

THE DETERMINANTS OF PORTFOLIO INVESTMENTS TO TURKEY:
FROM 1989 TO 2008

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ABSTRACT

THE DETERMINANTS OF PORTFOLIO INVESTMENTS TO TURKEY: FROM 1989 TO 2008

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This thesis analyzes the factors that determine the portfolio investments to Turkey in the period from 1989:04 to 2008:12. The factors that are examined are budget balance, current account balance, nominal exchange rate between the Turkish Lira and the US dollar, Turkish domestic interest rate, US 3-months Treasury Bill rate, annual inflation rate in Turkey and ISE 100 Index. A Vector Autoregressive Model is used for the purpose of examining the impacts of these variables on the level of portfolio investments to Turkey. The results of the model show that the portfolio investment in Turkey was affected positively by domestic interest rates and negatively by ISE 100 Index in the period before 2001. On the other hand, it is affected positively by exchange rate and US interest rate in the post-crisis period. It is also found that current account deficit affect portfolio investments negatively.

Keywords: Portfolio investment, VAR, capital flows, developing countries, Turkey

ÖZ

TÜRKİYE'YE GELEN PORTFÖY YATIRIMLARINI BELİRLEYEN FAKTÖRLER: 1989'DAN 2008'E

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Yüksek Lisans, İşletme Bölümü

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Bu tez 1989:04 – 2008:12 arasında Türkiye'deki portföy yatırımlarını etkileyen faktörleri incelemektedir. İncelenen faktörler Türkiye'deki bütçe dengesi ve cari denge, Türk Lirası ve Amerikan doları arasındaki kur, Türkiye'deki faiz oranları, Amerika'daki 3 aylık Hazine kağıtlarına uygulanan faiz oranı, Türkiye'deki yıllık enflasyon ve İMKB 100 endeksidir. Bu faktörlerin Türkiye'deki portföy yatırımlarına olan etkisini araştırmak için Vektör Otoregressif Modeli kullanılmıştır. Modelin sonuçları Türkiye'deki portföy yatırımlarının 2001 krizi öncesi dönemde faiz oranlarına pozitif, İMKB endeksi ile ise negatif bir ilişkisi olduğunu göstermektedir. Bununla beraber, 2001 krizi sonrası süreçte ise portföy yatırımları döviz kurundan ve Amerika'daki faiz oranlarından pozitif olarak etkilenmiştir. Ayrıca, cari açığın portföy yatırımları üzerinde negatif bir etkisi olduğu görülmüştür.

Anahtar kelimeler: Portföy yatırımları, VAR, sermaye akımları, gelişmekte olan ülkeler, Türkiye

to my parents

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TABLE OF CONTENTS

PLAGIARISM	iii
ABSTRACT	iv
DEDICATION	vi
ACKNOWLEDGEMENTS	vii
TABLE OF CONTENTS	viii
LIST OF TABLES	x
LIST OF FIGURES	xi
CHAPTER	
1. INTRODUCTION	1
2. LITERATURE REVIEW	12
2.1 Introduction	12
2.2 Details of some of the studies concluding that mainly external factors determine the amount of capital inflow to a country	15
2.3 Details of some of the studies concluding that mainly internal factors determine the amount of capital inflow to a country	21
2.4 Details of some of the studies concluding that both external and internal factors determine the amount of capital inflow to a country	28

3.	THE EMPIRICAL STUDY ON THE DETERMINANTS OF SHORT-TERM CAPITAL FLOW TO TURKEY	33
3.1	The Overview of Capital Flows to Turkey	33
3.2	Literature Review on Capital Flows to Turkey.....	41
4.	THE DETERMINANTS OF PORTFOLIO INVESTMENT TO TURKEY: EMPIRICAL INVESTIGATION.....	47
4.1	The Data.....	47
4.2	Econometric Evidence	48
4.2.1	Vector Autoregressive Models.....	49
4.2.2	Specification of the VAR Model	52
4.2.3	Unit Root Tests	53
4.3	Estimation of the Model.....	55
4.4	Implications of the Results.....	60
5.	CONCLUSION	63
	REFERENCES.....	66
	APPENDICES	
A.	GRAPHS OF THE SERIES AND THEIR DIFFERENCES.....	71
B.	DESCRIPTIVE STATISTICS	80

LIST OF TABLES

TABLES

Table 1.1 Private Capital Flows to Developing Countries by Region	7
Table 4.1 Results of ADF Unit Root Test.....	54
Table 4.2 Results of KPSS Stationarity Test	54
Table 4.3 Results of Phillips-Perron Unit Root Test	55
Table 4.4 Results of Lag Order Selection for the Period 1989:04-2008:12	56
Table 4.5 Results of the Lag Order Selection for the Sub-period 1989:04-2001:12	57
Table 4.6 Results of the Lag Order Selection for the Sub-period 2002:01-2008:12	57
Table 4.7 Results of the VAR Model for the period 1989:04-2008:12	58
Table 4.8 Results of the VAR Model for the Sub-Period 1989:04-2001:12	59
Table 4.9 Results of the VAR Model for the Sub-Period 2002:01-2008:12	60

LIST OF FIGURES

FIGURES

Figure 1.1 Growth Rates of Developed Countries and Private Capital Flows to Developing Countries.....	3
Figure 1.2 Private Capital Flows to Developing Countries and Current Account Balance in Developing Countries.....	4
Figure 1.3 Private Capital Flows and Change in Reserves in Developing Countries	5
Figure 1.4 Shares of Private Capital Flows to Developing Countries by Region	6
Figure 1.5 Components of Private Capital Flows to Developing Countries	8
Figure 1.6 Capital Flows to Turkey and Capital Flows to Developing Countries	10
Figure 3.1 Current Account Balance, Financial Account Balance, Net Errors and Omissions, Reserves as Percentages of GDP.....	34
Figure 3.2 GDP Growth Rate and Capital Flows in Turkey.....	36
Figure 3.3 Current Account Balance and Capital Flows in Turkey.....	37
Figure 3.4 Components of Capital Flows in Turkey.....	38
Figure 3.5 Components of Portfolio Investments in Turkey	40

CHAPTER 1

INTRODUCTION

Increasing capital mobility and international financial integration have contributed to the increasing level of capital flows to the developing markets in the recent years. Nevertheless, the incoming foreign capital has both positive and negative consequences on the domestic economies of those countries. In terms of the positive impacts, first of all, capital inflows tend to increase aggregate domestic demand and the level of investment in developing countries, and also contribute to the national production. Secondly, the government can finance its current account deficit with the incoming capital flows. In that regard, the presence of foreign capital provides flexibility to the developing countries in financing their deficits.

On the other hand, inflationary pressures, widening current account deficit and increasing level of vulnerability to external shocks are the negative impacts of the capital inflows to developing countries. Increasing aggregate domestic demand as a result of incoming capital flows may cause inflationary pressures. Moreover, capital inflow increases the supply of the foreign currencies which results in domestic currency appreciation. This appreciation causes a boost in imports which worsens the current account deficit in developing countries. In addition, capital inflows increase the currency risk for a country which makes it quite vulnerable to the external shocks. In the absence of a solid financial system, a sudden reversal can cause considerable macroeconomic instability. Mexico Crisis in 1994, East Asia Crisis in 1997, Russia Crisis in 1998 and Argentina and Turkey crises in 2001 are the examples of such situations.

Those possible impacts of capital flows points out the importance of the existence of sound monetary institutions in developing countries. Without a proper financial and banking system, the adverse effects of capital withdrawals are more likely to have worse consequences for developing countries. In that sense, capital flows may necessitate some structural changes. Moreover, capital flows can only take place in a liberalized economic system; therefore, financial liberalization is the starting point. However, in the case of a large reversal, a fully liberalized system can harm the economy of a developing country especially if the country is highly dependent on the foreign capital to finance its deficits, but lacks a system that can smooth the effects of such an outflow. Therefore, the timing as well as the extent of the liberalization is also crucial for developing countries and the structure of the domestic economy should be taken into the consideration while planning the financial liberalization.

In the last two decades, the level of the capital flows to those countries has increased significantly in the early 1990s. This situation can be explained by the declining level of interest rates globally. Another explanation might be the surplus generated by the growing economies of the advanced countries at that time which enabled them to increase their investments to developing countries. In addition, the increasing level of capital mobility with the aid of improvements in information technology, as well as spreading financial liberalization among the developing countries, has also facilitated the capital flows. The figure below shows the relationship between the GDP growth rate in advanced countries and consequent private capital flows¹ to developing countries.

¹ Private capital flows comprise net direct investment, net portfolio flows, and other long- and short-term net investment flows including official and private borrowing. In the standard balance of payments presentation, total net capital flows are equal to the balance on financial account minus the change in reserve assets.

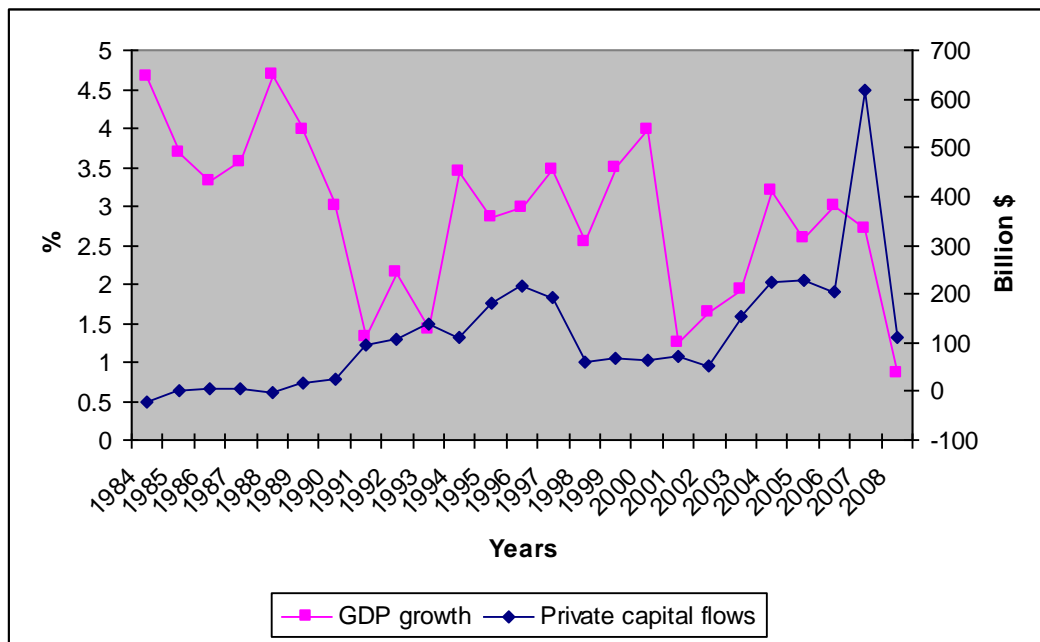


Figure 1.1²: Growth Rate of Developed Countries (Left Panel) and Private Capital Flows to Developing Countries (Right Panel)

As we can see from the graph, the positive relationship between the GDP growth rate of advanced countries and private capital flows to developing countries becomes apparent starting from the early 1990s. The private capital flows to developing countries gains an increasing trend from 2002. In 2007, it reaches to its peak of \$618 billion. However, it experiences a huge decrease and falls to \$110 billion in 2008. The GDP growth rate of the advanced countries also experiences a considerable decrease in the same year and declines to 0.85%. The main reason of those huge decreases can be the global financial crisis that started in 2007. In that regard, it can be concluded that the recessions experienced in the developed countries has caused the investors in those countries to get out of the developing markets. Therefore, it is safe to argue that the level of capital inflows to the developing countries is dependent on the global economic situation.

² Source: IMF World Economic Outlook Database, April 2009.

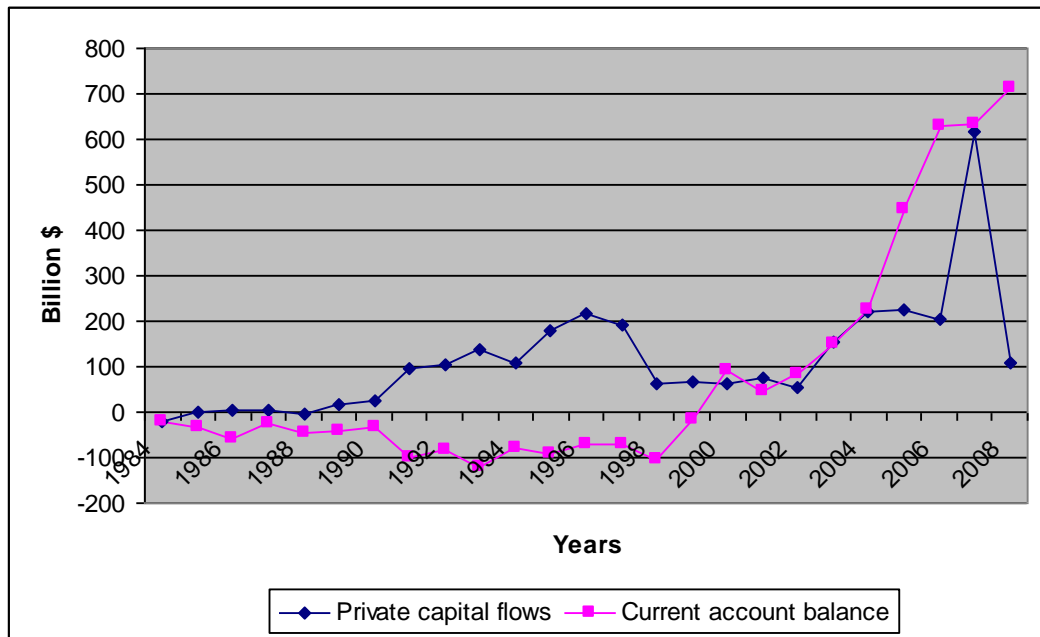


Figure 1.2³: Private Capital Flows to Developing Countries and Current Account Balance in Developing Countries

When the private capital flows and current account balance levels of the developing countries are compared, it is possible to see a negative relationship until 2000s. On the other hand, a positive relationship can be seen starting from 2000. Since 2000, developing countries have a current account surplus which shows an increasing trend. Similarly, the private capital flows also exhibit an increasing trend until 2008. However, there is a considerable decrease in the private capital flows in 2008 and the reason of this decline might be the global financial turmoil.

³ Source: IMF World Economic Outlook Database, April 2009.

