capital coming from this channel is not generally used in the economy and is not effective in economic activities in a direct way.

Another way of calculation of net capital inflows are summarized in equations 3.1 and 3.2 below.

Total Financing = - (Current Account Balance + Net Errors and Omissions) (3.1)

Net Capital Inflows = Total Financing – IMF Credits – Change in Reserve Assets of Banking Sector – Change in Official Reserves (3.2)

In order to normalize the series to use in the estimations, net capital inflows are divided by quarterly nominal GDP. GDP series are converted into USD with 3 months average of USD. The source of capital inflows series is Balance of Payments Statistics of the Central Bank of Turkey. Moreover, GDP series are taken from Turkstat. The series are represented as *cap* in the empirical models.

The second variable used in estimations is the *real exchange rate*. CPI based real effective exchange rate (1995=100) is used to represent the data. Source of data is the Central Bank and it is the 3 month average of monthly data. CPI based real effective exchange rate index is calculated using the IMF weights for 19 countries including Germany, USA, Italy, France, United Kingdom, Japan, Netherlands, Belgium, Switzerland, Austria, Spain, Canada, Korea, Sweden, Taiwan, Iran, Brazil, China and Greece. The series are measured in logs and represented as *ler* in the models. Moreover, an increase in this variable represents appreciation.

The third variable which is the key variable of interest for this analysis is the *real GDP*. Seasonally adjusted quarterly GDP series calculated by expenditure approach and with constant prices is used. Base year for the series is 1998 and the source of data is Turkstat. The series are measured in logs and represented as *ly* in the models.

3.2 A General Look into the Raw Data

In this section to develop an understanding of the data set, a descriptive analysis of the variables will be presented. Table 3.1 shows the annual net capital inflows as a percent of GDP in the first row and breakdown of capital inflows in USD for the rest of the rows. Three major decreases in capital inflows were seen in the periods 1998, 2001-2002 and 2009.

Table 3.1: Net Capital Inflows for Years

	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Net Capital Inflows (% of GDP)	0.0	2.5	4.2	-7.7	0.2	2.1	6.0	8.9	10.0	8.0	5.8	0.6
Net Capital Inflows ($ billion)	-0.1	6.2	11.3	-15.5	0.6	6.5	23.7	43.0	53.0	52.2	42.6	4.0
Direct Investment (net)	0.6	0.1	0.1	2.9	0.9	1.3	2.0	9.0	19.3	19.9	15.7	6.3
Portfolio Inv (net)	-6.7	3.4	1.0	-4.5	-0.6	2.5	8.0	13.4	7.4	0.7	-5.0	0.2
Credit Drawing (net)	3.7	3.3	10.3	-11.5	1.2	3.0	13.9	20.0	24.6	35.9	30.0	-13.2
o/w General Government	-1.7	-1.9	0.1	-2.0	-0.7	-2.2	-1.2	-2.2	-0.7	0.1	1.7	1.6
o/w Banks	0.9	2.2	4.4	-8.1	-1.0	2.0	5.7	9.2	5.8	5.6	3.0	-4.1
o/w Other Sectors	4.5	3.0	5.8	-1.5	2.9	3.2	9.3	12.9	19.5	30.2	25.2	-10.7
Deposits	2.9	0.2	0.0	-0.8	0.3	1.4	0.6	0.5	4.6	-3.3	3.4	4.6
Other	-0.5	-0.9	-0.2	-1.4	-1.3	-1.6	-0.9	0.1	-2.9	-1.0	-1.5	6.1

The first decline was in 1998 due to Russian crisis. As seen in table 3.2 which gives the breakdown of net capital inflows for quarters, there was a capital outflow in the second half of 1998. The main source of outflows in this period was portfolio investment outflows (8.1 billion US Dollar). With the help of deposits and borrowing of corporate sector total outflow in 1998 was nearly zero.

Capital inflows recovered in 1999 and were positive until the third quarter of 2000. The second period of capital outflows started in the last quarter of 2000 with the financial crises in November 2000 and end in the third quarter of 2002. In the last quarter of 2000, capital outflows were 1.3 billion USD, with a 5 billion USD portfolio investment outflow. However, the outflows were deepened after 2001 February crisis. Total capital flight in 2001 reached to 15.5 billion USD (7.7 percent of GDP). This time the main reason of outflow was credit repayments. The repayments of banking sector amounted to 8.1 billion USD as 2001 crisis mainly hit the banking sector. Either there was no substantial outflow in 2002, Turkey

could not attract capital. The amount of net capital inflows in 2002 was only 0.6 billion (0.2 percent of GDP) USD which was realized with the effect of recovery started in the last quarter of this year.

Turkey benefitted from the large wave of capital inflows to emerging markets for the period between 2003 and 2008. Total amount of capital flowed into Turkey in this period was around 220 billion USD, with an average of 6.8 percent of GDP. Around 30 percent of this capital was in the form of foreign direct investment. Net credit drawing constitutes 58 percent of this amount and corporate sector was the main user of these credits (around 90 percent). Finally portfolio investments hold 13 percent of the all inflows. Similar to other emerging markets, Turkey started to be affected from the global financial crisis started at the end of 2008. The immediate effect of the crisis was in portfolio investments with a 5.5 billion USD and in private sector with 6.2 billion USD outflow in the last quarter of 2008.

The flight of capital in 2009 was in the form of credit drawings of private sector, mainly from corporate sector. Foreign direct investments, deposits and other inflows compensate the outflows and Turkey ended with a 4 billion USD (0.6 percent of GDP) net capital inflow in 2009.

Table 3.2 Net Capital Inflows for Selected Quarters

	1998					2000				
	Q1	Q2	Q3	Q4	1998	Q1	Q2	Q3	Q4	2000
Net Capital Inflows	1.9	4.1	-5.4	-0.7	-0.1	3.8	3.8	4.9	-1.3	11.3
Direct Investment (net)	0.1	0.1	0.2	0.2	0.6	0.0	0.2	-0.4	0.4	0.1
Portfolio Investment (net)	0.9	0.5	-7.0	-1.1	-6.7	2.1	1.6	2.3	-5.0	1.0
Credit Drawing (net)	0.3	2.9	1.2	-0.7	3.7	0.5	3.5	2.4	3.8	10.3
o/w General Government	-0.5	-0.4	-0.4	-0.3	-1.7	-0.2	-0.2	-0.4	0.9	0.1
o/w Banks	0.2	0.7	0.4	-0.5	0.9	-0.2	1.6	1.7	1.3	4.4
o/w Other Sectors	0.6	2.6	1.2	0.1	4.5	0.9	2.1	1.1	1.7	5.8
Deposits	0.7	0.7	0.4	1.0	2.9	1.3	-1.3	0.5	-0.4	0.0
Other	-0.1	-0.2	-0.2	0.0	-0.5	0.0	-0.2	0.1	0.0	-0.2
	2001					**2002**				
	Q1	Q2	Q3	Q4	2001	Q1	Q2	Q3	Q4	2002
Net Capital Inflows	-4.0	-5.1	-2.7	-3.7	-15.5	-0.9	0.0	-0.6	2.2	0.6
Direct Investment (net)	1.6	0.1	0.5	0.7	2.9	0.1	0.4	0.2	0.3	0.9
Portfolio Investment (net)	-2.9	-0.3	-0.7	-0.6	-4.5	-0.1	-0.7	-0.5	0.7	-0.6
Credit Drawing (net)	-1.8	-4.6	-1.9	-3.3	-11.5	-0.5	0.9	-0.2	1.0	1.2
o/w General Government	-0.4	-1.6	0.9	-0.9	-2.0	-0.4	-0.3	0.3	-0.3	-0.7
o/w Banks	-1.2	-2.2	-2.7	-2.0	-8.1	-0.4	0.3	-1.2	0.3	-1.0
o/w Other Sectors	-0.1	-0.8	-0.1	-0.5	-1.5	0.3	0.9	0.7	0.9	2.9
Deposits	-0.6	-0.1	0.0	-0.1	-0.8	-0.1	-0.1	0.3	0.3	0.3
Other	-0.3	-0.1	-0.6	-0.4	-1.4	-0.3	-0.4	-0.4	-0.1	-1.3
	2008					**2009**				
	Q1	Q2	Q3	Q4	2008	Q1	Q2	Q3	Q4	2009
Net Capital Inflows	11.1	22.1	11.3	-1.8	42.6	-4.5	1.5	3.2	3.8	4.0
Direct Investment (net)	3.8	4.8	3.4	3.8	15.7	2.1	1.5	1.9	0.9	6.3
Portfolio Investment (net)	-1.3	3.0	-1.2	-5.5	-5.0	-3.1	2.7	1.2	-0.6	0.2
Credit Drawing (net)	10.1	15.2	10.2	-5.6	30.0	-4.7	-6.0	-3.1	0.6	-13.2
o/w General Government	0.2	0.2	0.8	0.6	1.7	0.3	-0.3	1.6	0.0	1.6
o/w Banks	1.4	1.7	2.8	-2.9	3.0	-2.4	-2.7	-1.2	2.2	-4.1
o/w Other Sectors	8.5	13.3	6.6	-3.2	25.2	-2.6	-3.0	-3.5	-1.6	-10.7
Deposits	0.9	2.9	1.6	-2.0	3.4	0.6	2.5	1.2	0.3	4.6
Other	-2.4	-3.8	-2.8	7.5	-1.5	0.7	0.8	2.1	2.6	6.1

Figure 3.1 shows the real exchange rate series for the period 1998-2009. Real effective exchange rate (REER) appreciated until the end of 2000. In 2001 crisis the TL depreciated sharply in real terms by about 18 percent with respect to 2000

and returned to its 1997 level. By the end of 2003 the REER had appreciated by 21 percent from end-2001 and returned to its end-2000 pre-crisis level. Between 2003 and 2007, the REER appreciated by a further 34 percent at a roughly even pace, slowing only during 2006. In the wake of global financial crises the lira started to depreciate again. The total depreciation between August 2008 and March 2009 was 18 percent. Then the TL started to appreciate but has not caught the pre-crisis level yet.