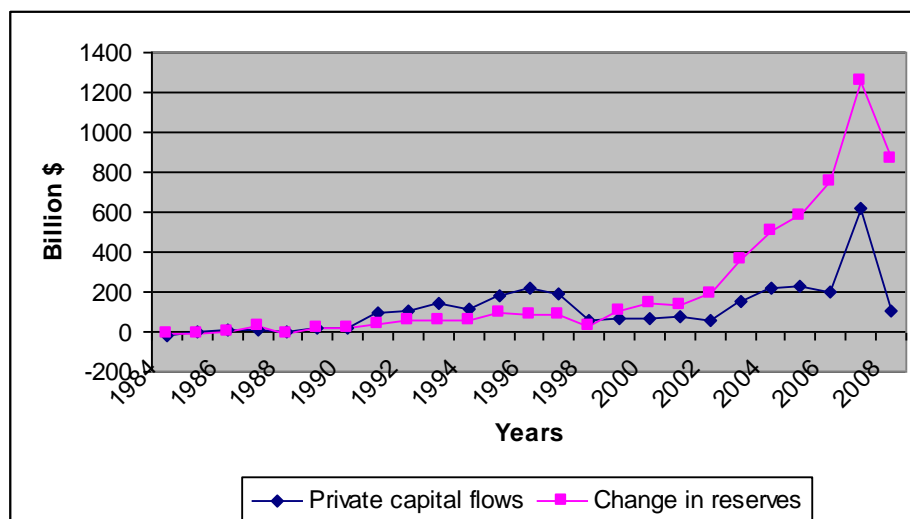


Figure 1.3⁴: Private Capital Flows and Change in Reserves in Developing Countries

There is a positive relationship between private capital flows to developing countries and change in reserves in those countries and both accounts show an increasing trend especially starting from 2000s. This can be explained by incoming foreign capital increasing the reserves by creating capital account surpluses. However, this situation is mostly correct in China's case which gets a noticeable portion of the capital flows to developing countries, so it is possible that including China might have produced this outcome. In 2007, private capital flows to developing countries reaches to \$618 billion while the international reserves increases by \$1260 billion.

Even though the recipient countries face the same international economic conditions that make them more attractive for foreign investment, the amount of capital flow to each country is different. The reason for this situation is the domestic economic conditions of the recipient country, like growth rate of GDP, interest rates offered, macroeconomic stability as well as political issues. The

⁴ Source: IMF World Economic Outlook Database, April 2009.

table and graph below shows the distribution of the private capital flow to developing countries by region in 2007.

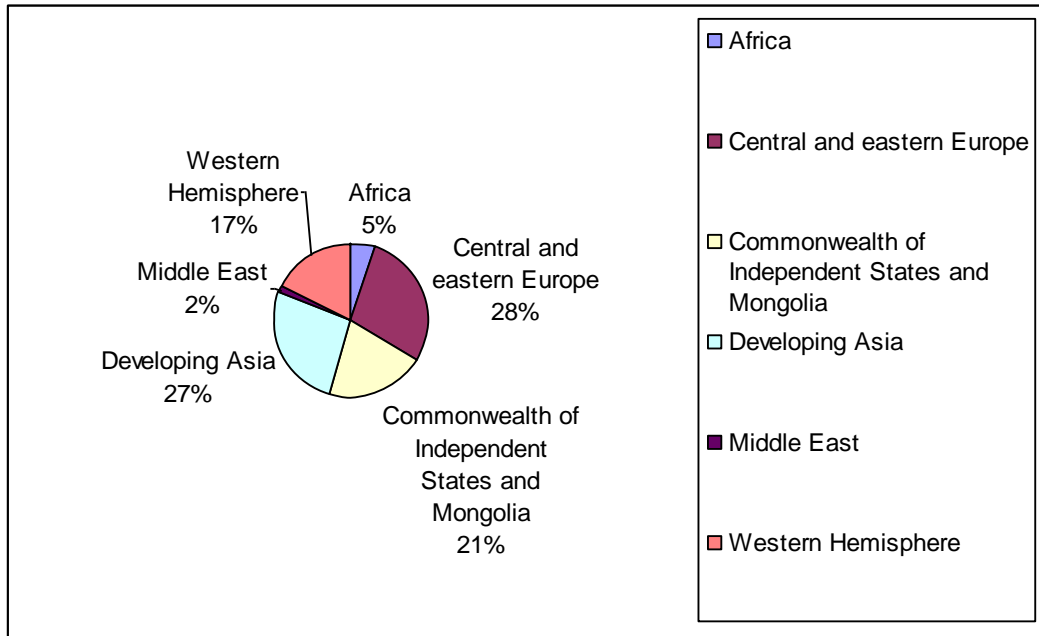


Figure 1.4⁵: Share of Private Capital Flows to Developing Countries by Region

⁵ Source: IMF World Economic Outlook Database, April 2009.

Table 1.1⁶: Private Capital Flows to Developing Countries by Region

Country Group Name	Capital flow (Billion US\$)	%
Africa	33.44	5%
Central and Eastern Europe	173.566	28%
Commonwealth of Independent States and Mongolia	127.231	21%
Developing Asia	164.838	27%
Middle East	11.007	2%
Western Hemisphere	107.408	17%
TOTAL	617.49	100%

The data show that the Central and Eastern European countries got the biggest share of the private capital flows in 2007. The second is the developing Asian countries. Middle Eastern countries received the lowest amount of private capital flows in the same year. This is probably due to the fact that Central and Eastern European countries as well as developing Asian countries have a more stable economy with better functioning financial institutions and more developed markets compared to Middle Eastern and African countries. Therefore, those countries attract more foreign investors. Moreover, some of the Middle Eastern countries themselves are net foreign investors and this situation nullifies the effect of the inflows they receive.

It should be noted that China is not included in the above analysis, however, in 2007 China has received around \$200 billion of FDI and non-FDI (PI and other investments) (Glick and Hutchison, 2008). It shows that China by itself gets approximately 25% of the total capital flows to developing countries.

⁶ Source: IMF World Economic Outlook Database, April 2009.

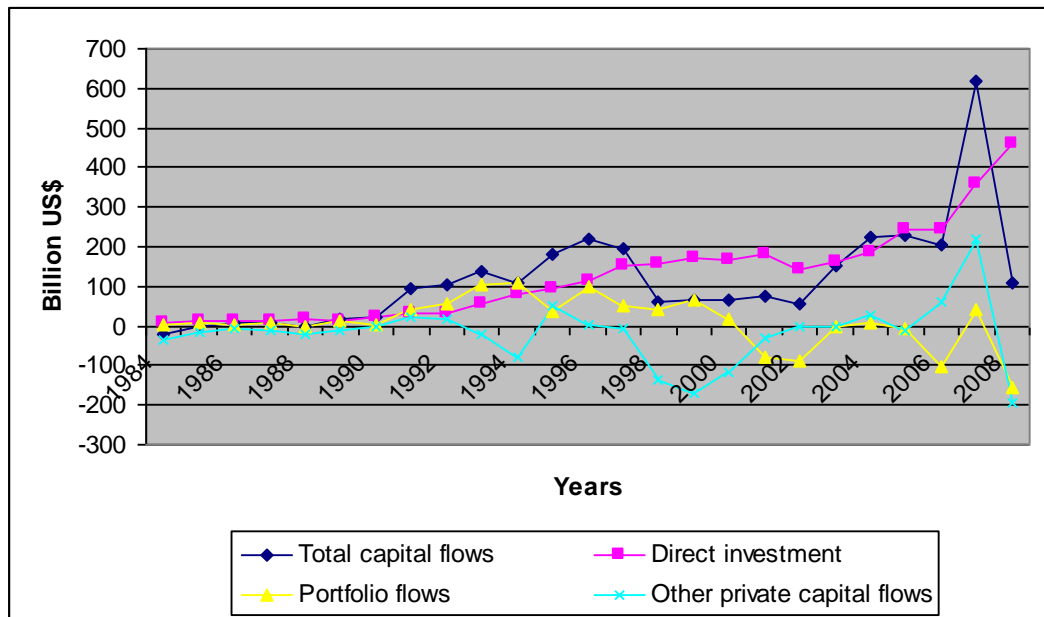


Figure 1.5⁷: Components of Private Capital Flows to Developing Countries

The graph above shows the components of private capital flows to the developing countries from 1984 to 2008. The private capital flows consist of direct investment, portfolio flows and other private capital direct investment has an increasing trend which becomes more obvious in 1990s. There is a sharp increase during the mid 2000s in direct investment. However, portfolio investments and other capital flows to developing countries have more volatile patterns. Considerable decreases in the other private capital flow in 1994, 1998 and 2008 can be seen. This shows that the other capital flows are quite dependent on the global economic climate since those are the years of important economic crises that had international impacts. Portfolio flows seem to be less volatile than the other capital flows, but still there are some crucial decreases in 2002, 2006 and 2008. These declines are probably related with the Argentina and Turkey Crises in 2001 and the global economic crisis in 2007. It means, portfolio investments to the developing countries are also related with the global economic condition.

⁷ Source: IMF World Economic Outlook Database, April 2009.

Among the three, direct investment to the developing countries is the less dependent one on the international economic condition, since it does not decline during the times of global financial and economic crises. The overall structure of the private capital flows also show that in 2000s, direct investment has become the main component of the capital flows to the developing countries whereas the overall portfolio flows are negative at that period.

The importance of the foreign capital flows for the developing countries and the impacts of them on those markets have caused people to elaborate the determinants of those flows. The studies have reached to different conclusions about the matter. Calvo *et al.* (1993), Fernandez-Arias (1996), Kim (2000), Ying and Kim (2001) claim that external factors such as international interest rates and global economic condition are the main determinants of the capital flows to the developing countries. On the other hand, according to the authors such as Dasgupta and Ratha (2000), Mody *et al.* (2001) and Hernandez (2001) who are in favor of the dominance of the internal factors, the situation of the domestic economy of the recipient countries is the main driving force of the incoming capital flows. A third argument on the matter is that, it is not possible to explain the capital flows just by looking at the external or internal factors. In their studies, Chuhan *et al.* (1993), Taylor and Sarno (1997), Milesi-Ferreti and Razin (1998) state that both push and pull factors are effective in the determination of the capital flows to the developing countries.

As a developing country herself, Turkey has liberalized her financial accounts in 1989 with the declaration of Decree 32. With this decree, the capital inflows and outflows to Turkey were fully liberalized for the aim of obtaining foreign capital. After that, Turkey received high amount of capital inflows in the early 1990s just like other developing countries which liberalized their financial accounts in the late 1980s. The graph below hints a positive relationship between the capital flows to developing countries and the capital flows to Turkey.

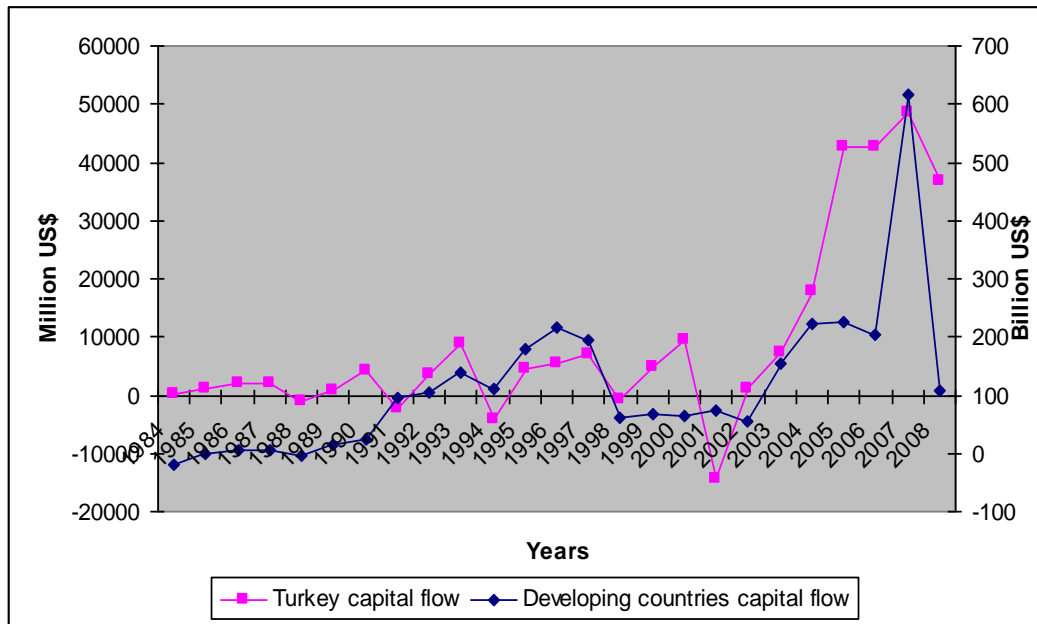


Figure 1.6⁸: Capital Flows to Turkey (Left Panel) and Capital Flows to Developing Countries (Right Panel)

Starting from the early 1990s, the volatility of the private capital flows has increased both for Turkey and for other developing countries. Moreover, starting from the early 2000s, the level of private capital flows shows an increasing trend in both cases. However, there is a decrease in both of these in the year 2008 as a result of the global financial crisis. Those facts indicate that Turkey has shown a similar pattern to the developing countries in terms of capital flows during the last two decades. Consequently, it is crucial to identify the factors that drive foreign capital flows to Turkey to create policies on managing those flows.

A previous study by Balkan *et al.* (2002) examined the determinants of short-term capital flows to Turkey. Çulha (2006) investigated the factors that determine the capital flows to Turkey. Another study by Kara (2007) examined the direct investment component of the capital flows to Turkey. This study investigates the

⁸ Source: IMF World Economic Outlook, April 2009.

factors that influenced portfolio investments to Turkey in the period of 1989 to 2008, and provide information on the missing portfolio flow component of the capital flows.

This study consists of five chapters including the introduction. In the following chapter, the literature on the determinants of direct and portfolio investments is presented. In the third chapter, the overview of capital flows to Turkey and the literature on this subject is presented. In the fourth chapter, the empirical analysis on the determinants of portfolio investments to Turkey and implications of the results are shown. In the fifth and the last chapter, the concluding remarks follow.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

When we look at the related literature, we see that the factors that are effective in the determination of the level of capital flows to a country are grouped mainly under two headings: the external factors and the internal factors. In the literature, one of the major debates about the factors that are effective on the capital inflows is whether the external or the internal factors play a bigger role in the determination of the capital inflows. These views of the authors about the issue can be gathered under three groups.

The external factors are the factors that emerge outside the mentioned country. The first group is stating that the external factors are the primary determinants of the level of capital flow in a country. Those arguments form the 'push' view which claims that the factors which arise outside of a country are the main determinants of the capital inflow to this country. In different articles, different indicators and sample countries are used. The most commonly used for the external factors are the level of international interest rates, the real interest rates of developed and influential countries such as the US and European countries, as well as global economic and financial climate. In that sense, they argue that the most important external factors are the international interest rates as well as prevalent economic and financial climate in the world. The widespread conclusion is that; the level of capital inflow to a particular country is likely to decrease when the international interest rate level is relatively higher than the interest rate that is offered by this country. Moreover, some of the authors also

conclude that the capital inflows to the countries tend to increase when the liquidity in the international financial markets increases and decrease when the liquidity in the international financial markets decreases.

With a different perspective, researches claiming that internal factors are the main determinants of the capital inflow to a country form the 'pull' view which argues that domestic economic and financial conditions of a country are the main driving force of the capital coming from the outside. The internal factors that play role in the determination of the capital inflows to a country are usually related with the domestic economic and financial situation of the country. The major indicators used within the internal factors are current balance, domestic real interest rate, real effective exchange rate, inflation rate and annual GDP level. Moreover, some authors also emphasize on the monetary and fiscal policies applied by the countries while elaborating the effect of internal factors on the level of capital inflows to a country.

These authors usually claim that some of the important domestic economic factors, such as current account deficits, domestic interest rates and the economic climate experienced within the country play an important role in the determination of the capital inflows to a particular country. In that regard, when the country is experiencing economic downturn, the capital inflows to this country tends to decrease since the confidence of the investors towards this country have deteriorated. Moreover, they also argue that considerable level of current account deficits; decreasing exchange rates and relatively lower domestic interest rates than international interest rates are some of the important internal factors that cause the level of incoming capital to a country to decrease. On the contrary, these authors also claim that when the economy of a country improves, the capital inflow to the country also increases due to the fact that the expectations of the foreign investors about this country become more positive. In addition, it is also stated that higher level of domestic interest rates relative to the international interest rates, current account surpluses or low level of current

account deficits and decreasing exchange rates are several important internal factors that result increased in the capital inflows to a country.

A point that should be noted about this approach is, the effect of the domestic interest rates over the capital flows is related with the level of the international interest rates. In other words, domestic interest rates can attract foreign capital only if it is higher than the international interest rates. Since domestic interest rate is an internal factor whereas international interest rate is an external factor, the actual effect of the interest rates can be considered as a case in which both internal and external factors are influential.

The third view in the literature is that, both external and internal factors explain the changes in the level of capital inflows to a country. The supporters of this argument claim that external factors such as international interest rate and current global economic climate are effective in the determination of the capital inflows, but still, the role of the internal factors such as domestic economic indicators and fiscal and monetary policies pursued by the countries cannot be neglected. Those authors conclude that before the liberalization of the most of the economies in 1990s, the internal factors were dominant determinants of the capital movements to a particular country. However, with the acceleration of the economic liberalization movements in the developing countries and increasing level of internationalization of the financial markets in 1990s, the role of external factors has increased. In that regard, the supporters of this idea claim that although both external and internal factors are effective in the determination of capital inflows, the influence of external factors in that process has intensified compared to internal factors in the last decade.

In the following section, the factors affecting capital movements to developing countries will be elaborated in a more detailed fashion by analyzing major papers for each of the three views. The studies supporting the view that mainly the external factors influence the level of capital inflows coming to a country are examined first. Secondly, the papers supporting the dominance of internal factors

over external factors about the capital inflows are analyzed. And finally, papers concluding that both external and internal factors are determinants of the level of capital inflows to a country are studied.

2.2 Details of some of the studies concluding that mainly external factors determine the amount of capital inflow to a country

In this section, three different papers with the perspective that it is chiefly the push factors that are dominant in the designation of capital inflows are studied.

In one of the papers about the subject, it is debated that mainly the external conditions explain the increase of the capital inflows to Latin America countries in the early 1990s (Calvo *et al.*, 1993). Those conditions are, first, decreasing US short-term interest rates, second, continuing recession in the US, and third, increasing outflows and decreasing inflows in the US balance of payments. For econometric analyses, monthly data were taken from ten Latin American countries (Argentina, Bolivia, Brazil, Chile, Colombia, Ecuador, Mexico, Peru, Uruguay, and Venezuela) between January 1988 and December 1991.

In the econometric analyses, first of all, Calvo *et al.* (1993) establish the extent of co-movement of official reserves and real exchange rates among the countries because those variables proxy for capital flows. Then, the role of the external factors to the capital inflow to Latin America has been analyzed. At that point, the authors mainly focus on various US indicators as external factors and use the data between 1988 and 1991. The US variables for external factors are US Treasury bill rate, certificate of deposit, commercial paper, treasury long bond, one month capital gain in S&P 500, 12-month capital gain in real estate, and deviations from trend in real disposable income. In order to define the relationship between these external factors and capital flows in Latin America a structural vector auto regression (VAR) is used.

After operating the model, the paper reaches to five important conclusions:

1. For most countries, external factors determine about 50 percent of the monthly error variance in the real exchange rate;
2. External factors explain the biggest part of the variance of the real exchange rate in countries (Bolivia, Chile, Colombia, and Ecuador) that has not experienced major changes in domestic policies between the periods 1988-1991;
3. External factors explain the least for Argentina, Brazil, Mexico, and Venezuela where significant domestic policy changes took place during the period between 1988 and 1991;
4. External factors determine a considerable part of the forecasted error variance in monthly reserves in most of the countries;
5. The reserves decline as capital flows out, mainly due to the reason that an increase in the interest rates abroad induces a capital outflow from those countries;

In conclusion, according to the findings of Calvo *et al.* (1993), the decrease in the US interest rates in the early 1990s increased the capital inflows to Latin American countries. The result of this capital inflow is appreciation of the domestic currencies and accumulation in the official reserves. In the end, the paper states that the external factors are main determinants of the capital inflows to developing countries.

Calvo *et al.* (1996) has a similar approach about the determinants of capital flows. In this study, it is argued that both external and internal factors are effective in increasing level of capital inflows to Latin American and Asian countries throughout 1990s. The main argument is, both external and internal factors played an important role in the surge of capital inflow to the developing economies of Asia and Latin America in 1990s. The examined countries are Indonesia, Malaysia, Philippines, and Thailand in Asia; Argentina, Brazil, Chile,

Colombia, and Mexico in Latin America. The data were collected for the period between 1988 and 1994.

In the paper, it is stated that, external factors are more effective compared to the internal factors. In that respect, the paper state several causes of the capital inflows to those countries:

1. Sustained decline in the world interest rates: Interest rates in developed countries such as the US were declining in the early 1990s and thus, lower interest rates in the developed nations attracted investors to the high-investment yields and improving economic prospects of economies in Latin America and Asia. However, the tightening of the monetary policy in the US in 1994 resulted in increasing the level of interest rates and made investment in Asia and Latin America less attractive.
2. In the early 1990s, recessions were experienced in the US, Japan and many countries of Europe. As a result of this swing of international business cycle, profit opportunities in developing economies had emerged while becoming more attractive for investors. However, as the OECD counties moved toward recovery starting from mid-1990s, this factor became less important for creating capital inflows for developing countries of Asia and Latin America.
3. There had been a trend toward international diversification of investments in major financial centers and toward growing integration of world capital markets (Gooptu, 1993). Increasing amount of funds managed by life insurance companies and mutual funds have entered emerging markets (El-Erian, 1992).
4. Many heavily indebted countries improved relations with external creditors. Another domestic policy was debt-equity swaps in encouraging foreign direct investment (Edwards, 1991).

5. Several countries began to adopt sound monetary and fiscal policies as well as market oriented reforms that have included trade and capital market liberalization. Bolivia, Chile and Mexico implemented major disinflation policies in late 1980s, while Brazil, Ecuador and Peru have done so during the early 1990s. This can reduce macroeconomic risks and stimulate capital inflows. A similar outcome can be obtained from introduction of institutional reforms, such as liberalization of the domestic capital market (Obstfeld, 1986) and the opening of the trade account (Calvo, 1988).
6. Contagion effects: a large shift in capital flows to one or two large countries in a region may generate externalities for the smaller neighboring countries.

In conclusion, the authors argue that both external and internal factors have a determining role in the level of capital inflow to developing countries. However, especially in the first half of the 1990s, the effect of the external factors was more dominant than the internal factors (Calvo et al., 1996). But still, the internal factors remain important and countries with sound domestic fundamentals attracted capital on a larger scale and with a higher proportion of long-term investment.

In another study that supports the “push” view, the author suggests that even with the existence of country creditworthiness, the continuation and maintenance of capital inflows to a country is vulnerable to external factors (Fernandez-Arias, 1996). In the paper, the author uses an analytical model of international portfolio investment in developing countries which is based on non-arbitrage conditions between external returns and domestic returns adjusted by country risk. The countries that are selected are Algeria, Argentina, Brazil, Chile, Korea, Malaysia, Mexico, Panama, Philippines, Poland, Thailand, Uruguay, and Venezuela and the time range is between 1989 and 1993.

In the model, the variables used are capital flows and stock ratios, external returns and creditworthiness. For the econometric estimation and testing, OLS estimators are used. In the model, the proximate factors that affect increase the inflows in those countries are the improving economic climate, rising country creditworthiness, and falling international returns. According to the model:

1. Except Argentina, Republic of Korea and considerably Mexico, the capital inflows are driven mainly by low level of returns in developed countries than by domestic factors,
2. Increased country creditworthiness has an important role in explaining capital inflows in many countries, but its effect is smaller than international interest rates (except Argentina),
3. International interest rates are the most effective factor that determines the capital inflow in those countries. This implies that it is mainly the “push” factors that determine the portfolio flows,
4. The low returns in developed countries pushed the capital inflows either directly or through creditworthiness in most countries,
5. Since the capital inflows are highly dependent on the external factors according to the model, it can be argued that most developing countries are vulnerable to adverse exogenous developments that would make the capital inflows unsustainable,
6. However, since the stock adjustment is not an important part of the adjustment mechanism in the capital inflows, a high increase in international interest rates would result in less capital inflow or moderate capital outflows instead of high amount of capital outflows in those countries.

In his paper, Kim (2000) compares the effectiveness of external and internal factors by using different indicators for both sides on four developing Latin

American and East Asian countries; Mexico, Chile, Korea and Malaysia. The domestic factors used are country specific supply shocks, aggregate demand shocks, disinflation shocks, and monetary shocks. On the other hand, the external factors that are included in the model are changes in output and interest rates in industrial countries as well as terms of trade shocks. For econometric analyses, structural VAR method is used to see the role of factors taken in determining the capital inflows to the selected countries. In the end, the author reaches two important conclusions:

1. There has been a drastic increase in the role of external factors such as decreases in the world interest rates and recessions in developed countries about the capital inflows in sample countries while the role of domestic factors such as aggregate demand shocks and domestic supply has decreased especially in the past ten years.
2. The causes of capital inflows differ among the four countries that are examined. For the case of Malaysia, Mexico and Chile, the influence of domestic factors is more than the influence of the external factors at the beginning, but in time, the external factors have become more dominant. However, in the case of Korea, the effect of external factors is the strongest amongst the four.

Similarly, Ying and Kim (2001) have found out that capital inflows coming to Mexico and Korea are mostly determined by the push factors such as the US business cycle and foreign interest rates. In their analyses on Korea and Mexico, they have used structural VAR models in which the capital account is the dependent variable whereas world supply shocks and the foreign interest rate shock are external factors and domestic supply and domestic money are internal factors. The data sets are taken on quarterly basis and cover the period 1960:01 – 1996:04 for both countries.

The results of the empirical analysis show that external factors have become more important for capital flows in Mexico and Korea. The effect of foreign interest rate on capital inflows has become more apparent in the 1990s. Moreover, it is also found out that foreign output shock explains more than 50% of the changes in capital flows in both countries. According to the authors, it means that the capital flows in Mexico and Korea are very sensitive to business cycles in developed countries and reversals may occur in times of unfavorable foreign economic conditions.

In conclusion, according to the papers supporting the ascendancy of the external factors in this subject, it is mainly the global indicators such as international real interest rates and the global economic situation that determine the amount of capital inflows coming to a country. The relatively lower level of international interest rates compared to the domestic real interest rates or a positive global economic condition which results in an increase of the liquidity available in the international markets result in an increase in the capital inflows, whereas higher level of international interest rates compared to domestic real interest rates or a global economic downturn which results in a lack of liquidity within the international markets tend to cause a decrease in the capital inflows.

2.3 Details of some of the studies concluding that mainly internal factors determine the amount of capital inflow to a country

In the literature, there are studies concluding that the internal factors are the main driving force behind the determination of capital inflows into markets. One of the main claims of supporters of this idea is that the overall economic situation of the country, and the policies followed by the governments are the main determinants of capital inflows. In the following section, different studies on this topic will be elaborated.

Berg and Patillo (1999) elaborate the reasons behind the Asian financial crises in 1997 and conclude that high level of increase in the domestic credit growth,

overvaluation of real exchange and vulnerability of the financial system in the sampled developing countries were the main factors that increase the probability of a crisis in those countries. In order to predict the crises and their possible reasons, three different models are used. In the KLR (Kaminsky, Lizondo, and Reinhart) Signals Approach, the monthly data from 20 sample countries (Argentina, Bolivia, Brazil, Chile, Colombia, Denmark, Finland, Indonesia, Israel, Malaysia, Mexico, Norway, Peru, the Philippines, Spain, Sweden, Thailand, Turkey, Uruguay, and Venezuela) were taken for the time period between 1970 and 1995. In the model, several domestic as well as external factors are used to predict the 1997 financial crises⁹. The model concludes that the countries with overvalued exchange rates as well as huge current deficits are more likely to experience currency crises in the future. In the end, the model succeeds to predict the 1997 to a certain degree; however, the overall explanatory power of the model is low.

The second model is Frankel and Rose (1996) Probit Model Using Multi-Country Sample (FR). In this model, annual data for over 100 developing countries are used for the period between 1970 and 1992. Domestic as well as external indicators are used as variables in the model to estimate the probability of a currency crash.¹⁰ According to that model, probability of crisis increases when

⁹ The indicators used in this model are (1) international reserves in U.S. dollars; (2) imports in U.S. dollars; (3) exports in U.S. dollars; (4) terms of trade; (5) deviations of the real exchange rate from a deterministic time trend (in percentage terms); (6) the differential between foreign and domestic real interest rates on deposits; (7) “excess” real M1 balances, where excess is defined as the residuals from a regression of real M1 balances on real GDP, inflation, and deterministic time trend; (8) the money multiplier of M2; (9) the ratio of domestic credit to GDP; (10) the real interest rate on deposits; (11) the ratio of (nominal) lending to deposit rates; (12) the stock of commercial bank deposits; (13) the ratio of broad money to gross international reserves; (14) an index of output; and (15) an index of equity prices measured in U.S. dollars. The indicator is defined as the annual percentage change in the level of the variable (except for the deviation of the real exchange rate from trend, “excess” real M1 balances, and the three interest rate variables) (Berg and Patillo, 1999, p.110).