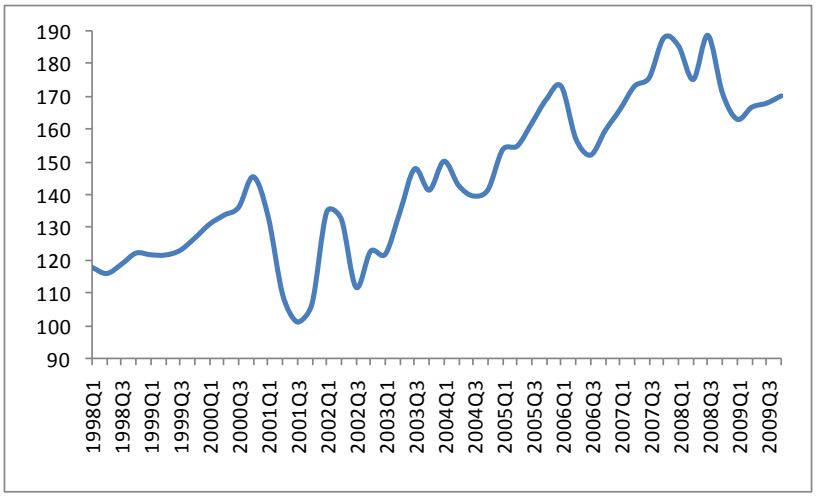

Figure 3.1: Real Effective Exchange Rate (REER)

Figure 3.2 shows growth rates for the period 1999-2009. Turkey contracted by 3.4 percent in 1999 mainly because of the 1999 earthquake. After growing 6.8 percent in 2000, the economy contracted 5.7 percent in 2001 banking crisis. Domestic and external factors allowed Turkey to maintain fast and stable economic growth after 2001. Average growth rate in the five year period 2002-2007 was 6.8 percent.

Turkish economy had already begun to slow down from 2007 onwards. Growth in 2007 declined to 4.7 percent from 6.9 percent in 2006. With the advent of global crisis in late 2008, fourth quarter growth fell to -7.0 percent year-on-year, bringing the annual growth for 2008 to a stagnant 0.7 percent. Turkey hit by global crisis severe in 2009, the contraction reached to 4.7 percent.

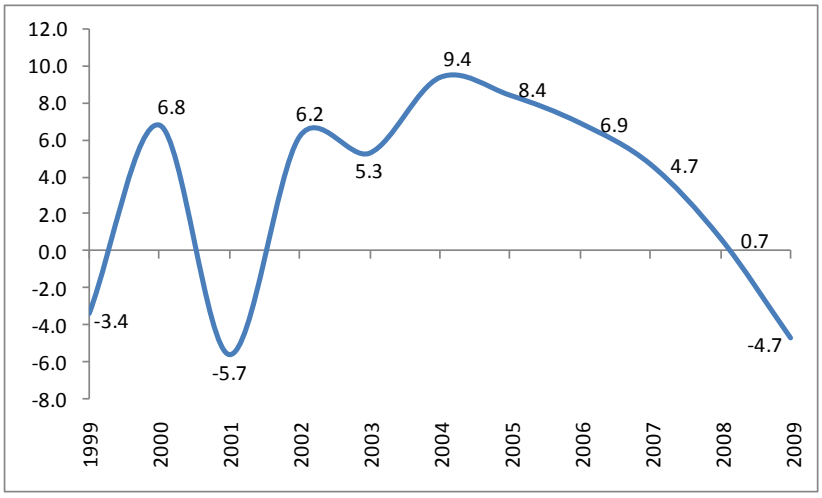

Figure 3.2 Growth Rates

As seen in figure 3.3, capital inflows and real exchange rate move together through the sample period. In 1999 and 2000 capital inflows were positive and real exchange rate appreciated. In 2001 Turkey faced a huge capital flight which is accompanied by a sharp depreciation of real exchange rate. During the buoyant capital inflow period 2003-2008, real exchange rate appreciated significantly. Finally, as capital inflows tended to slow down starting at the end of 2008, appreciation trend in the real exchange rate also turned into a depreciation pattern.

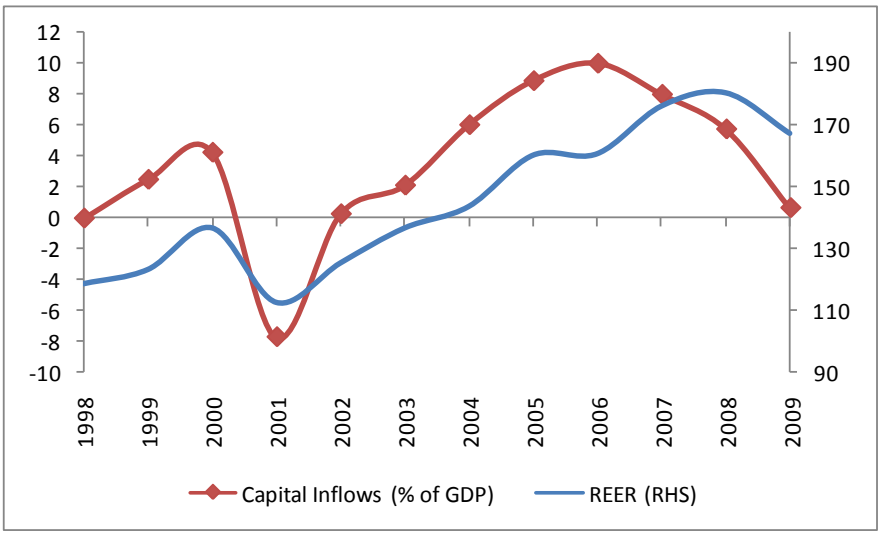

Figure 3.3 Capital Inflows (percent of GDP) and Real Exchange Rate

Figure 3.4 shows the annual growth and net capital inflows for 1999-2009. It is seen from the figure that growth performance and capital inflows are moving together. In 2001, capital inflows turned to an outflow and Turkish economy contracted. Moreover, strong economic performance in terms of the growth between 2002 and 2007 coincides with abundant capital flowing to Turkey. Finally in 2009 capital inflows were nearly zero and Turkish economy contracted by 4.7 percent annually.

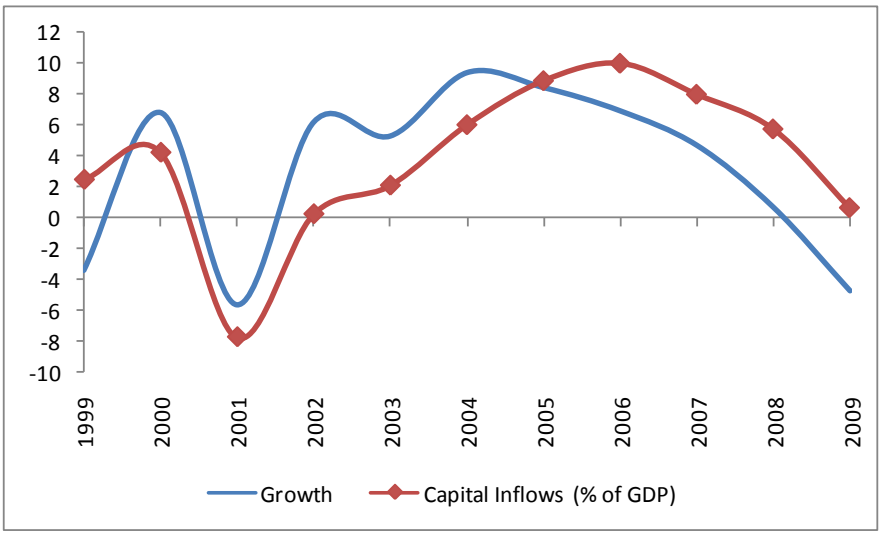

Figure 3.4 Capital Inflows and Growth

3.3 Unit Root Tests

The bounds testing approach of Pesaran et al. (2001) can be used if the variables are either stationary or integrated of order one. In other words, bounds testing cannot be applied if the order of integration for variables is two or higher. To determine the order of integration, Augmented Dickey Fuller (ADF) tests are applied to the levels and the first differences. The letter 'D' indicates that the variable is differenced once. The results are given in tables 3.3 and 3.4.