¹⁰ The variables used in the model are as follows: Domestic macroeconomic variables: (1) the rate of growth of domestic credit, (2) the government budget as percent of GDP, (3) and the growth rate of real GNP. Measures of vulnerability to external shocks include: (1) the ratio of total debt to GNP, (2) the ratio of reserves to imports, (3) the current account as a percentage of GDP, and (4) the degree of overvaluation, defined as the deviation from the average bilateral real exchange over the period. Foreign variables are represented by (1) the percentage growth rate of real OECD

output growth is low, domestic credit growth is high, foreign interest rates is high, and FDI as a proportion of total debt is low. However, the model mostly fails to provide much insight about the 1997 financial crisis.

The third model, Sachs, Tornell, and Velasco (1996) Cross-Country Regressions (STV) analyzes the 1994 Mexican Tequila crisis and its effect on the other emerging markets. In the model, 20 sample countries and their data in 1995 is used. The purpose is to understand in which sample country the effects of the crisis will be most apparent. With the use of regression models with a focus on decreasing reserves in sample countries, the model claims that the countries with vulnerable banking structures and overvalued exchange rates were more likely to suffer from capital outflows in 1995 financial crises. However, the model mostly fails to predict the 1995 crises that are driven by the Tequila Crisis experienced in Mexico in 1994.

In the end, all three models conclude that in the countries which the domestic credit growth rate as well as ratio of M2 to reserves is high, and the exchange rate is overvalued. Besides, both FP and KLR models suggest that a large current account deficit is a big risk factor for currency crises in the future. In that regard, Berg and Patillo (1999) mainly argues that the internal factors had a bigger role than the external factors in the beginning of the 1997 Asian Crises.

With a similar point of view, Moreno (2000) claims that the pegging system applied in East Asian economies prior to 1997 Asian financial crises increased the vulnerability of these countries' economies towards crises. The author uses data

output (in U.S. dollars at 1990 exchange rates and prices), and (2) a "foreign interest rate" constructed as the weighted average of short-term interest rates for the United States, Germany, Japan, France, the United Kingdom, and Switzerland, with weights proportional to the fractions of debt denominated in the relevant currencies. Characteristics of the composition of capital inflows are expressed as a percentage of the total stock of external debt and include (1) amount of debt lent by commercial banks, (2) amount that is concessional, (3) amount that is variable rate, (4) amount that is public sector, (5) amount that is short-term, (6) amount lent by multilateral development banks (includes the World Bank and regional development banks but not the International Monetary Fund), and (7) the flow of FDI as a percentage of the debt stock (Berg and Patillo, 1999, p.116).

sets from two different groups of sample countries. In the first group, the data from seven East Asian countries (Hong Kong, Indonesia, Malaysia, Philippines, Singapore, South Korea, and Thailand) have been collected for the period from 1975 to 1999. For the second group, the author used data from 98 developing countries. For the model, three sets of macroeconomic indicators are taken into account: (1) Indicators of macroeconomic performance: inflation and output; (2) Indicators of macroeconomic policy: nominal and real money growth and the budget balance as a percentage of nominal GDP; (3) Indicators of external state behavior: openness and the current account as a proportion of GDP and percentage changes in the nominal and real exchange rate.

In terms of inflation and output, the findings show that in the case of full sample countries, under the floating regime, the inflation is slightly less volatile than the pegged currency system. On the other hand, the output level was higher in pegged regime in pre-1997 period than floating system, because, first of all, floating system provides more flexibility in shocks and this causes fluctuations to occur in output level. And secondly, fluctuation in the value of yen had crucial effects on trade and foreign direct investments, as well as on business cycles in East Asia (Kwan, 1998).

About the money growth, it was seen that the nominal M2 growth accelerated two years before the 1997 crisis and the growth level is higher under the pegging regime. Nevertheless, the money growth faced with a slowdown after 1997, meaning that under the pegged regime, the liquidity in the economy increased just before the crisis, but in the post-crisis period, the rapid growth of liquidity started to slow down. With regard to the external sector, it can be observed that after the implementation of floating systems, the increasing volatility in terms of exchange rates affected the investments towards the East Asian countries adversely (Moreno, 2000). Moreover, the sharp declines in the output level because of the crisis resulted in a decrease in the level of foreign investments to those countries. Eventually, the shift from pegged to floating system caused a decrease in the amount of capital inflows to the East Asian countries.

In their paper, Dasgupta and Ratha (2000) also find that pull factors are more influential over the capital inflows to developing countries. Aggregate data and panel data analyses are used on the samples taken from various developing and low-income countries. The data sets are from 1978 to 1998 on annual basis. The variables used in the analysis are private FDI, private portfolio flows, current account balance, inflation, real exchange rate, real interest rate, domestic economic growth, per capita income, non-private FDI, non-private portfolio flows, international reserves and official flows (including World Bank lending), world GDP growth rate, real LIBOR rate, global market growth. The results of the econometric analyses show that non-FDI portfolio flows are likely to rise as a result of an increase in the current account deficit, a rise in FDI flows, higher per capita income and better growth performance. Moreover, World Bank lending commitments seems to be affecting the FDI and portfolio flows in a positive way. In conclusion, the paper suggests that pull factors have a stronger influence on the determination of the capital flows.

Similarly, Mody *et al.* (2001) find that pull factors have a heavier importance in the determination of capital flows in general. The vector error correction method is used for the econometric analysis. The data set used comprises of three types of capital flows (bond, equity and syndicated loan flows) to 32 developing countries and used to provide forecasts of capital inflows for 2001 to 2003.¹¹ The data set is from 1990:01 to 2000:12 on a monthly basis. Country-specific ‘pull’ factors and global ‘push’ factors are taken as the explanatory variables. For the country-specific factors consumer price index, the level of domestic credit, the short-term debt to reserves ratio, the level of industrial production, the domestic short-term interest rate, credit ratings, the reserves to import ratio and the domestic stock market index are used. On the other hand, the strength of the US output growth,

¹¹ The 32 countries included in the study are: Argentina, Brazil, Columbia, Ecuador, Honduras, Jamaica, Mexico, Peru and Venezuela for Latin America; China, India, Indonesia, Korea, Malaysia, Pakistan, Philippines, Papua New Guinea, Thailand and Turkey for Asia; Bulgaria, Hungary, Lithuania, Russia and Ukraine for the Eastern Europe; Algeria, Egypt, Jordan, Lebanon and Morocco for the Middle East; and Cameroon, Nigeria and South Africa for Africa (Mody *et al.*, 2001, p. 204).

US short-term and long-term interest rates, the Emerging Markets Bond Index (EMBI), the US swap rate and the US high-yield spread (as proxies for a measure of risk aversion) are employed as the global factors. The findings of the analysis show that forecasts of increasing country credit ratings and stock prices are likely to increase the forecasts of capital flow coming to the country. In general, according to the study, the push factors are more effective than the pull factors while explaining the determinants of their capital inflows to developing countries.

Hernandez *et al.* (2001) also argue that pull factors are the driving forces of private capital flows to developing countries. VAR method is used for econometric analysis and the data set covers the period from 1977 to 1997. Private flow is the dependent variable of the model. Real ex-post international interest rate (US dollar 3-months LIBOR minus the US consumer price index 3-months inflation), net private capital flows minus the flows received as a share of GDP of the major industrial countries and economic activity in terms of GDP in industrial countries are taken as the external variables (push factors). The domestic variables (pull factors) used in the model are real GDP growth, public sector balance as a share of GDP, gross domestic investment as a share of GDP, total exports as a share of GDP, foreign debt service as a share of GDP, growth in banking sector nominal credit to the private sector and real exchange rate.

In the end, the authors arrive at several conclusions based on their empirical findings. First of all, the real interest rate does not play a significant role in attracting capital inflows towards the developing countries. Second, investment rate affects portfolio flows. Third, an increase in the economic growth also increases the FDI flows. Fourth, it is seen that real exchange rate appreciation is effective on the capital flows, especially FDI. Fifth, public sector balance is not as influential as expected on the level of capital inflows. In sum, the paper concludes that it is the pull factors that are the main determinants of the capital inflow.

In another study in favor of the dominance of internal factors over external factors in determination of capital inflows to a country; it is argued that economic

policies as well as investors' perceptions and expectations about credit risk and the stability of political institutions within a country are the determinants of the capital inflows (Ahlquist, 2006). In his model, the author assembled an annual data set from 90 developing countries from 1985 to 2002. For the data to be compared within each country the author used ordinary least squares (OLS) method and in order to correct the unbalanced data series, the error-correction model (ECM) was also applied.

In order to show the influence of policy signals on investors' perceptions of riskiness, Ahlquist uses a model in which IIR (Institutional Investors' country credit risk ratings)¹² is taken as the dependent variable and used as a measure of beliefs about creditworthiness and default risk, and thus, debt intolerance. The independent variables taken in the model are central government budget deficit, overall government consumption, inflation, external debt levels, past defaults and currency volatility. In order to assess the effect of political institutions and instability over investors' beliefs about country credit risk, Polity IV scores for each country are used.¹³ Since macroeconomic factors can also alter the perceptions of the investors about the creditworthiness of countries, major macroeconomic indicators such as GDP per capita, market size and cyclical fluctuations of the sample countries are also added to the model. In the end, the model shows that default history of a country has a considerable impact over the investors' perceptions about the riskiness of the country. Moreover, negative policy signals, especially budget deficits tend to change the investors' beliefs about the credit risk in a negative way.

To understand the effect of investors' beliefs and perceptions on the portfolio capital flows, Ahlquist uses another model in which the net portfolio flows (the sum of net inflows of bonds and equity) in millions of U.S. dollars were taken as the dependent variable whereas IIR, central government budget deficit, overall

¹² The ratings range from 0 (high risk of default) to 100 (low risk of default).

¹³ The scale is from 0 (authoritarian) to 20 (democratic).

government consumption, inflation, external debt levels, past defaults, currency volatility, GDP per capita, market size, cyclical fluctuations of the sample countries, Policy IV scores as well as real U.S. interest rates were taken as the independent variables. The model shows that investors' beliefs about credit risks of the countries affect the actual capital inflows into developing countries in the form of bonds and equities. Moreover, the positive relationship between IIR and the portfolio flows among the countries shows that as the investors' perception of riskiness about a developing country increases, the amount of capital inflows to that country decreases and vice versa. However, economic policy signal are more influential on the capital flows that occur within the countries. Another concluding remark of the model is, the instability of the political institutions in a country affects the capital inflows adversely since it deteriorates the investors' perception about the creditworthiness of the country.

In sum, the papers in favor of the ascendancy on internal factors state that domestic economic indicators of a country and the economic policies pursued by the government are the main components in determination of the capital inflows. Positive domestic economic indicators such as small or no current account deficit, economic growth, low inflation, low foreign debt tend to improve the confidence of the foreign investors towards the country which results in an increase of the capital inflows. Moreover, political stability in a country is another factor that causes an augmentation in the level of capital inflows by ameliorating the investors' confidence towards those markets and attracting foreign investment.

2.4 Details of some of the studies concluding that both external and internal factors determine the amount of capital inflow to a country

In the literature, some authors suggest that both internal and external factors are effective in the determination of the level of capital inflows into a country. In one of the paper supporting this point of view, it is claimed that global factors such as the level of US interest rates and recession in US industrial production as well as country developments are also crucial in determining the capital inflows to

emerging markets in Latin America and Asia (Chuhan *et al.*, 1993). To prove that claim, monthly US capital flow data on gross and net purchases of non-US long term securities from 9 Latin American countries (Argentina, Brazil, Chile, Colombia, Ecuador, Jamaica, Mexico, Uruguay, and Venezuela) and 9 Asian countries (China, India, Indonesia, Korea, Malaysia, Pakistan, Philippines, Taiwan, and Thailand) for the period between 1988:01 and 1992:09 were used in the model. First, a simultaneous equation error component model and then a “VAR-panel” approach are used to see the relationships between the variables. In the model, bond and equity flows from the US to the sample countries are taken as dependent variables. The country-specific variables such as domestic equity, credit and exchange market variables of the sample countries as well as the key global variables such as US interest rates and US industrial production are used as independent variables.

Chuhan *et al.* (1993) concluded that, first of all, global factors such as a drop in US interest rates and the slowdown in US industrial production are important in explaining capital inflows to developing countries. However, country credit ratings and stock prices are important as well in determining those flows, especially for Asia. Secondly, equity flows are more sensitive than bond flows to global factors, but that bond flows are generally more sensitive to a country’s credit rating and to the secondary market price of debt. In the end, the findings of the paper support the importance of both country-specific and global factors in explaining capital flows to emerging markets in Latin America and Asia.

A similar result is also seen in the studies of Taylor and Sarno (1997) in which they examine the determinants of the large portfolio flows to Asian and Latin American countries from the United States in the period of 1988 – 1992. Nine Asian and nine Latin American countries are included in the model.¹⁴ The cointegration technique is used while developing the model. The data set covers

¹⁴ Asian countries are China, India, Indonesia, the Republic of Korea, Malaysia, Pakistan, the Philippines, Taiwan, and Thailand. Latin American countries are Argentina, Brazil, Chile, Colombia, Ecuador, Jamaica, Mexico, Uruguay, and Venezuela (Taylor and Sarno, 1997, p. 457).

the period of 1988:01 – 1992:09 and it is in monthly terms. The dependent variable in the model is portfolio inflows. The explanatory variables are taken as two different sets: country-specific ‘pull’ factors and global ‘push’ factors. For country-specific factors, country credit rating and black market exchange rate premium are employed. On the other hand, long-term (government bond yield) and short-term (the Treasury bill rate) US interest rate and the level of real US industrial production are used as the global factors. The results of the model show that both pull and push factors explain the variations in the level of US portfolio flows to developing countries. It is seen that both US interest rates and US industrial production affect the capital flows towards the developing countries especially in the short-run. However, in the long-run, country credit rating and black market exchange rate are equally important in the determination of the capital flows to the developing countries. In conclusion, the paper suggests that both pull and push factors affect the amount of capital inflows towards developing countries from the US.

Milesi-Ferreti and Razin (1998) examine the reasons of current account reversals in middle-income countries, the authors conclude that current account reversals are more likely to occur in countries with persistent deficits, low reserves and unfavorable terms of trade. The data set used in the study consists of 105 low and middle income countries (48 African countries, 26 Asian countries, 26 countries from Latin America and the Caribbean and 5 European countries) between 1972 and 1992. The variables used in the model are:

- **Macroeconomic variables:** economic growth, real consumption growth, the rate of investment, the fiscal balance, the level of GDP per capita;
- **External variables:** current account balance, the real effective exchange rate, the degree of real exchange rate overvaluation, the degree of openness to trade, the level of external official transfers as a fraction of GDP;
- **Debt variables:** ratio of external debt to output, the interest burden as a fraction of GDP, the share of concessional debt, short-term debt, public

debt and multilateral debt in total debt and the ratio of FDI flows to debt outstanding;

- **Financial variables:** ratio of M2 to GDP, the credit growth rate and the ratio of private credit to GDP;
- **Foreign variables:** the real interest rate in the US, the rate of growth in OECD countries, and the terms of trade;
- **Dummy variables:** regional dummies (1 if the countries' exchange rate is pegged and zero otherwise), and IMF dummy (1 if the country has an IMF program in place for at least 6 months during the year and zero otherwise).

In the model, output growth during reversal periods in sample countries is taken as dependent variable and OLS estimation is used to assess the relationship between the dependent and independent variables. The model shows that the probability of a reversal in current account balance is higher when there are persistent deficits, low reserves and unfavorable terms of trade are experienced within a country. On the other hand, external factors such as unfavorable terms of trade and high interest rates in industrial countries are also influential in the occurrence of capital reversals. At the end of the day, the authors suggest that both internal and external factors are effective in the determination of the level of capital outflows in developing countries.

In another study about the factors determining capital flows in a country, it is claimed that the importance of the internal factors while explaining the reasons for capital inflows to developing countries should not be underestimated (Hoti, 2004). The author further suggests that although the external factors have become more dominant in the determination of capital inflows, the internal factors still have an effective role in this area as well.

In her article, Hoti uses data from nine sample developing countries Argentina, Brazil, Hungary, Indonesia, Mexico, Pakistan, Philippines, Russia and Slovenia. Data for Argentina, Brazil and Mexico are available for the period 1977 (1)-2001 (2), 1979 (1)-2001 (2), and 1979 (1)-2000 (4), respectively. Data for Indonesia,

Pakistan and Philippines are available for 1981 (1)-2001 (1), 1984 (1)-2001 (1), and 1977 (1)-2001, respectively. Data for Russia and Slovenia are available for 1993 (1)-2001 (2), 1994 (1)-2001 (2), and 1992 (1)-2001 (2), respectively. In the model, the dependent variable is taken as the amount of capital flowing from one country to another. In that dependent variable, net, gross or change in total, official, private, and bilateral flows; portfolio capital (bond and equity) flows; FDI flows; short, medium and long-term debt and equity flows; and lending commitments are taken. The global factors in the model are US real and nominal GDP, US Treasury bill rate, and US nominal interest rates and the internal factors are net purchases of stocks, price of developing country commercial bank debt, real exchange rate, domestic output, real money supply, capital account balance, and probability of attracting international private capital. The model shows that both external factors such as US interest rates and domestic factors such as domestic output and capital account balance are effective in the determination of capital flows to developing countries.

In sum, the papers that advocate both external and internal factors are influential in the determination of capital inflows claim that both internal and external factors are influential in the determination of the capital inflows to a country.

CHAPTER 3

THE EMPIRICAL STUDY ON THE DETERMINANTS OF SHORT-TERM CAPITAL FLOW TO TURKEY

In this chapter, first the capital inflow to Turkey and the structure of the Balance of Payments in terms of financial account will be examined. In the second section, the literature which investigates the determinants of capital inflows to Turkey will be discussed.

3.1 The Overview of Capital Flows to Turkey

Following the liberalization of her financial accounts in August 1989, Turkey has experienced huge amounts of capital flows just like many other developing countries in the early 1990s and the mid 2000s. Nevertheless, because of its fragile financial system, this surge of flows has also caused some problems for the Turkish economy. Together with the fragile financial system and weak fiscal discipline, huge capital inflows caused macroeconomic instability especially in times of sudden stops or reversals which further deteriorated the economic situation. In order to cope with those problems brought by the financial liberalization, some structural reforms and stabilization policies were followed at times; however, they did not become successful. As a result, Turkey experienced two financial crises in 1994 and 2001 which were mainly caused by high levels of capital outflows. The financial crises worsened the economic condition especially by altering the exchange rates and interest rates drastically.

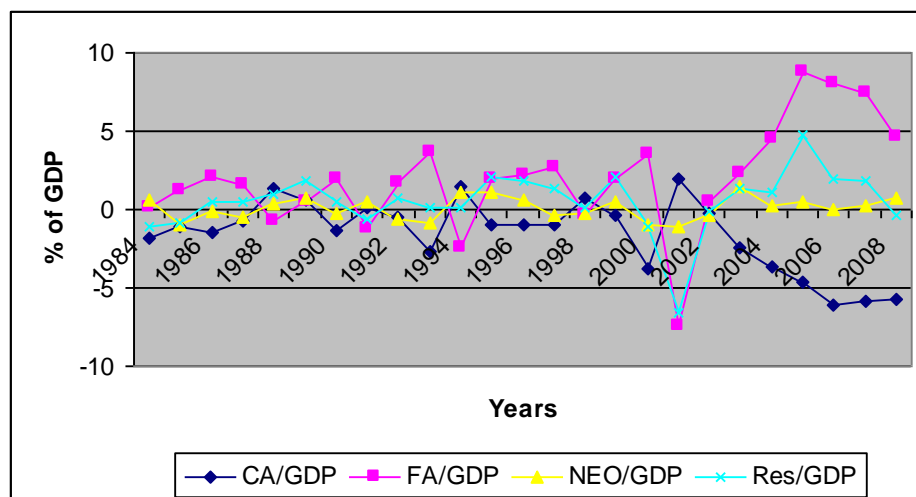


Figure 3.1¹⁵: Current Account Balance, Financial Account Balance, Net Errors and Omissions, Reserves as Percentages of GDP

Financial account balance is mostly positive in the period 1984-2008 with the exception of five years. It also shows some drastic declines in the crisis years of 1994 and 2001. Another observation that can be made is, Turkey has experienced current account deficits in this period except five years and two of them were experienced during the 1994 and 2001 crises. The international reserves seem to be accumulating for the most of the time however, decreases during the 1994 and 2001 crises also takes place.

When we look at the net errors and omissions, we can see that even though it is not as influential as the other three accounts, it still is significant enough not to be omitted. The presence of errors might be because of the problems that are faced while measuring current and financial account balances.

Another fact that can be seen from the graph is; the current account and the financial accounts move in the opposite direction as expected. Moreover, there

¹⁵ Source: Central Bank of the Republic of Turkey Database

appears to be a positive relationship between the financial accounts and changes in the international reserves mainly because capital inflows contribute to reserves.

It is also noticeable that there have been some changes in the structure of the Balance of Payments in 2000s. First of all, there has been a drastic increase in the current account balance and international reserves in 2001. However, in the same year, a significant decrease occurs in the financial account balance, mainly because of the capital outflows that was experienced during the financial crisis. Starting from 2002, financial account balance shows a considerable increase until 2005. In 2005, Turkey received \$43.6 billion of net foreign capital which was about 12% of its GDP at that time. The reason of this situation can be the high level of international liquidity and the overall increase in the level of capital inflows to Turkey in that period. In year 2008, the financial account balance is about \$36.8 billion and it is about 5% of GDP. After 2005, the financial account starts to decline gradually. The current account balance declines gradually after 2001 and in the period 2002-2008, it is negative. The current account deficit in 2008 is about \$41.5 billion and its ratio to GDP is around 5.7%.

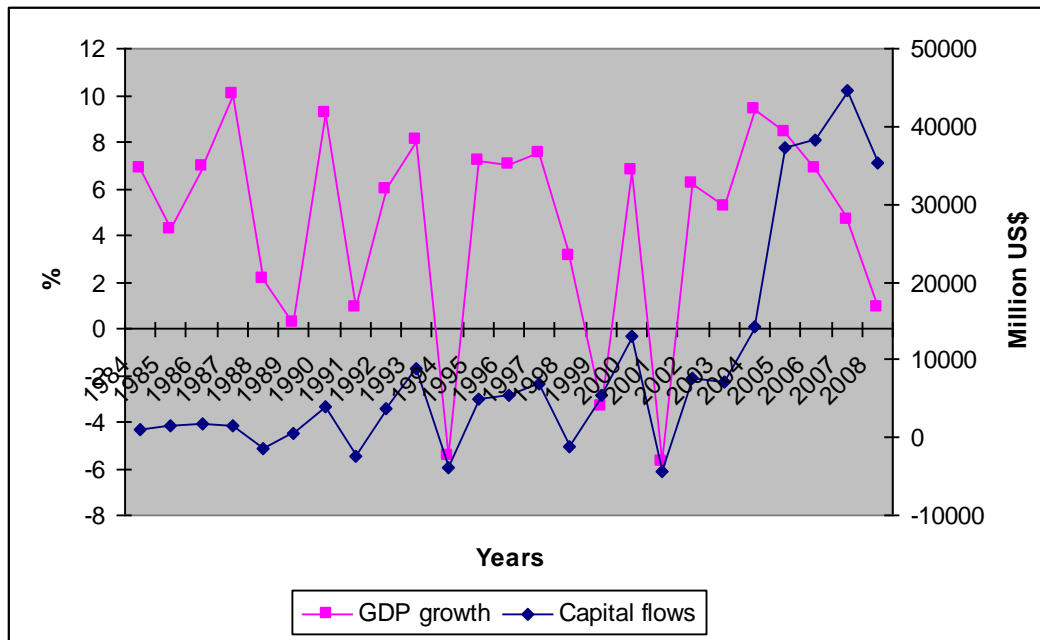


Figure 3.2¹⁶: GDP Growth Rate (Left Panel) and Capital Flows (Right Panel) in Turkey

When GDP growth rate and financial account balance of Turkey are compared, a positive relationship between the two until 2004 can be seen. Both series decrease drastically during 1994 and 2001 economic crises. In addition, after 2001, both of them show a significant increase until 2005 which can be explained with the increasing capital inflows to Turkey at that period.

¹⁶ Source: IMF World Economic Outlook Database, April 2009.

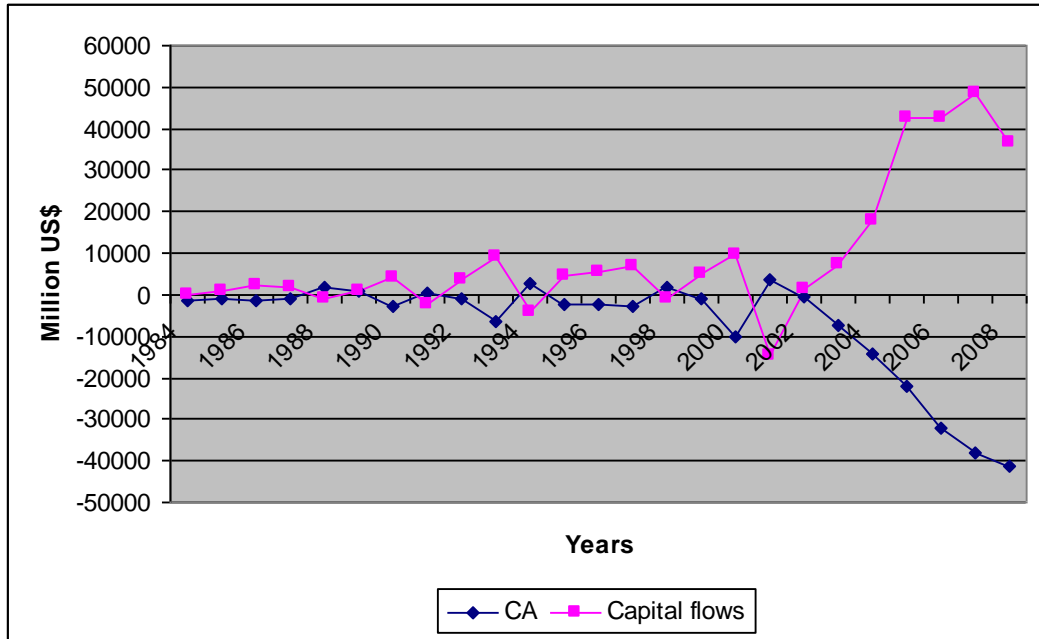


Figure 3.3¹⁷: Current Account Balance and Capital Flows in Turkey

The negative relationship between current account deficit and capital flows in Turkey can be observed from the graph. This indicates that as the capital flows to Turkey increase, the current account deficit widens. In 2008, current account deficit has reached to a record level of \$41.5 billion with a GDP ratio of 5.7%. The capital flows on the other hand is around \$36.8 billion with a GDP ratio about 5%.

¹⁷ Source: Central Bank of the Republic of Turkey Database

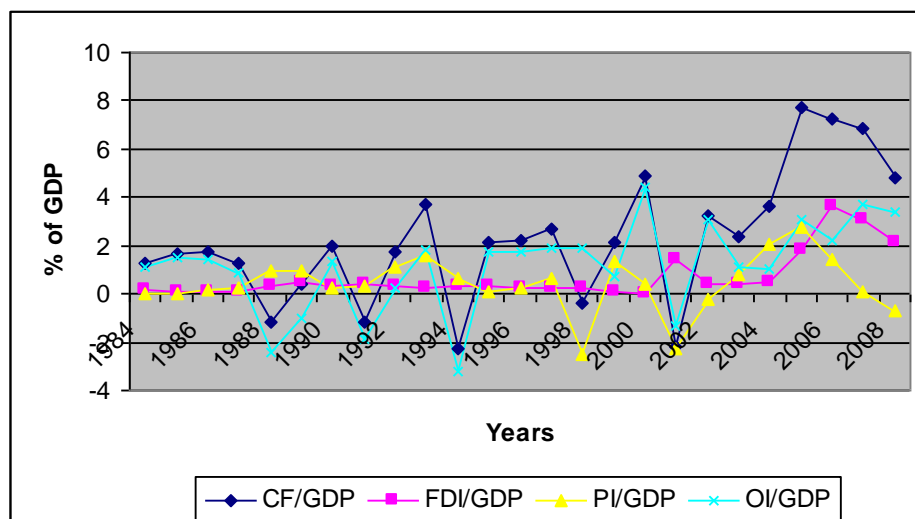


Figure 3.4¹⁸: Components of Capital Flows in Turkey

The capital flows consist of net direct investment, net portfolio investment, and net other investments. When we compare those three accounts for the period 1984 – 2008, we can see that net foreign direct investment is the most stable one. This shows that FDI is less influenced from the negative shocks on the economy. In addition, net FDI is positive in all observations. This indicates that Turkey is a net productive capital importer. The increase in 2001 in the FDI can be explained with the entrance of high amounts of foreign investment at that time. In 2005 and 2006, FDI again shows an increasing trend mainly because of the privatizations that occurred with the new Public Procurement Law as well as sales of domestic private firms especially in the fields of banking, mining, petroleum, manufacturing and telecommunication. In 2005 and 2006, FDI reaches to 1.8% and 3.6% of GDP respectively. However in 2008, net FDI decreases to \$15 billion and its GDP ratio becomes about 2.1%. The main reason of this situation can be the global financial and economic crisis experienced at that period. As a result of the decreasing level of liquidity in the international markets, a decrease in the net FDI to Turkey was also expected.