Table 3.3 ADF test results for levels of variables

	With trend and intercept		With intercept only	
Variables	Lags	Calculated ADF	Lags	Calculated ADF
cap	1	-2.91	1	-2.70
ler	1	-3.71**	1	-1.56
ly	1	-1.92	1	-0.38
Note: The critical values for the models with trend and intercept are -4.17, -3.51, and -3.18 for confidence levels of 99 percent, 95 percent and 90 percent respectively. The critical values with intercept only are -3.58, -2.92, and 2.60 for confidence levels of 99 percent, 95 percent and 90 percent respectively. Rejection of null hypothesis is shown with * for 90 percent, ** for 95 percent and *** for 99 percent confidence levels.				

The test results suggest that the null hypothesis of a unit root cannot be rejected for *cap, ler* and *ly* with intercept only (Table 1) for all confidence levels. Moreover, the results confirm unit root cannot be rejected for all variables at 99 percent confidence level. Only *ler* is trend stationary for 95 percent confidence level. When table 3.4 is examined, all variables are found to be stationary when their first differences are taken.

Table 3.4: ADF test results for difference of variables

	With intercept only		Without intercept and trend	
Variables	Lags	Calculated ADF	Lags	Calculated ADF
dcap	1	-8.20***	1	-8.29***
dler	2	-6.18***	2	-6.13***
dly	1	-5.63***	1	-5.35***
Note: The critical values for the models with intercept only are -3.58, -2.93, and 2.60 for confidence levels of 99 percent, 95 percent and 90 percent respectively. The critical values without an intercept and trend are -2.62, -1.95, and -1.61 for confidence levels of 99 percent, 95 percent and 90 percent respectively. Rejection of null hypothesis is shown with * for 90 percent, ** for 95 percent and *** for 99 percent confidence levels.				

Table 3.5 gives the correlation matrix of *dly*, *dcap* and *dler*. Their first differences are included as the levels are not stationary. The results suggest that real output is positively correlated with capital inflows and real exchange rate.

Table 3.5 Correlation Matrix

Variables	*dcap*	*dler*	*dly*
dcap	1.00	0.29	0.35
dler	0.29	1.00	0.37
dly	0.35	0.37	1.00

CHAPTER 4

EMPRICAL ANALYSES

4.1 ARDL Model Results

The main concern of the analysis in this part is finding answers to the questions summarized below:

- Is there cointegration among the variables which means is there a significant long run relationship between the net capital inflows *(cap)*, real exchange rate *(ler)* and real GDP *(ly)*?
- Is there a significant short run relationship between *cap*,*ler* and *ly*?
- If the answers to the questions above are affirmative, what is the direction of the relationship between these variables?

To test the existence of cointegration among the variables, Bounds testing approach of Pesaran, Shin and Smith (2001) is used. The reason for selecting this approach is that it allows the variables to be stationary, integrated order one or a combination of both. Moreover, as illustrated by Pesaran et al. (2001), bounds testing for

cointegration is followed by an analysis of an autoregressive distributed lag model (ARDL) based on Pesaran and Shin (1999). This model allows examining both the short run and long run dynamics.

The Bounds testing approach (Pesaran et al. 2001) tests the null hypothesis of no cointegration. It is mainly a joint significance test of the one period lagged values of the levels in a conditional error correction model (ECM) expressed as follows:

$$\Delta LY_t = \alpha + \beta t + \sum_{k=1}^{p} \gamma_k \Delta LY_{t-k} + \sum_{k=0}^{p} \pi_k \Delta LER_{t-k} + \sum_{k=0}^{p} \rho_k \Delta CAP_{t-k} + \delta 1 LYt{-}1 + \delta 2 LERt{-}1 + \delta 3 CAPt{-}1 + \mu t \quad (4.1)$$

The first step is to test H_0: $\delta_1=\delta_2=\delta_3=0$ (the hypothesis of no cointegration) against the alternative H_1: $\delta_1\neq0$, $\delta_2\neq0$, $\delta_3\neq0$. The calculated F-statistics has a nonstandard distribution such that for each confidence level, two critical value bounds are developed: one assuming that all the variables are stationary and another assuming that all the variables are integrated of order one. These critical values provide upper and lower bounds to compare the calculated F-statistic. If the calculated statistics lies above the upper bound, the null hypothesis of no cointegration is rejected. If the calculated statistic lies below the lower bound, the null hypothesis cannot be rejected. If the calculated F-statistic falls between the lower and upper bounds, then a conclusion cannot be drawn, the analysis can be carried further into the ECM.

As Pesaran et al. (2001) stated bound testing results are sensitive to the selected lag length for the first differenced variables. In order to determine the appropriate lag length p and whether a deterministic linear trend is required, model 4.1 is estimated by OLS, with and without a linear time trend, for p=0,1, 2, . . . , 8. The calculated F-statistics for different lags chosen for the first differences of the variables are given in table 4.1. Following Pesaran and Pesaran (1997), the current values of the first differenced explanatory variables are not included at this stage, as it cannot be inferred that those variables are totally 'explanatory' rather than being 'dependent'. In other words, calculated F-statistics presented below are namely F(LY | LER, CAP) for now.

Table 4.1 The calculated F-statistics relevant for bounds test for different lag lengths of the variables and statistics for selecting lag order.

	Without deterministic trend			With deterministic trend		
Lag Length	F value	AIC	SBC	F value	AIC	SBC
1	2.811	105.049	99.495	6.523***	111.452	104.976
2	0.147	94.566	88.166	3.549*i*	100.609	93.294
3	0.108	90.969	81.936	2.090	94.894	84.957
4	0.468	88.042	76.445	5.575**	98.295	85.805
5	0.477	90.528	76.440	3.798*i*	98.312	83.342
6	1.141	88.264	71.756	9.202***	104.998	87.621
7	0.1729	94.299	75.450	2.903	102.951	83.245
8	0.3716	92.354	71.244	1.758	98.061	76.106
9	0.4744	91.750	68.460	2.210	100.728	76.606

The critical value bounds to test the null hypothesis of no cointegration are 3.17 and 4.14 for 90 percent, 3.79 and 4.85 for 95 percent, 5.15 and 6.36 for 99 percent confidence levels for without deterministic trend part (Pesaran et al. 2001, Table CI(iii) Case III).

The critical value bounds to test the null hypothesis of no cointegration are 3.38 and 4.02 for 90 percent, 3.88 and 4.61 for 95 percent, 4.99 and 5.85 for 99 percent confidence levels for with deterministic trend part (Pesaran et al. 2001, Table CI(iv) Case IV).

Rejection of null hypothesis is indicated with * for 90 percent, ** for 95 percent, and *** for 99 percent confidence levels, and *i* denotes inconclusiveness for 90 percent. Lag length refers to the lags of the level of the variables.

Table 4.2: The calculated statistics for correlation, homoscedasticity and functional form

	Without deterministic trend			With deterministic trend		
Lag Length	Serial Corr. Test(1)	Functional Form Miss. (2)	Heterosc. (3)	Serial Corr. Test(1)	Functional Form Miss. (2)	Heterosc. (3)
1	1.835* [0.766]	3.679* [0.055]	1.528* [0.216]	6.668* [0.155]	1.093* [0.296]	0.009* [0.923]
2	3.733* [0.443]	7.303 [0.007]	0.813* [0.367]	11.591 [0.021]	1.2840* [0.257]	0.327* [0.567]
3	15.360 [0.004]	6.737 [0.009]	0.142* [0.706]	18.630 [0.001]	1.9327* [0.164]	0.420* [0.517]
4	13.685 [0.008]	9.152 [0.002]	0.160* [0.689]	9.910 [0.042]	7.887 [0.005]	0.001* [0.971]
5	5.479* [0.242]	12.541 [0.000]	0.768* [0.381]	11.787 [0.019]	7.340 [0.007]	1.474* [0.225]
6	11.487 [0.022]	16.340 [0.000]	0.249* [0.618]	14.021 [0.007]	17.451 [0.000]	1.770* [0.183]
7	5.988* [0.200]	26.475 [0.000]	4.608 [0.032]	7.676 [0.104]	21.591 [0.000]	0.377* [0.539]
8	4.223* [0.377]	19.857 [0.000]	2.236* [0.135]	3.604* [0.462]	19.949 [0.000]	0.011* [0.915]
9	34.880 [0.000]	15.972 [0.000]	0.050* [0.823]	24.075 [0.000]	19.255 [0.000]	0.133* [0.715]

Lagrange multiplier (LM) statistics for testing the hypothesis of no residual serial correlation. The values are Chi-Square with order four and values in parenthesis are p-values.
Ramsey's RESET test using the square of the fitted values for testing the hypothesis of no functional form misspecification. The values are Chi-Square with order one and values in parenthesis are p-values.
Based on the regression of squared residuals on squared fitted values for testing the hypothesis of no Heteroscedasticity. The values are Chi-Square with order one and values in parenthesis are p-values.
Fail of rejection of null hypothesis is indicated with *

As seen from Table 4.2, for the models including deterministic trend, the hypothesis of no cointegration between the real output, the real exchange rate, net capital inflows is rejected at different significance levels for lag orders of 1, 4, and 6. The results are inconclusive for lag orders of 2 and 5. For the models without deterministic trend, the hypothesis of no cointegration between the real output, the real exchange rate, net capital inflows cannot rejected at any level of lag orders.

Table 4.1 also gives the Akaike's Information Criteria (AIC) and Schwarz Information Criteria (SC) to select the lag length. As seen from the table, AIC and SC agree on the optimum number of lags to be included as one whether deterministic trend is included or not. Finally table 4.2 gives the statistics to test serial correlation, homoscedasticity and functional form specification. Based on these statistics, only for the lag length one there is no serial correlation, no heteroscedasticity and no functional form misspecification.

Based on all statistics, the optimum lag length for the model is chosen as one. Moreover, since there is a cointegration relation in the models including deterministic trend and since the trend coefficient is significant in estimations, it is decided to select the models that have deterministic trend with the lag order one.

After determining there is a cointegration between capital inflows, real exchange rate and real gdp the next step is to determine the "long run forcing" (p.360) variables as Pesaran and Pesaran (1997) stated. In other words, among the three

variables, the variables which affect and which are affected should be determined. For this purpose, whether the one period lagged level variables are jointly significant in explaining the real exchange rate, the capital inflows are tested separately using bounds testing approach at lag levels determined above. In other words, *cap* and *ler* are chosen as the dependent variable in equation 4.1, and the bounds test is conducted for each separately. The results are given in table 4.3 below:

Table 4.3: The result of bounds test for different dependent variables

Estimated Model	F Value
LER | LY, CAP	4.330
CAP | LY, LER	4.810
The critical value bounds to test the null hypothesis of no cointegration are 3.38 and 4.02 for 90 percent, 3.88 and 4.61 for 95 percent, 4.99 and 5.85 for 99 percent confidence levels for with deterministic trend part (Pesaran et al. 2001, Table CI(iv) Case IV).	

As seen in table 4.3, the results show that if there is a cointegration among the three variables, net capital inflows are also possibly explained by other variables additional to the case where real gdp is explained by others. In other words, capital inflows variable can also be the dependent variable. However, since the question is the effect of capital inflows on growth *ly* will be considered as the dependent variable in estimations. These findings hint that a single equation model causes loss

of information, that is the possible feedback affects between the variables are ignored. This necessitates a dynamic multivariate analysis that will capture these interactions. Thus a VAR analysis will be run in the next part.

In the light of Pesaran et al. (2001), since the results shows there is a cointegration, an ARDL(q,r,s) following Pesaran and Shin (1999) is built and the estimates of the relationship between levels is examined. Accordingly, the long run relationship is examined next and the results are presented in Table 4.4.

Table 4.4: The long run estimates of the relationship between the levels

	Dependent Variable: *ly*	
Regressors	Coefficient	P value
Intercept	2.450***	0.003
Trend	0.010***	0.000
cap	1.160***	0.000
ler	0.070	0.674
Significance at 90 percent, 95 percent, and 99 percent is denoted by *, **, and*** respectively.		

The results show that real exchange rate is not a significant variable for affecting growth in the long run. *Net capital inflows* (*cap*) is the only significant variable for explaining *real GDP* (*ly*). The behavior is in line with the literature: increase in capital inflows leads to an increase in real output, meaning that there is a strong long run relation between capital inflows and growth.

The ARDL specification of the short run dynamics can be derived by constructing an error correction model (ECM) of the following form.

$$\Delta LY_t = \alpha + \beta t + \sum_{k=1}^{p} \gamma_k \Delta LY_{t-k} + \sum_{k=0}^{p} \pi_k \Delta LER_{t-k} + \sum_{k=0}^{p} \rho_k \Delta CAP_{t-k} + \varphi ECT_{t-1} + v_t \quad (4.2)$$

All coefficients of short run equation are coefficients relating to the short run dynamics of the model's convergence to the equilibrium and φ represent the speed of adjustment. The short run coefficients of the variables are presented in table 4.5.

Table 4.5: Estimated short run coefficients of the variables

	Dependent Variable: *dly*	
Regressors	ARDL(1,1,1)	
	Coefficient	P value
Intercept	0.859***	0.003
Trend	0.003***	0.000
dcap	0.283***	0.002
dler	0.070	0.215
ECT(-1)	-0.351***	0.000
Significance of the variables are indicated * for 90 percent, ** for 95 percent, and *** for 99 percent confidence levels.		

As results of the ARDL based ECM shows, the error correction term (ECT) is negative and highly significant. This means that deviations from the long run

equilibrium are corrected through time. Therefore, ECM supports the results of the Bounds test for existence of cointegration. In the short run, real gdp (*dly*) mainly depends on capital inflows (*dcap*). The coefficient of *dcap* is positive and highly significant in the short run. This means that capital inflows increase real gdp in the short run, in addition to long run significant affect. Real exchange rate coefficient is positive but insignificant in the short run equilibrium as in the long run.

To sum up, as explained above, net capital inflows causes an improvement in real GDP both in the short run and the long run. Long run estimations show that there is a significant, one to one relation, between net capital inflows and real output. Moreover, the coefficients of the error correction model shows that net capital inflows are also affective in determining the real output in the short run. In terms of the real exchange rate, the results showed that net effect of real exchange rate on real output is zero in the long run. Moreover, real exchange rate is not found to be a significant factor for real output in the short run as well.

4.2 VAR Model Results

Since the ARDL model is a single equation approach, it is inadequate in the presence of feedback relations. For example the effect of capital inflow on real exchange rate cannot be captured from the models estimated above. Thus a VAR model is constructed in order to assess the dynamic effects.

Before starting to construct a VAR model, it is important to decide whether the VAR model will be in levels or in difference form, since the variables that are used are non-stationary. According to Fanchon and Wendel (1992), there are three approaches in estimating VAR models with non-stationary data.

These estimation methods are:

- Estimating a vector error correction model which takes the difference of data to achieve the stationarity and use error correction term to restore the loss of information due to differencing data.
- Estimating VAR in levels with raw data, if the non-stationary data is cointegrated.
- Estimating a Bayesian VAR in which estimates are not affected by non-stationarity but the models are thought to be not appropriate when data is cointegrated.

According to asymptotic distribution theory developed by Phillips and Darlauf (1986), Stock (1987), West (1988) and Sims et al. (1990) if there is a cointegration between non-stationary explanatory variables then the OLS estimates provides consistent estimates for these variables. Thus under this theory, estimating a VAR model in levels with non-stationary data is possible if there is a cointegration between variables.

Since the variables are cointegrated according to Bounds test results to capture the macroeconomic effects of capital flows on real exchange rate and growth, the VAR analysis is performed in levels and model 4.4 was constructed to represent the economy for the VAR analyses.

$$\begin{bmatrix} 1 & b_{12} \\ b_{21} & 1 \end{bmatrix} \begin{bmatrix} x_t \\ y_t \end{bmatrix} = \begin{bmatrix} b_{10} \\ b_{20} \end{bmatrix} + \begin{bmatrix} \alpha_{11} & \alpha_{12} \\ \alpha_{21} & \alpha_{22} \end{bmatrix} + \begin{bmatrix} x_{t-1} \\ y_{t-1} \end{bmatrix} + \begin{bmatrix} \varepsilon_{xt} \\ \varepsilon_{yt} \end{bmatrix} \quad (4.4)$$

where x_t represents the *cap*, y_t is a vector of other key economic variables of interest which are *ler* rate and *ly*, and ε_{xt} and ε_{yt} are orthogonalized disturbances.

The system can be estimated by OLS, which yields consistent estimates of the parameters. However, this representation under-identifies the VAR. The model can also be written in matrix form as:

$$BX_t = \tilde{A}_0 + \tilde{A}_1 X_{t-1} + \varepsilon_t \quad (4.5)$$

In the light of Sims (1980) a recursive system is used to identify the model by forming B as a lower triangular. This means that x_t has a contemporaneous effect on y_t, but not vice versa. Thus, equation 4.5 can be represented as:

$$X_t = A_0 + A_1 X_{t-1} + e_t \quad (4.6)$$

where

$$A_0 = B^{-1}\tilde{A}_0\,, A_1 = B^{-1}\tilde{A}_1\; and\; e_t = \;\; B^{-1}\varepsilon_t$$

Both types of structural shocks can now be identified from the residuals of the recursive VAR model. This restriction indicates that:

- The residual of x_t from equation 4.6 (ext) and the residual vector of y_t from equation 4.6 (e_{yt}) affect y_t contemporaneously,
- But ext affects only x_t contemporaneously.

Cholesky decomposition is the method of this identification of the orthogonalized residuals of the VAR in triangular version. Under these restrictions the system is asymmetric which brings the importance of the order of variables. One way of determining the order of variables is granger-causality statistics. As Stock and Watson (2001) mentioned, these statistics help to observe whether lagged values of one variable is effective on predicting another variable. For example, if real exchange rate does not help predict capital inflows, then the coefficients on the lags of real exchange rate will all be zero in the reduced form capital inflow equation.