¹⁸ Source: Central Bank of the Republic of Turkey Database

Net portfolio investment and net other investment show a more volatile pattern compared to net FDI. In 2001, both types of investments face with drastic decreases mainly because of the 2001 crisis and the capital outflow experienced at that time in Turkey. A significant decrease in portfolio investments and other investments can also be observed during the 1994 crisis. However, those investments gain an increasing trend starting from 2002 that takes place until 2005. In 2005, net portfolio investment reaches to \$13.5 billion with a GDP ratio of 2.8% while net other investments become \$20.3 billion with a GDP ratio of 4.2%. As a result of those increases, Turkey experiences a high inflow of foreign capital which brought the amount of capital flows to a record level. On the other hand, a declining trend on portfolio investments can be observed starting from 2006 which might be related with several domestic developments such as the decline of Istanbul Stock Exchange 100 Index. In 2008, net portfolio investment decreases to -\$5 billions with a GDP ratio of -0.7%. The net other investment also decreases in 2008 and becomes \$26 billion with a GDP ratio of 3.6%.

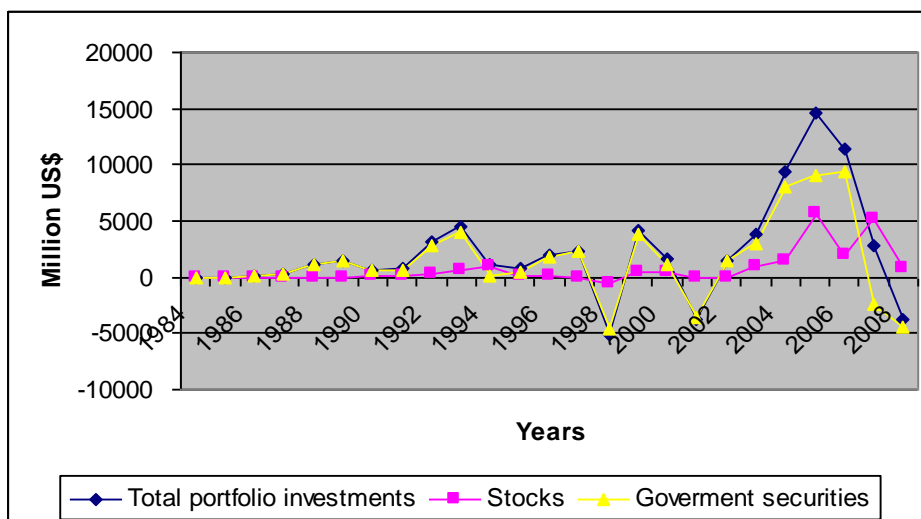


Figure 3.5¹⁹: Components of Portfolio Investments in Turkey

When we look at the structure of the portfolio investments in Turkey, we can see that the purchase of government securities is the main determinant of the level of portfolio investments. Drastic decreases in 1994 and 2001 take place because of the economic instability caused by the crisis in Turkey. The fall in 1998 can be an outcome of the declining confidence towards developing markets as a result of the 1998 Asian financial crisis. In 2005, portfolio inflows reach to a record level of \$14.7 billion with the increases in both government securities and stock purchases of foreigners. The main reason of this can be the high liquidity experienced in the international markets at that time. However, a noticeable decrease in the government securities purchase takes place in 2007 as a result of the global confidence crisis. The stock purchases of foreign investors are less affected by the internal and external negative shocks and thus it is less volatile. It even increases in 2007 while the government securities sales decreasing drastically due to the global economic downturn. However, in 2008, both accounts decrease and the total portfolio outflow reaches to \$3.8 billion.

¹⁹ Source: Central Bank of the Republic of Turkey Database

To sum up, Turkey has become more dependent on the foreign capital inflows therefore, its vulnerability to internal and external negative shocks have increased. Especially the portfolio investments are likely to be influenced by domestic and global economic situations. The surges and reversals cause portfolio investments to become more volatile compared to foreign direct investments. In the end, the volatility experienced in portfolio investments has a significant effect on the financial account of the Balance of Payments. Therefore, within the capital flows, it is important to understand the factors that affect the portfolio investments. In this study, those sources are investigated by using several domestic and international economic indicators within an econometric model, which are presented in the following chapter.

3.2 Literature Review on Capital Flows to Turkey

In this section, several studies that examine the capital flows to Turkey will be mentioned.

Ulengin and Yentürk (2001) discuss the impact of foreign savings on aggregate spending categories in Turkey in their paper. The VAR method is employed during the econometric analysis and the data series cover the period of 1987:01 - 1997:04 in quarterly terms. The variables used in the model are foreign savings²⁰, private consumption and private investment. The results of the model show that foreign savings have positively affected the private consumption whereas they have not created such an outcome for investment. As a result, the authors argue that depending solely on the foreign savings for the purpose of sustaining a long-lasting increase in the tradable sector investments as well as in the competitiveness of Turkey will not be enough in Turkey case.

²⁰ The calculation of foreign savings is based on the current account deficit (Ulengin et al, 2001, p. 1324).

In another study on the subject, Balkan, Biçer and Yeldan (2002) investigate the determinants of the short-term capital flows to Turkey after the capital account liberalization in 1989. For this purpose, they used a multiple regression model in which short-term foreign financial capital is the dependent variable whereas index of the ISE National-100, the real exchange rate, the real interest rate, ratio of the public sector borrowing requirement to GNP, industrial production index, the degree of trade- openness and the ratio of short-term debt to Central Bank's foreign reserves are the explanatory variables. The data set is monthly and covers the period 1992:01 to 2001:12.

The results reveal that stock price index, the degree of the trade openness, the ratio of short-term debt to Central Bank's foreign reserves and real exchange rates affect the short-term capital movements to Turkey positively. Plus, even though they fail to be significant explanatory variables, higher Turkish real effective interest rate and the ratio of the public sector requirement to GDP are founded to be increasing the level of short-term capital movements to Turkey. On the other hand, the industrial production index is concluded to be negatively related with the dependent variable meaning that a decrease in this index results in an increase in the short-term capital inflow. In the end, the paper concludes that the level of short-term capital flows to Turkey is highly dependent on various macroeconomic indicators.

In their article, Çimenoğlu and Yentürk (2005) deal with the impacts of international capital flows on the Turkish economy. In the econometric analysis, a quarterly VAR model is used with the data covering the period 1987-2002. The variables that are included in the model are “the ratio of the capital account to the balance of payments (as a proxy of international capital inflows), the annual growth rate of private real consumption expenditures, and the real exchange rate”. The results of the VAR analysis show that net foreign capital inflows in Turkey and the appreciation of the Turkish Lira have positive effects on private consumption expenditures.

In the second part of their study, Çimenoğlu and Yentürk investigate whether increased consumption demand causes a positive impact on private investments. In this analysis, a quarterly VAR model that covers the period 1990-2002 is used. The variables in the model are foreign capital inflows²¹, private consumption expenditures, and private investment expenditures. The impulse-response analysis is employed while analyzing the interactions between the variables.

The analysis shows that there is a positive relationship between net foreign capital inflows and private consumption expenditures as detected in the previous model. Moreover, an increase in the private consumption expenditures is likely to increase private investment. However, private investment expenditures have found to be having no significant impact on private consumption expenditures.

In the third part of their article, the authors discuss whether capital inflows affect the distribution of investments between the tradable and non-tradable sectors. For the analysis, annual data is used which covers the period 1990-2002. Since the number of observations is pretty small, the data are not appropriate for conducting an econometric model. Therefore, monthly price indices and annual sectoral investment figures are explored to see whether a change has occurred in the distribution of investment among the sectors.

In the previous analyses in this paper, it was shown that an increase capital inflows results in an increase in the private consumption expenditures. According to this analysis, increased consumption demand causes an increase in the relative prices of non-tradable sector goods in terms of tradable sector goods. As a result, a large amount of investment is directed towards the non-tradable sectors than the tradable sectors. In the end, it can be suggested that a surge in the capital flows triggers a rise in investment to the non-tradable sectors, while investment into the tradable sectors just stands still.

²¹ For the capital inflows, the capital account balance of the balance of payments is used (Çimenoğlu and Yentürk, 2005, p. 101).

In conclusion, the paper states that the economy tends to improve as a whole after a surge of capital inflow occurs. First, it initiates an increase in the private consumption demand in favor of the non-tradable sector. As a result, more investments are made for the non-tradable sectors. However, the authors argue that the investments being directed towards non-tradable sectors rather than tradable sectors has been one of the reasons that caused financial crises in Turkey. That is due to the reason that investments in non-tradable sectors do not improve the foreign exchange generating capacity of the country and thus, when a reversal takes place, it is not possible for Turkey to find any sources means that can substitute the sources of funds that are essential to keep the economy functioning. In the end, large capital inflows tend to result in economic crises for Turkey.

Çulha (2006) examines the determinants of the capital flow to Turkey within the push and pull factors perspective. He uses structural VAR method in his econometric analyses and the data covers the period of 1992:01 – 2005:12 on a monthly basis. The dependent variable of the model is capital inflows to Turkey which was calculated as the sum of portfolio and short-term capital inflows. Interest rate on 3-month US Treasury Bill and the US industrial production index are the independent variables that represent the push factors whereas real interest rate on Turkish Treasury bills, Istanbul Stock Exchange price index, budget balance and current account balance are employed as the variables that represent the pull factors. In order to understand the effect of 2001 economic crisis in Turkey, two sub-periods which use data from the period of 1992:01 – 2001:12 and 2002:01 – 2005:12 were also constructed. Impulse-response and variance decomposition analysis have been employed on the variables.

The results of the impulse-response analysis show that shocks to US interest rates increases while shocks to domestic real interest rates decreases the capital flows to Turkey in the whole sample period. The author explains this inconsistent result with the instable nature of the Turkish economy which is characterized by high level of inflation and interest rates especially during the late 1990s. The same result is also seen in the sub-period 1992:01 – 2001:12 for the same variables.

However, in the second sub-period of 2002:01 – 2005:12, it is seen that the shocks in the US interest rate cause capital outflows while the domestic interest rate shocks cause capital inflows. The author suggests that this is the result of the economic and political stability that was experienced in 2000s.

The impulse-response analysis also suggests that shocks to US industrial production has a positive relationship with the capital inflows to Turkey meaning that an increase in the US economic activity raises the financial funds that are available to Turkey. The analysis also shows that a shock to ISE causes an increase in the capital inflows to Turkey in general. On the other hand, the empirical findings suggest that there is a negative relationship between the shocks to budget and capital account balances and capital flows. At that point, it is argued that since these balances are perceived as indicators of fiscal and external fragility by foreign investors, deterioration in those balances results in capital outflows from the country.

According to the variance decomposition analysis over the whole sample period, shocks to US interest rates is the most influential factor in determining the fluctuations in capital inflows, followed by shocks to domestic interest rate and budget balance respectively. Overall, pull factors are more effective than the push factors during the second sub-period (2002:01 – 2005:12) and for the whole sample period as well.

The results show that the role of the US interest rates in the determination of the capital inflows to Turkey has increased especially since the beginning of 2002. According to the author, this suggests that capital flows are quite dependent on the external conditions and a sudden reversal may result in an exchange rate crisis in countries that finance their capital account deficits via foreign capital. Therefore, it is stated that the development and implementation of sound fiscal and monetary policies that would assure sustainable budget and current account balances are very crucial. In sum, the paper claims that the push factors are more dominant in the determination of the capital inflows in the case of Turkey.

However, solid economic and fiscal policies are necessary in order to avoid the problems that may arise as a result of the dependence on the foreign capital flows.

CHAPTER 4

THE DETERMINANTS OF PORTFOLIO INVESTMENT TO TURKEY: EMPIRICAL INVESTIGATION

In this chapter, the determinants of portfolio investments to Turkey are investigated. As stated in the previous sections, other studies claim that an increase in Turkish interest rates, a real appreciation of Turkish Lira, a higher budget balance, a higher current account balance, a lower inflation and a decrease in the US interest rates are likely to result in an increase in the net capital flows to Turkey. Net capital flows include net direct investment, net portfolio investment and other investments. In this study, the effect of those factors on the net portfolio investment to Turkey is examined. Vector autoregression methodology is utilized to test whether abovementioned factors explain the net portfolio investments to Turkey.

4.1 The Data

The study uses monthly data for the period 1989:04 – 2008:12. The variables of the model are as follows:

PI: Portfolio investments to Turkey

d(PI): First difference of the PI series

BB: Budget balance

d(BB): First difference of the BB series

CA: Current account balance

$d(CA)$: First difference of the CA series

ISE : Istanbul Stock Exchange National 100 price index

$d(ISE)$: First difference of the ISE series

$LNER$: Natural logarithm of the nominal exchange rate between TL and USD

$d(LNER)$: First difference of the LNER series

$LNINF$: Natural logarithm of the percentage change in CPI

$d(LNINF)$: First difference of the LNINF series

$LNIRTR$: Natural logarithm of the short-term interest rate in Turkey

$d(LNIRTR)$: First difference of the LNIRTR series

$LNIRUS$: Natural logarithm of the short-term interest rate in the US

$d(LNIRUS)$: First difference of the LNIRUS series

$d(LNIRUS,2)$: Second difference of the LNIRUS series

US data are obtained from IMF database (International Financial Statistics). All the other data are taken from the database of Central Bank of the Republic of Turkey. LNIRTR series are Turkish money market rate and LNIRUS series are the US 3-month Treasury bill rate.