Table 4.6 summarizes the Granger-causality test results for the three variable VAR with one lag and a constant and trend term. It shows the p-values associated with the F-statistics for testing whether the relevant sets of coefficients are zero. The results show that *cap* helps to predict *ler* at the 5 percent significance level (p value is 0.04) but *ly* does not. Similarly, *cap* again helps to predict *ly*, however, *ler* does

not Granger cause *ly*. Finally both *ler* and *ly* do not help to predict *cap*, shows that *ca*p is the most exogenous variable affects economy contemporaneously but not vice versa.

Table 4.6 Granger Causality Tests

	Dependent Variable in Regression		
Regressors	*cap*	*ler*	*ly*
cap	0.00	0.04	0.00
ler	0.54	0.00	0.54
ly	0.79	0.37	0.00

Using the results of the granger causality tests and also in order to observe the effects of capital inflows on the economy, *cap* is put first in the ordering. The last variable in Cholesky ordering is *ly*, which is affected by *cap*. Although Granger causality tests show *ler* does not help to predict *ly*, following the literature *ler* is put second in the ordering. [1]

After determining order of the variables, a VAR model is constructed with one lag with a constant and a trend term following the results of ARDL Bounds test results. Generally VAR models are analyzed through impulse response functions. Impulse response functions represent the dynamic response (response of the current and

[1] To check the robustness of the model, the ordering of the variables is changed to *cap*, *ler* and *ly* in Cholesky decomposition. The impulse response graphs are given in Appendix A. It is seen from the impulse responses that most the results are same. The only difference is response of *ly* to *ler* is significant for 2 quarters in this case but the total size of response is only 2.7 percent.

future values) of a variable to an error term which refers to a shock or innovation in one of the VAR equations. Following Stock and Watson (2001), sixty-eight percent confidence bands, which are ±1 standard error bands, are estimated for impulse response functions. These error bands are generated with Monte Carlo bootstrapping method with 1000 repetitions in the light of Dungey and Pagan (2000).

The sizes of shocks applied to the VAR systems are generally either in the form of one unit or one standard deviation shocks of the error term. The measure applied for the impulse response analyses in this study is one standard deviation shock of error. The size of each shock is given in table 4.7. Since *ler* and *ly* is in natural logarithm form the size of shock is in terms of percentage. For example, the size of real exchange rate shock in impulse response functions is equal to 5.9 percent. However, since *cap* is not in natural logarithm form due to negative values in outflow periods, the size of shock is presented in units. To give an idea about the size of shock, the historical average of *cap* in the sample period can be given, which is 0.034.Finally, since the effect of sudden stop of capital inflows is investigated in VAR analysis, the impulse response shocks are applied as a negative shock.

Table 4.7: Impulse response shocks: one standard deviation of the error

Variable	Size of Shock
cap	-0.040
ler	-0.059
ly	-0.021

The impulse response analyses starts with the response of capital inflows to its own shock. Figure 4.1 presents the response of capital flows to one negative standard deviation of its own shock. The peak response occurs immediately and total impact persists nearly four quarters. The amount of initial response is about 4 percent of quarterly GDP level.

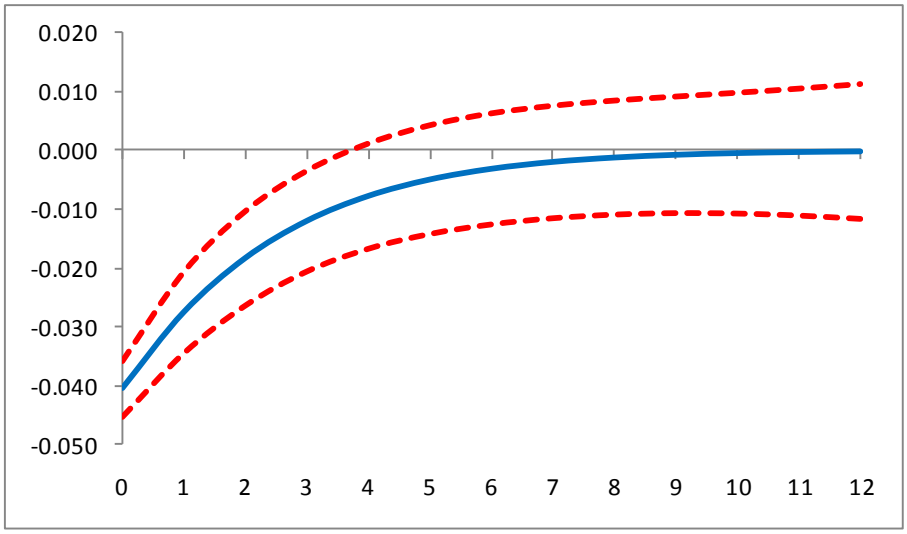

Figure 4.1: Response of *cap* to its own shock

Figure 4.2 shows the response of *ler* to a standard deviation negative shock of *cap*. The results confirm the initial expectations depreciation which is also given in literature[2]. Real exchange rate responds with an immediate depreciation of 2.1 percent. The peak response comes at the first quarter and the total affect lasts five quarters. Total amount of depreciation in this period is about 14.5 percent.

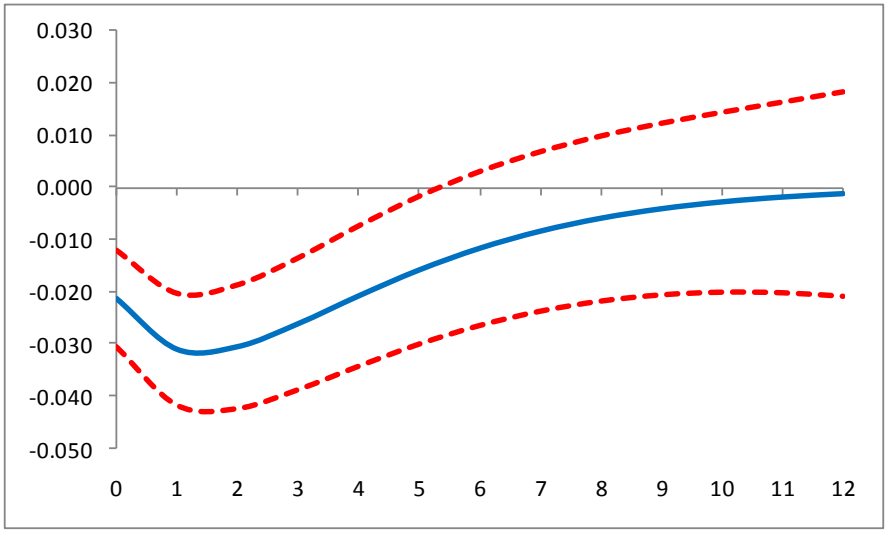

Figure 4.2: Response of *ler* to *cap*

Response of real exchange rate to its own shock is illustrated in figure 4.3. The initial response which also gives the size of *ler* shock is -5.9 percent. The impact of negative shock persist 2 quarters and causes depreciation around 9 percent.

[2] See Calvo and Reinhart (2000), Guidotti, Sturzenegger and Villar (2004), Calvo, Izquierdo and Mejia (2004), Calvo, Izquierdo and Mejia (2008), Hutchison and Noy (2004), Berument and Dincer (2004), Kilinc (2006), Celasun, Denizer and He (1999)

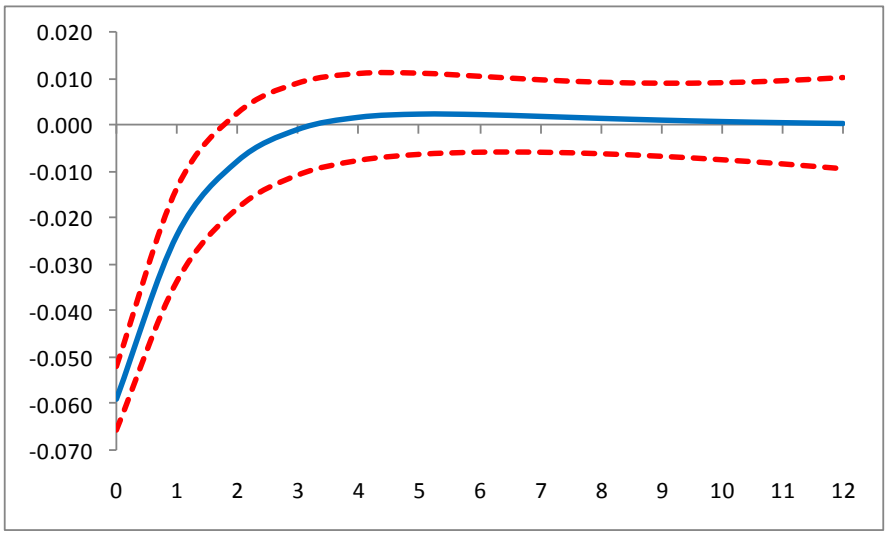

Figure 4.3: Response of *ler* to its own shock

Figure 4.4 shows the response of output to a negative capital inflow shock. As expected, output is affected adversely from a negative shock to *cap*, *which* means a capital inflow in this case. Output level responds immediately with 1.3 percent decrease and peaked at the second quarter. Output continued to be affected for 6 quarters with a total -12.4 percent level effect. It should be noted that 12.4 percent is not the change in annual growth. To give an idea about annual contraction in growth, a scenario was constructed. The baseline growth rates for 2010 and 2011 were taken from World Bank Global Economic Prospects (GEP) 2010 report. According to this report, growth rate is expected to be 6.3 percent in 2010 and 4.2 percent in 2011. Under the assumption that a capital outflow shock is given in the first quarter of 2010, annual growth comes to 3.7 percent in 2010 and 3.6 percent in 2011. Details of the calculation are given in table 4.8.

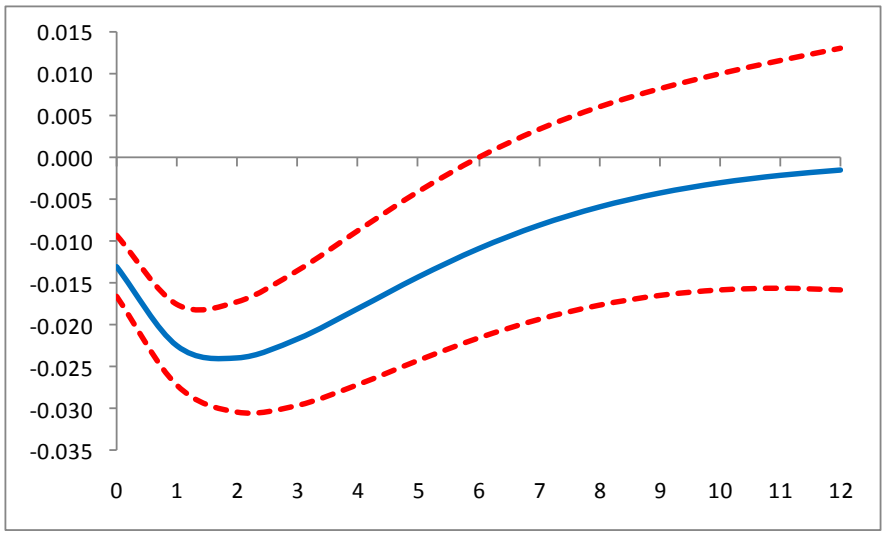

Figure 4.4: Response of *ly* to *cap*

Table 4.8: The effect of 1s.d *cap* shock on growth

	Baseline (GEP) *ly*	**Size of Shock**	**Shocked *ly***	**Baseline (GEP) *y***	**Shocked *y***
2009	…	…	…	96.8	96.8
2010Q1	3.179	-0.035	3.144	24.0	23.2
2010Q2	3.243	-0.024	3.219	25.6	25.0
2010Q3	3.272	-0.022	3.250	26.4	25.8
2010Q4	3.292	-0.018	3.274	26.9	26.4
2010	12.986		12.887	102.9	100.4
Annual Growth				**6.3%**	**3.7%**
2011Q1	3.185	-0.014	3.171	24.2	23.8
2011Q2	3.261	-0.011	3.250	26.1	25.8
2011Q3	3.291		3.291	26.9	26.9
2011Q4	3.315		3.315	27.5	27.5
2011	13.052		13.027	104.6	104.0
Annual Growth				**4.2%**	**3.6%**

In order to see the effect of capital outflows on growth in 2008-2009 global economic crisis, another scenario was constructed. To measure the effect of capital outflows, four consecutive shocks, started in 2008 Q3, were applied to the model. The amount of outflow was calculated as the difference between 2008Q4-2009Q3 net capital inflows and 2007Q3-2008Q3 net capital inflows, under the assumption that the amount of net capital inflows in crisis period would be 2007Q3-2008Q3 net capital inflows if there was no crisis. Each shock for the related four quarter was adjusted in order to reach this calculated net capital outflow in the crisis period. Moreover, the baseline growth rates were taken from 2008 Annual Program, which is prepared before the crisis thus, assumes there was no crisis in the projection period. These growth rates are 4 percent for 2008 and 2009 and 5 percent for 2010. The results of capital outflow shocks were calculated as 2.9 percent growth in 2008, 2.1 percent contraction in 2010 and 3.6 percent growth in 2010. The actual growth rates were 0.8 percent in 2008 and -5.2 percent in 2009. Thus according to the VAR model, 1.1 percentage points of 3.2 percentage points contraction in 2008 was resulted from capital outflows. The related number for 2009 was 6.1 percentage points of 9.2 percentage point contraction.

Last two responses to be examined are the response of output to real exchange rate and response of output to its own shock. Figure 4.5 shows the response of *ly* to *ler*. Output is affected negatively by a real exchange depreciation shock immediately. But the size of response is only -0.4 percent thus it is possible to say that exchange

rate depreciations does not directly affect output or net effect of exchange rate depreciation on output is zero.

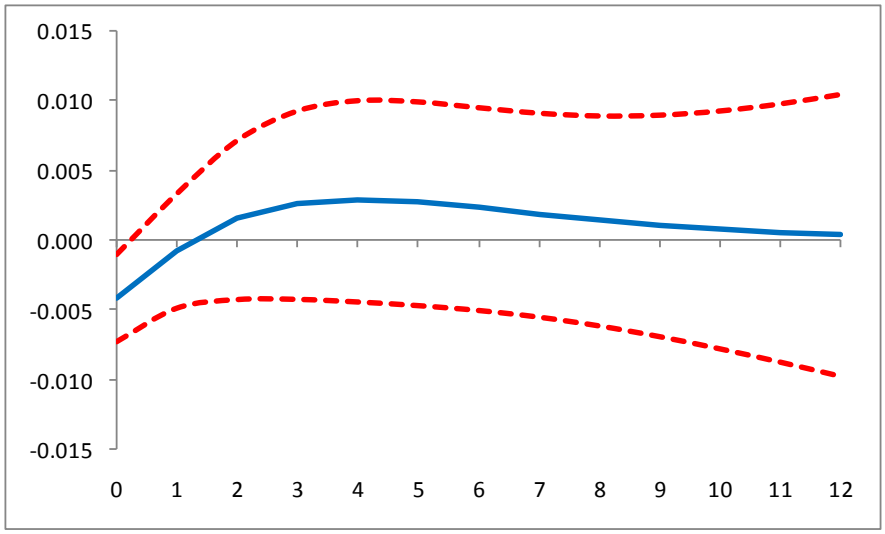

Figure 4.5: Response of *ly* to *ler*

Figure 4.6 gives the last impulse response graph, which is the response of output to its own shock. Output is affected by negatively by a negative output shock and this effect is persistent for 4 quarters. The peak response comes immediately with a size of 2.1 percent and the total amount of response in the 4 quarter is -5.5 percent.

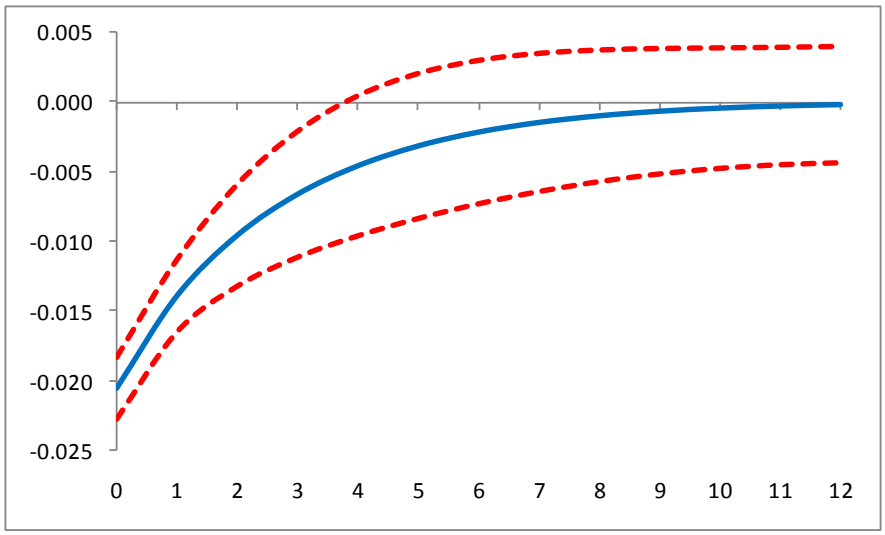

Figure 4.6 Response of *ly* to its own shock

Ineffectiveness of exchange rate in determining output brings the question of whether there is structural change in real exchange rate in the time period and if so, does it change the results. Chow test results sign the possibility of structural change for real exchange rate in 2001. In order to see whether a possible structural change affects the estimation results, VAR model is estimated for the period between 2002-2009. The impulse response functions are given in Appendix B. The results are mostly similar to the estimation results for the whole sample period. The only difference is response of *ler* to *cap* in the sense that real exchange rate is less responsive to a capital inflow shock. Finally response of *ly* to *ler* is insignificant in

determining real output, which shows that a possible structural change in real exchange rate does not change the results in general.[3]

After examining the dynamic affects of capital inflows on growth and real exchange rate with impulse response analyses, the next step is investigating the contribution of the shocks to the variability of variables. According to Stock and Watson (2001), forecast error variance decomposition is the percentage contribution of the specific shock error term to the variance of the error resulted in forecasting a variable in a time horizon. In other words, they named the forecast error decomposition as the partial R^2 for the forecast error, by forecast horizon. In the light of Stock and Watson (2001) study, variance error decomposition of the variables is presented in the following tables.