4.2 Econometric Evidence

In this section, the determinants of the portfolio investments to Turkey are examined by using VAR method. First, the VAR models will be discussed briefly, and then the model which is used in this study will be specified. After that, the necessary unit-root tests are employed to see whether the series are stationary. At the end, the model will be run and its results will be discussed in detail.

4.2.1 Vector Autoregressive Models

Vector autoregressive models are models of vectors of variables as autoregressive processes, where each variable depends linearly on its own lagged values and those of the other variables in the vector. In that sense, the future values of the process are a weighted sum of past and present values as well as some noise and sometimes exogenous variables (Fabozzi et al, 2007, p. 321). VARs are usually employed for making macroeconomic models and in the literature, there are various common uses of these models. Some authors argue that unrestricted VARs would work better for forecasting than structural multiple equations. Another common use of the VAR is testing for causality between the variables. The causality is derived when lagged values of a variable, for instance, x_t have explanatory power in a regression of a variable, y_t on lagged values of y_t and x_t (Granger, 1969).

Consider the simple bivariate system:

$$\begin{aligned}y_t &= b_{10} - b_{12}z_t + \gamma_{11}y_{t-1} + \epsilon_{yt} \\z_t &= b_{20} - b_{21}y_t + \gamma_{22}z_{t-1} + \epsilon_{zt}\end{aligned}\tag{4.1}$$

Where it is assumed that (1) both y_t and z_t are stationary; (2) ϵ_{yt} and ϵ_{zt} are white noise disturbances with standard deviations of σ_y and σ_z respectively; and (3) ϵ_{yt} and ϵ_{zt} are uncorrelated white-noise disturbances.

Using the matrix algebra, the system can be written in the compact form:

$$\begin{pmatrix} 1 & b_{12} \\ b_{21} & 1 \end{pmatrix} \begin{pmatrix} y_t \\ z_t \end{pmatrix} = \begin{pmatrix} b_{10} \\ b_{20} \end{pmatrix} + \begin{pmatrix} \gamma_{11} & \gamma_{12} \\ \gamma_{21} & \gamma_{22} \end{pmatrix} \begin{pmatrix} y_{t-1} \\ z_{t-1} \end{pmatrix} + \begin{pmatrix} \epsilon_{yt} \\ \epsilon_{zt} \end{pmatrix}\tag{4.2}$$

or

$$Bx_t = \Gamma_0 + \Gamma_1 x_{t-1} + \epsilon_t \quad (4.3)$$

Where,

$$\begin{aligned} B &= \begin{pmatrix} 1 & b_{12} \\ b_{21} & 1 \end{pmatrix}, \quad x_t = \begin{pmatrix} y_t \\ z_t \end{pmatrix}, \quad \Gamma_0 = \begin{pmatrix} b_{10} \\ b_{20} \end{pmatrix} \\ \Gamma_1 &= \begin{pmatrix} \gamma_{11} & \gamma_{12} \\ \gamma_{21} & \gamma_{22} \end{pmatrix}, \quad \epsilon_t = \begin{pmatrix} \epsilon_{yt} \\ \epsilon_{zt} \end{pmatrix} \end{aligned} \quad (4.4)$$

Premultiplication by B^{-1} allows us to obtain the vector autoregressive (VAR) model in standard form:

$$x_t = A_0 + A_1 x_{t-1} + e_t \quad (4.5)$$

Where,

$$\begin{aligned} A_0 &= B^{-1} \Gamma_0 \\ A_1 &= B^{-1} \Gamma_1 \\ e_t &= B^{-1} \epsilon_t \end{aligned} \quad (4.6)$$

So, a reduced p^{th} order VAR, denoted VAR (p) is:

$$x_t = c + A_1 x_{t-1} + A_2 x_{t-2} + \dots + A_p x_{t-p} + e_t \quad (4.7)$$

where c is a $k \times 1$ factor of constraints (intercept), A_i is a $k \times k$ matrix (for every $i = 1, \dots, p$) and e_t is a $k \times 1$ vector of error terms satisfying (1) every error term has a mean zero, (2) the contemporaneous covariance matrix of error terms is a $n \times n$ positive definite matrix, (3) for any non-zero k — there is no correlation across time; in particular, no serial correlation in individual error terms.

The l -periods back observation x_{t-l} is called the l^{th} lag of x . Thus, a p th-order VAR is also called a VAR with p lags.

In VAR models, it is possible to develop an n -equation with each equation containing p lags of all n variables in the system. However, degree of freedom is quickly eroded as more variables are included. In that regard, determining the appropriate number of variables in the VAR model is crucial.

An n -equation VAR can be represented by:

$$\begin{pmatrix} x_{1t} \\ x_{2t} \\ \vdots \\ x_{nt} \end{pmatrix} = \begin{pmatrix} A_{10} \\ A_{20} \\ \vdots \\ A_{n0} \end{pmatrix} + \begin{pmatrix} A_{11} L & A_{12} L & \cdots & A_{1n} L \\ A_{21} L & A_{22} L & \cdots & A_{2n} L \\ \vdots & \vdots & \cdots & \vdots \\ A_{n1} L & A_{n2} L & \cdots & A_{nn} L \end{pmatrix} \begin{pmatrix} x_{1t-1} \\ x_{2t-1} \\ \vdots \\ x_{nt-1} \end{pmatrix} + \begin{pmatrix} e_{1t} \\ e_{2t} \\ \vdots \\ e_{nt} \end{pmatrix} \quad (4.8)$$

Where A_{i0} are the parameters representing the intercept terms and $A_{ij}(L)$ are the polynomials in the lag operator L .

The individual coefficients of $A_{ij}(L)$ are denoted by $a_{ij,1}, a_{ij,2}, \dots$. Due to the fact that all the equations have the same lag length, all the polynomials $A_{ij}(L)$ are of the same degree. The terms e_{it} are white-noise disturbances that may be correlated.

Another important thing while developing a VAR model is the determination of the appropriate lag length. In a VAR model, long lag lengths may undermine the degrees of freedom. For instance, if the lag length is p , each of the n equations contains np coefficients plus the intercept term. In that sense, the proper selection of the lag-length is crucial since if the p is taken so small, the model may be misspecified, but if the p is taken so large, it may waste the degrees of freedom. In order to determine the appropriateness of the lag length for a VAR model, several criteria can be applied. The most common used ones are Schwarz

Bayesian Criterion, Hannan-Quinn Information Criterion and Akaike Information Criterion

4.2.2 Specification of the VAR Model

In our model, the US short-term interest rate is the independent variable which is an external factor. Budget balance, current account balance, Turkish short-term interest rate, inflation rate, real effective exchange rate and stock exchange index are the explanatory variables that represent internal factors. In this framework, portfolio investments (PI) can be modeled as follows:

$$PI_t = f(u_t^{BB}, u_t^{CA}, u_t^{ISE}, u_t^{LNER}, u_t^{LNINF}, u_t^{LNIRTR}, u_t^{LNIRUS}, u_t^{PI}) \quad (4.9)$$

The equation defines the portfolio investments as a function of US interest rate, budget balance, current account balance, ISE 100 index, inflation rate, Turkish interest rate, exchange rate, and portfolio investment itself.

In order to observe the effect of those variables on the portfolio investment in Turkey, an unrestricted VAR model which consists of seven variables is used. Moreover, two dummy variables for the crisis years of 1994 and 2001 by taking into account the exchange rate are also included in the model. The VAR model is specified below:

$$Y_t = \sum_{i=1}^{\infty} A_i U_{t-i} = A L U_t \quad (4.10)$$

Where,

$$Y_t = (BB_t, CA_t, ISE_t, LNER_t, LNINF_t, LNIRTR_t, LNIRUS_t, PI_t)' \quad (4.11)$$

$$U_t = (u_t^{BB}, u_t^{CA}, u_t^{ISE}, u_t^{LNER}, u_t^{LNINF}, u_t^{LNIRTR}, u_t^{LNIRUS}, u_t^{PI})' \quad (4.12)$$

$$A L = \sum_{i=0}^{\infty} A_i L^i = a_{ij} L \quad (4.13)$$

L is the lag operator and A_i is the matrix of impulse responses of endogenous variable to structural shocks.

In the following section, the results of the employed unit root tests are shown.

4.2.3 Unit Root Tests

Since the VAR method will be used in order to identify the relationship between the variables, it is important to determine whether the variables have unit roots or not. However, there are various unit root tests and their results might be different from each other. In other words, while one test decides a variable is stationary, another test may treat the same variable as non-stationary. Therefore, in order to reach the most possible objective conclusion, three different unit root tests, namely Augmented Dickey-Fuller (ADF), Kwiatkowski, Phillips, Schmidt and Shin (KPSS) and Phillips-Perron (PP) are used. ADF and PP tests take the non-stationarity as the null hypothesis whereas KPSS test employs stationarity as the null hypothesis. The result of the majority of the tests is taken into account while arriving at a conclusion about the stationarity of a variable. For instance, if two of the three tests show that the variable is non-stationary, while the remaining one showing it as stationary, the variable is accepted as non-stationary in the study. In the unit root tests, Modified Schwarz Criteria is used for automatic lag selection. AR spectral – OLS method is employed as the spectral estimation method for KPSS and PP. The results of the unit root tests are shown below:

Table 4.1 Results of ADF Unit Root Test

Notes: The equations for λ_t include a constant and the equations for λ_m include a constant and a trend. McKinnon (1996) 5% critical values are -2.87 for λ_t and -3.43 for λ_m . The values with “*” indicate that the null hypothesis (H_0) is rejected at the 5% level. The numbers in the parentheses show the lag numbers.

Series	Level		First difference	Second difference
	λ_t	λ_m	λ_m	λ_m
PI	-2.83 (12)	-2.78 (12)	-23.22* (0)	
BB	-1.48 (12)	-1.39 (12)	-20.05* (0)	
CA	-0.22 (12)	-1.47 (12)	-11.59* (1)	
ISE	-0.92 (0)	-1.90 (1)	-3.96* (8)	
LNINF	0.77 (12)	-1.58 (12)	-4.06* (8)	
LNIRTR	-1.15 (5)	-2.79 (5)	-9.24* (2)	
LNIRUS	-0.18 (9)	0.37 (1)	0.71 (0)	0.34 (3)
LNER	-2.70 (1)	0.36 (1)	-9.84* (0)	

Table 4.2 Results of KPSS Stationarity Test

Notes: The equations for K_t include a constant and the equations for K_m include a constant and a trend. Kwiatkowski, Phillips, Schmidt and Shin (1992) 5% level critical LM values are 0.463 for K_t and 0.146 for K_m . The values with “*” indicate that the null hypothesis (H_0) is rejected at the 5% level. The numbers in the parentheses show the lag numbers.

Series	Level		First difference	Second difference
	K_t	K_m	K_m	K_m
PI	2.57* (12)	1.70* (12)	0.003 (0)	
BB	178.9* (12)	40.9* (12)	0.01 (0)	
CA	660.8* (12)	74.7* (12)	0.007 (1)	
ISE	1080.2* (0)	72.4* (1)	0.29* (8)	0.003 (0)
LNINF	3862* (12)	338.7* (12)	0.45* (8)	0.004 (0)
LNIRTR	327* (5)	37.2* (1)	0.014 (2)	
LNIRUS	30.7* (2)	0.016 (1)		
LNER	19732.42* (1)	537.6* (1)	0.49* (0)	0.004 (0)

Table 4.3 Results of Phillips-Perron Unit Root Test

Notes: The equations for λ_t include a constant and the equations for λ_m include a constant and a trend. McKinnon (1996) 5% critical values are -2.87 for λ_t and -3.43 for λ_m . The values with “*” indicate that the null hypothesis (H_0) is rejected at the 5% level. The numbers in the parentheses show the lag numbers.

Series	Level		First difference	Second difference
	λ_t	λ_m	λ_m	λ_m
PI	-19.23* (12)	-18.98* (12)		
BB	-2.65 (12)	-3.03 (12)	-20.04* (0)	
CA	-1.09 (12)	-3.27 (12)	-19.23* (1)	
ISE	-0.92 (0)	-1.93 (11)	-21.1* (8)	
LNINF	0.59 (12)	-1.60 (12)	-9.41* (8)	
LNIRTR	-1.44 (5)	-3.51* (5)		
LNIRUS	0.78 (8)	-0.15 (8)	0.66 (6)	-13.75* (7)
LNER	-2.64 (1)	0.38 (1)	-9.34* (0)	

All three tests show consistent results for the variables BB and CA and conclude that they are I(1). However, the variables PI and LNIRTR are I(1) according to ADF and KPSS tests whereas PP test concludes that those variables are I(0). Another inconsistency is, ADF and KPSS tests show the variables ISE, LNER and LNINF as I(1) while KPSS test conclude that they are I(2). And lastly, ADF PP test shows LNIRUS as having more than two unit roots, whereas PP test concludes that it has two unit roots but KPSS test shows that this variable is I(0). By taking into account the majority of results for each variable, the first differences of BB, CA, ISE, LNER, LNINF, LNIRTR, PI and second difference of LNIRUS are used in the VAR model. Please refer to Appendix A for the graphs of the series and their differences.

In the following section, the VAR model and its results are discussed in detail.

4.3 Estimation of the Model

According to the discussions on the matter, the capital flows to a country may increase with higher domestic interest rates (LNIRTR), more favorable budget

balance (BB), more favorable current account balance (CA), lower international interest rates (LNIRUS), more valuable domestic currency (LNER), lower inflation rate (LNINF), and higher ISE price index (ISE). The aim of this study is to investigate whether those factors explain the portfolio investments to Turkey (PI) which is a component of the capital flow. The relationship between those variables can be tested by using the Vector Autoregression method. All the regressions in this study are run via EViews 5.1 program.

Initially, the model is run for the whole period 1989:04 – 2008:12. In addition, the data series are divided into two sub-periods of 1989:04 – 2001:12 and 2002:01 – 2008:12 and a model is run for each group. There are several reasons why the series are divided from the beginning of 2002. First of all, floating exchange regime was adopted in 2001. The second purpose is to understand the effect of the 2001 financial crisis on the variables used in the model.