Table 4.9 shows that capital inflow shocks contribute significantly to capital inflow fluctuations. One of the main reasons for this result is the ordering of the variables in Cholesky decomposition and the other is the exogeneity of capital inflows.

[3] Finally, for another consistency check, the VAR model is estimated for the whole sample period, but with a dummy variable included which takes value 1 before 2002 and 0 after 2002. The impulse response graphs are given in Appendix C. It is seen from the graphs that, the results are again mostly same with the model without dummy variable. Moreover, real exchange rate is insignificant on determining real output showing that a possible structural change after 2002 is not changing the estimation results.

Table 4.9: Variance Decomposition of *cap*

Forecast Horizon	Forecast Standard Error	Variance Decomposition (Percentage Points)		
		cap	*ler*	*ly*
1	0.041	100	0	0
4	0.054	98.8	1.1	0.1
8	0.055	98.5	1.4	0.1
12	0.055	98.5	1.4	0.1

Table 4.10 suggests that capital inflow and real exchange rate shocks explain the fluctuations in real exchange rate forecasts. While real exchange rate is the main contributor in the beginning, capital inflow shocks started to gain importance in next periods. For example at the 12 quarter horizon, 48.6 percent of the error in the forecast of the real exchange rate is attributed to capital inflow shocks.

Table 4.10 Variance Decomposition of *ler*

Forecast Horizon	Forecast Standard Error	Variance Decomposition (Percentage Points)		
		cap	*ler*	*ly*
1	0.063	11.6	88.4	0.0
4	0.085	42.1	56.9	1.0
8	0.090	48.2	50.5	1.2
12	0.090	48.6	50.1	1.2

Table 4.11 illustrates the variance decomposition of output which is the main variable of interest. The results suggest that capital inflows and output are the main contributors in the fluctuations of output growth. In all time horizons, more than 95 percent of the error in the forecast of the output is attributed to the capital inflows and output shocks. However the composition of the contribution is changing through time. The proportional rate of capital inflow shocks in explaining the forecast error variance of output is 28 percent in the beginning and its contribution reaches to 69 percent in 4 quarter horizon and becomes the main contributor in explaining the fluctuations. Moreover, the results support the findings from impulse responses that the role of real exchange rate is insignificant in determining the real gdp.

Table 4.11 Variance Decomposition of *ly*

Forecast Horizon	Forecast Standard Error	Variance Decomposition (Percentage Points)		
		cap	*ler*	*ly*
1	0.025	27.6	2.8	69.7
4	0.050	68.6	1.1	30.4
8	0.057	74.1	1.5	24.4
12	0.058	74.4	1.6	23.9

CHAPTER 5

CONCLUSIONS

Developing countries witnessed two strong capital inflow waves in the last two decades both of which ended with crises. The first wave of 1990s ended with Asian crises and the second one in 2003-2007 ended with global economic crises of 2008-2009. Developing countries benefited from these strong inflows both economically and financially but also suffered severely from capital reversals episodes. These up and downs leaded to a growing interest on the costs and benefits of capital inflows on economy.

There are two different views in terms of the effect of capital inflows. Adherents of capital inflows and the associated integration to global economy claims that capital inflows generate the necessary funds for capital accumulation and enhance growth for countries having capital shortages. Opponents of capital inflows claim that increased capital inflows and dependence to foreign capital creates loss of competitiveness, over-heating and vulnerability to crises.

Turkey has also been exposed to large amounts of capital inflows like other emerging markets in 1990s and since the beginning of 2002 which are accompanied with a high growth performance. However, with recent crises in 2001 and 2008-2009, capital inflows exhibited sharp fall, followed by a substantial contraction in private investment and overall economic activity. The spillover from the global crisis in 2008-2009 increased the importance of analyzing the impact of external shocks, specifically capital inflow shocks, on Turkey's macroeconomic outcomes. External factors are likely to have a major role in Turkey's economic growth performance, particularly in the absence of strong domestic savings. This study is an attempt to analyze the role of capital inflows on growth by using recent Turkish data.

Going through the literature, it is found that sudden stop of international capital outflows has a contractionary effect on output growth through different channels. Investment and consumption are the main items of output affected by sudden stops. Moreover, capital inflow reversals cause a significant depreciation of the real exchange rate.

This study analyzes the relation between capital inflows and growth with two methodologies, which are ARDL and VAR modeling approaches. To the best of our knowledge, this the first study in Turkey which uses two methodologies together to analyze this relationship. Moreover, the study includes the latest data

which include global financial crisis in model estimations. In the empirical analysis, quarterly data is used covering the net capital inflows, real exchange rate and real GDP for the period of 1998-2009.

The analyses start with autoregressive distributed lag (ARDL) bound testing approach of Pesaran Shin and Smith (2001), based on the fact that bound testing approach allows the variables to be stationary, integrated of order one or a mixture of both. After checking the existence of cointegration, the analyses continue with ARDL approach of Pesaran and Shin (1999) to investigate the short run and long run relations.

The results of the bound tests (Pesaran et al. 2001) suggest that there is a cointegration between the variables of net capital inflows, real exchange rate and real gdp. Moreover, ARDL model results confirmed the expected results. It is found from long run model estimations that there is a significant one to one positive relation between net capital inflows and real output. Moreover, the coefficients of the error correction model shows that net capital inflows also affects the real output in the short run. Finally, in terms of the real exchange rate, the results showed that net effect of real exchange rate on real output is zero both in the long run and short run.

The analyses continued with VAR modeling since in the absence of feedback relations ARDL models can be insufficient to capture the dynamic responses. Since the variables are cointegrated according to Bound test results, based on the asymptotic distribution theory developed by Phillips and Darlauf (1986), Stock (1987), West (1988) and Sims et al. (1990) VAR model is estimated in levels of raw data.

The results of the VAR analyses are in parallel with ARDL results. Impulse response analysis shows that net capital inflows has a significant effect on real GDP. A negative shock to capital inflow causes a contraction in output and depreciation in real exchange rate. Moreover, net effect of real exchange rate on real gdp is zero strengthening the earlier ARDL results. Additional results of VAR analyses are (1) real exchange rate is affected significantly from capital movements (2) all variables are affected by their own shocks, (3) net capital inflow shocks are more effective than real output shocks in fluctuations of real gdp.

In short, the empirical analyses results confirmed what is expected. Capital inflows are effective in Turkey in determining output both in the short run and long run. Abundant foreign capital helps Turkey to grow but in case of reversal, a significant depreciation occurs and also output falls. This dependence on foreign capital exposes Turkey to the high risk of capital reversal. In order to achieve sustainable growth Turkey should either increase its domestic savings to decrease the

dependency on foreign savings or should design policies to attract capital in more stable form so that capital inflows are less affected from cyclical movements.

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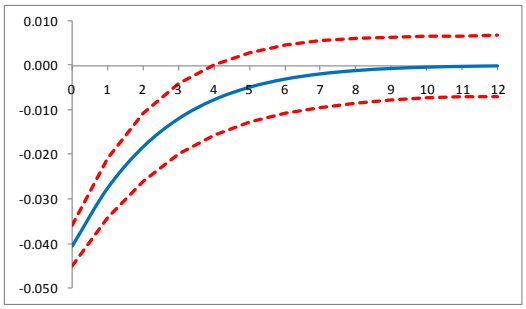
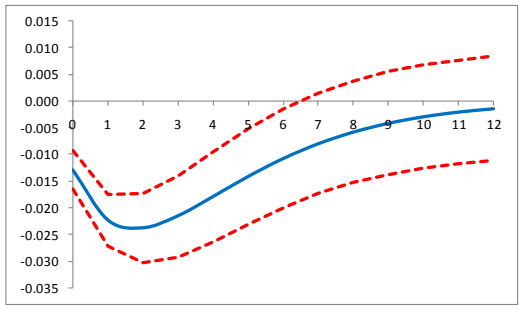
APPENDIX A: IMPULSE RESPONSE GRAPHS WITH CHOLESKY ORDERING OF *CAP, LY, LER*

Table A1: Impulse Responses to 1 s.d. shock

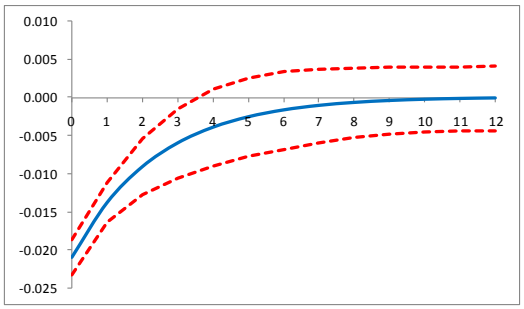
Response of *cap* to *cap*



Response of *ly* to *cap*



Response of *ly* to *ly*



Response of *ler* to *ler*

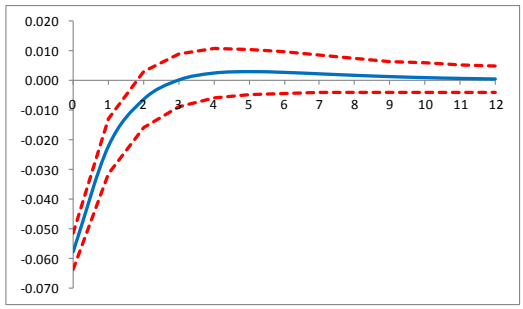
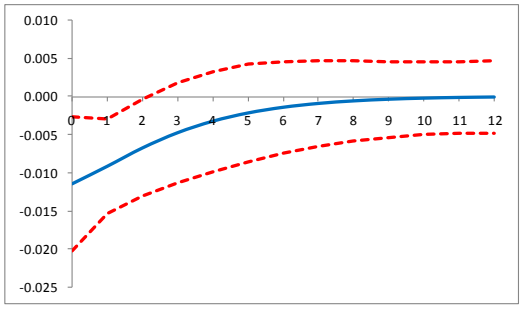
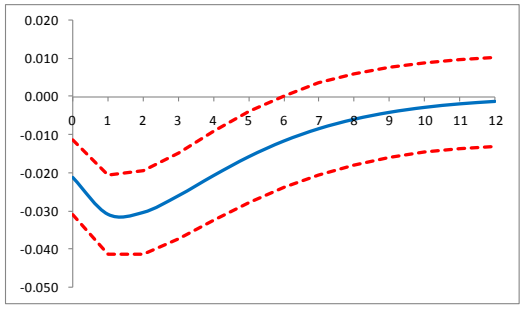


Table A1 (cont'd): Impulse Responses to 1 s.d. shock

Response of *ler* to *ly*



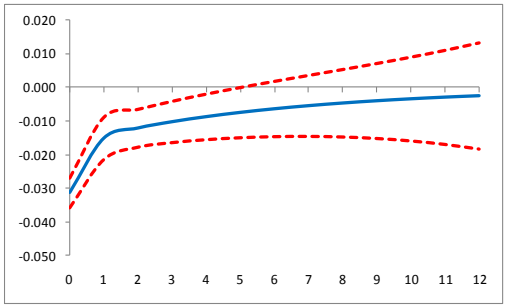
Response of *ler* to *cap*



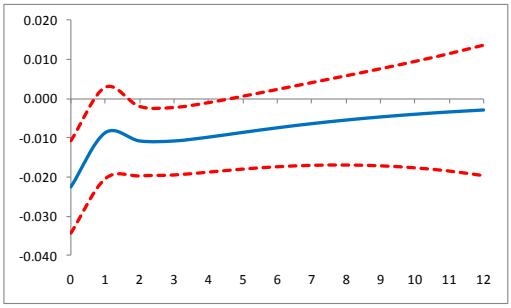
APPENDIX B: IMPULSE RESPONSE GRAPHS FROM THE VAR MODEL ESTIMATED BETWEEN 2002-2009

Table B1: Impulse Responses to 1 s.d. shock

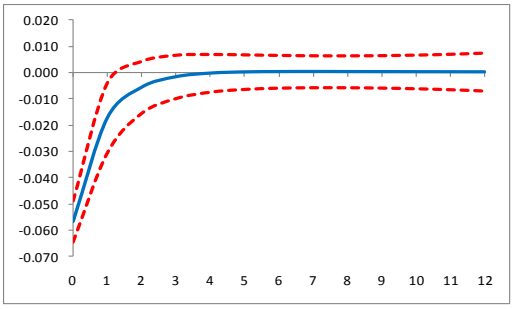
Response of *cap* to its own shock



Response of *ler* to *cap*



Response of *ler* to *ler*



Response of *ly* to *cap*

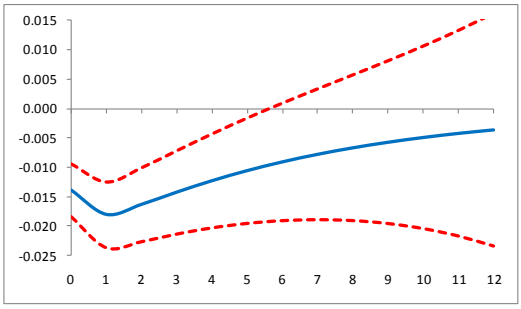
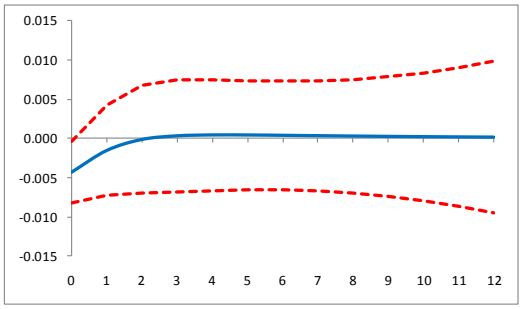
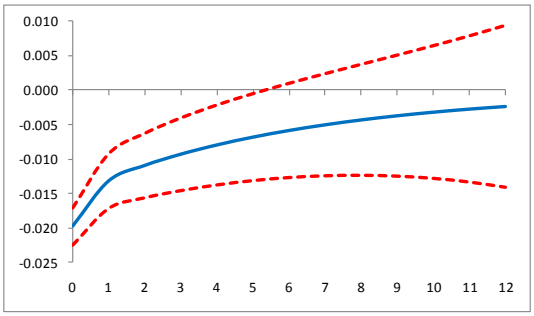


Table B1 (cont'd): Impulse Responses to 1 s.d. shock

Response of *ly* to *ler*



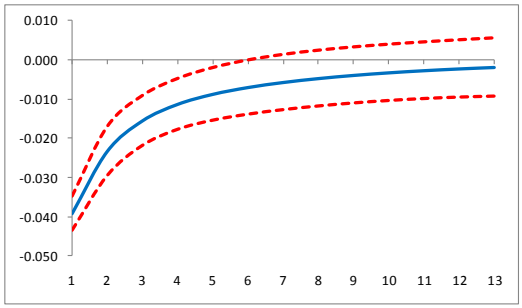
Response of *ly* to *ly*



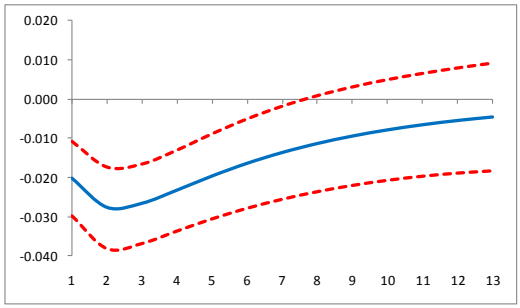
APPENDIX C: IMPULSE RESPONSE GRAPHS FROM THE VAR MODEL ESTIMATED WITH DUMMY

Table C1: Impulse Responses to 1 s.d. shock

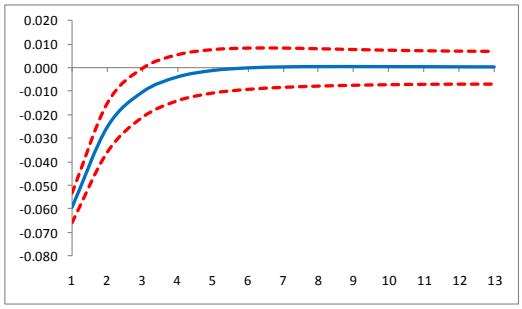
Response of *cap* to its own shock



Response of *ler* to *cap*



Response of *ler* to *ler*



Response of *ly* to *cap*

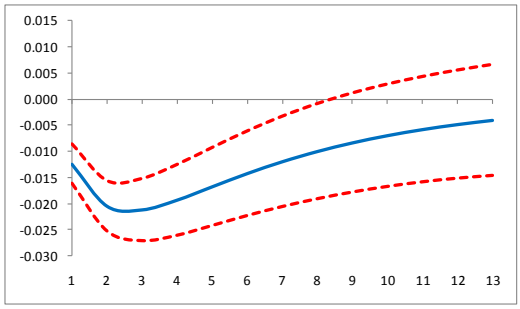
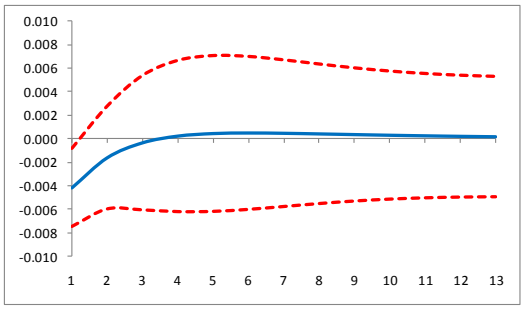


Table C1 (cont'd): Impulse Responses to 1 s.d. shock

Response of *ly* to *ler*



Response of *ly* to *ly*