Before starting the VAR analysis, it is necessary to determine the optimum lag length for the variables $d(PI)$, $d(BB)$, $d(CA)$, $d(ISE)$, $d(LNINF)$, $d(LNIRTR)$, $d(LNIRUS,2)$, $d(LNER)$ within each subgroup. The tables below show the results of the lag order selection:

Table 4.4 Results of Lag Order Selection for the Period 1989:04 - 2008:12

Notes: Numbers with “*” indicate the lag order selected by the criterion. LR: sequential modified LR test statistic (each test at 5% level), FPE: Final Prediction Error, AIC: Akaike Information Criterion, SC: Schwarz Bayesian Criterion, HQ: Hannan-Quinn Information Criterion.

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-9699.45	NA	2.22E+27	85.66918	86.03129*	85.81529
1	-9533.02	316.7432	9.00E+26	84.76665	86.09438	85.36859
2	-9432.3	184.5659	6.53E+26	84.44319	86.73655	85.30241*
3	-9353.14	139.4996	5.75e+26*	84.30957	87.56855	85.62462
4	-9294.25	99.61781	6.08E+26	84.3546	88.57921	86.05929
5	-9234.6	96.69754	6.42E+26	84.39295	89.58318	86.48728
6	-9156.44	121.1972	5.81E+26	84.26821*	90.42406	86.75218
7	-9105.13	75.94813	6.74E+26	84.38001	91.50149	87.25363
8	-9039.55	92.44484*	6.96E+26	84.36611	92.45321	87.62937

Table 4.5 Results of the Lag Order Selection for the Subgroup 1989:04 - 2001:12

Notes: Numbers with “*” indicate the lag order selected by the criterion. LR: sequential modified LR test statistic (each test at 5% level), FPE: Final Prediction Error, AIC: Akaike Information Criterion, SC: Schwarz Bayesian Criterion, HQ: Hannan-Quinn Information Criterion.

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-5509.02	NA	5.19E+24	79.61186	80.11853	79.81776
1	-5347.96	296.6414	1.29E+24	78.21521	80.07301*	78.97017
2	-5226.71	209.347	5.71E+23	77.39152	80.60044	78.69554
3	-5166.18	97.55271	6.17E+23	77.44138	82.00142	79.29446
4	-5096.62	104.081	5.97E+23	77.36146	83.27263	79.7636
5	-5015.34	112.2806	5.04E+23	77.11273	84.37503	80.06394
6	-4931.16	106.5876	4.25E+23	76.82238	85.4358	80.32264
7	-4865.68	75.36932	4.94E+23	76.80112	86.76567	80.85045
8	-4805.19	62.66667	6.60E+23	76.85162	88.16728	81.45
9	-4680.88	114.4737	3.84E+23	75.98383	88.65062	81.13127
10	-4504.1	142.4403	1.18E+23	74.36111	88.37903	80.05762
11	-4385.67	81.79429	9.76E+22	73.57793	88.94697	79.8235
12	-4155.59	132.4190*	2.01e+22*	71.18832*	87.90848	77.98295*

Table 4.6 Results of the Lag Order Selection for the Sub-period 2002:01-2008:12

Notes: Numbers with “*” indicate the lag order selected by the criterion. LR: sequential modified LR test statistic (each test at 5% level), FPE: Final Prediction Error, AIC: Akaike Information Criterion, SC: Schwarz Bayesian Criterion, HQ: Hannan-Quinn Information Criterion.

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-3511.16	NA	3.38E+26	83.78957	84.02107*	83.88263
1	-3404.82	189.8985	1.24e+26*	82.7814	84.86495	83.61897*
2	-3348.3	90.1677	1.54E+26	82.95942	86.89503	84.5415
3	-3280	95.94369*	1.55E+26	82.85706	88.64472	85.18365
4	-3223.38	68.75158	2.27E+26	83.0328	90.67251	86.1039
5	-3152.51	72.55177	2.79E+26	82.86936	92.36112	86.68497
6	-3055.91	80.50715	2.39E+26	82.09297	93.43678	86.65308
7	-2978.55	49.727	4.81E+26	81.77504	94.9709	87.07966
8	-2829.73	67.32366	3.60E+26	79.75550*	94.80341	85.80463

The optimum lag orders for the sub-periods 1989:04 – 2001:12 and 2002:01 – 2008:12 are chosen as 1 according to Schwarz Bayesian Criterion and Hannan-Quinn information criterion. For the period 1989:04 – 2008:12, the optimum lag

order is chosen as 2 according to Hannan-Quinn information criterion. The tests show that VAR models are stable. Please refer to Appendix B for the results of the tests.

After running the VAR model via EViews 5.1 program, the following results have been found:

Table 4.7 Results of the VAR Model for the period 1989:04 - 2008:12

Notes: “***” indicates significance at 1% level, “**” indicates significance at 5% level, “*” indicates significance at 10% level. 1% critical t value is 2.57, 5% critical t value is 1.96, 10% critical t-value is 1.64. The F-statistic of the model is 8.82.

Variables	Coefficients	Standard errors	t-statistics
d(PI)(-1)	-0.55449	-0.066	[-8.40162]***
d(PI)(-2)	-0.45882	-0.06517	[-7.04092]***
d(BB)(-1)	2.35E-08	-1.70E-05	[0.00140]
d(BB)(-2)	-1.54E-05	-1.60E-05	[-0.94910]
d(CA)(-1)	-0.22198	-0.12383	[-1.79259]*
d(CA)(-2)	-0.24681	-0.12698	[-1.94369]*
d(ISE)(-1)	-0.13571	-0.04072	[-3.33303]***
d(ISE)(-2)	-0.04583	-0.04328	[-1.05872]
d(LNER)(-1)	-278.648	-2017.16	[-0.13814]
d(LNER)(-2)	4057.702	-2141.44	[1.89485]*
d(LNINF)(-1)	16.22154	-21.6886	[0.74793]
d(LNINF)(-2)	-9.17189	-22.3934	[-0.40958]
d(LNIRTR)(-1)	530.8814	-311.647	[1.70347]*
d(LNIRTR)(-2)	-86.1472	-314.72	[-0.27373]
d(LNIRUS,2)(-1)	1448.157	-753.03	[1.92311]*
d(LNIRUS,2)(-2)	280.1186	-860.97	[0.32535]
C	-69.8838	-96.2774	[-0.72586]
DUM1994	-1727.15	-1033.01	[-1.67195]*
DUM2001	-205.87	-850.6	[-0.24203]

According to the results for the sub-period 1989:04 – 2003:12, d(PI) is significant at 1% level in both lags. d(ISE) is significant at 1% level in the first lag. d(CA) is significant at 10% level in both lags. d(LNER) is significant at 10% level in the second lag. d(LNIRUS,2) is significant at 1% level in the first

lag. $d(\text{LNIRUS},2)$ is significant at 10% level in the first lag. On the other hand, $d(\text{BB})$ and $d(\text{LNINF})$ are statistically insignificant in both lags.

Table 4.8 Results of the VAR Model for the Sub-Period 1989:04 - 2001:12

Notes: “***” indicates significance at 1% level, “**” indicates significance at 5% level, “*” indicates significance at 10% level. 1% critical t value is 2.57, 5% critical t value is 1.96, 10% critical t-value is 1.64. The F-statistic of the model is 8.08.

Variables	Coefficients	Standard errors	t-statistics
$d(\text{PI})(-1)$	-0.20073	-0.07881	[-2.54696]**
$d(\text{BB})(-1)$	-4.57E-05	-5.30E-05	[-0.86884]
$d(\text{CA})(-1)$	0.172207	-0.14394	[1.19639]
$d(\text{ISE})(-1)$	-0.205	-0.06563	[-3.12339]***
$d(\text{LNER})(-1)$	230.3351	-1542.35	[0.14934]
$d(\text{LNINF})(-1)$	11.27255	-15.4507	[0.72958]
$d(\text{LNIRTR})(-1)$	930.528	-221.644	[4.19830]***
$d(\text{LNIRUS},2)(-1)$	-1965.04	-1261.66	[-1.55751]
C	21.52515	-93.497	[0.23022]
DUM1994	-721.822	-570.483	[-1.26528]
DUM2001	-1365.26	-687.276	[-1.98648]**

According to the results, $d(\text{PI})$ variable is significant at 5% level. $d(\text{ISE})$ and $d(\text{LNIRTR})$ are significant at 1% level. However, $d(\text{BB})$, $d(\text{CA})$, $d(\text{LNER})$, $d(\text{LNINF})$ and $d(\text{LNIRUS},2)$ variables are statistically insignificant.

Table 4.9 Results of the VAR Model for the Sub-Period 2002:01 – 2008:12

Notes: “***” indicates significance at 1% level, “**” indicates significance at 5% level, “*” indicates significance at 10% level. 1% critical t value is 2.57, 5% critical t value is 1.96, 10% critical t-value is 1.64. The F-statistic of the model is 3.90.

Variables	Coefficients	Standard errors	t-statistics
d(PI)(-1)	-0.33021	-0.10431	[-3.16574]***
d(BB)(-1)	-2.42E-05	-2.60E-05	[-0.92864]
d(CA)(-1)	-0.14661	-0.23949	[-0.61220]
d(ISE)(-1)	-0.08635	-0.07288	[-1.18490]
d(LNER)(-1)	14293.04	-5502.57	[2.59752]***
d(LNINF)(-1)	101.2968	-101.851	[0.99456]
d(LNIRTR)(-1)	-2712.03	-5730.69	[-0.47325]
d(LNIRUS,2)(-1)	2398.72	-1303.11	[1.84076]*
C	79.22359	-214.104	[0.37002]

According to the results, d(PI) and d(LNER) are significant at 1% level. d(LNIRUS,2) is significant at 10% level. However, d(BB), d(CA), d(ISE), d(LNINF) and d(LNIRTR) are statistically insignificant.

4.4 Implications of the Results

For the period from 1989:04 to 2008:12, ISE price index variable is significant with a negative coefficient meaning that a lower ISE price index increases the net portfolio investments to Turkey. It might be explained with the fact that the investors tend to buy stocks when their prices are low with the expectation that it will raise in the future. However, this variable is founded to have a positive coefficient in the paper of Balkan *et al.* (2002). One of the reasons of the different results might be the different dependent variables used in the models. Balkan *et al.* (2002) took short-term capital flows as the dependent variable whereas this study examines the portfolio investments to Turkey. When the sub-periods are examined, it can be observed that Istanbul Stock Exchange Index has a negative relationship with the portfolio investments in the sub-period 1989:04 – 2001:12 but it loses its significance in the post-2001 period.

Current account balance is significant with negative coefficients in both lags for the period 1989:04 – 2008:12. In Turkey, there is a current account deficit so this result means an increase in current account balance results in a decrease in portfolio investments. It is compatible with the findings of Dasgupta and Ratha (2000) for the developing countries. The current account shows deficit in Turkey, meaning that a lower current account deficit results in an increase in portfolio investments. Çulha (2006) has also found a negative relationship between capital flows and current account balance in Turkey and explains this situation by stating that current account balance affects capital flows in two ways. First of all, deepening current account deficit requires financing mostly in terms of portfolio investments and direct investments. In this situation, an increase in the capital account balance points out an increase in the capital flows as well. However, in the second way, the capital account deficit is perceived as a negative sign about the country's external fragility and thus, their confidence may decrease. In this scenario, there is a negative relationship between the current account balance and capital flows. As a result, in Turkish case, the second channel is more dominant and since the presence of a current account deficit is seen as an indicator of external fragility, an increase in the current account deficit results in a decrease in the capital inflows.

The exchange rate variable is significant in the second lag with a positive coefficient for the period 1989:04 – 2008:12. It indicates that a depreciated TL against US dollar results in higher net portfolio investment to Turkey. This might be explained with the investor's decisions to enter into the Turkish market when the value of TL is lower. On the other hand, exchange rate variable is not significant in the sub-period 1989:04 – 2001:12 whereas it is significant in the sub-period 2002:01 – 2008:12. The reason of this change might be the shift from fixed exchange rate regime to floating exchange rate regime after the February 2001 economic crisis.

The Turkish interest rate variable is statistically significant with a positive coefficient in the first lag. This indicates that the higher domestic interest rates

results in higher levels of portfolio investments to Turkey. This result is in line with the findings of Balkan *et al.* (2002) in their studies about Turkey. Moreover, Mody *et al.* (2001) have also reached the same outcome in their study on the developing countries. In that regard, it is safe to assume that domestic interest rate is an explanatory variable of the portfolio flows to a country and there is a positive relationship between them. An increase in the domestic interest rate results in increasing level of capital inflows. However, in order for this to happen, the international interest rates should be lower than the domestic interest rates offered by the recipient country.

Another outcome of this model is that, Turkish interest rate is positively related with the portfolio investments before 2002 but after that period, it does not have a significant impact on the portfolio investment. The structural changes that Turkey went through after 2001 crisis as well as the accelerating globalization process which caused global factors to become more effective in determination of the capital flows might have caused the impact of domestic interest rates on the portfolio investments to decrease during the post-2001 period.

An interesting outcome of this investigation is that, the US interest rate's explanatory power on the portfolio investment is significant with a positive coefficient meaning that portfolio investments in Turkey tends to increase as the US interest rate rises. This contradicts with some of the previous studies on the matter. Balkan *et al.* (2002) and Çulha (2006) found a significant negative relationship between the US interest rates and capital flows. Moreover, Calvo *et al.* (1993), Fernandez-Arias (1994), Kim (2000) and Ying and Kim (2001) have also discovered that international interest rates are one of the major factors that affect the capital flows to the developing countries. The positive relationship between the US interest rate and in this study might be the outcome of the drastic decrease of the US Treasury Bill rates at the end of 2008, and requires further investigation.

CHAPTER 5

CONCLUSION

The amount of the capital flows to developing countries has increased considerably starting from the early 1990s. Improving technology, financial liberalization of the previously closed economies and the economic growth experienced in developed countries, as well as the presence of low returns in the developed countries have resulted in an increase in the capital flows towards developing countries. The developing countries benefited from these inflows by using them to finance their economic growth and make investments. However, absence of solid financial system and instable economies of those countries made it clear that capital flows may also cause serious problems, especially during times of capital reversals.

Different factors have been claimed to influence the foreign flows to a country. According to the push view, it is the international interest rates and the condition of the global economy that determines the capital flows to a country. On the other hand, the pull view states that domestic economic indicators such as domestic interest rates, real exchange rate, capital account balance, budget balance, real exchange rate and stock price index are the main determinants of the capital flows. A third view on the matter argues that both push and pull factors are influential on the capital flows.

As a developing country herself, Turkey has also experienced an increase in her capital inflows after the financial liberalization in 1989. Nevertheless, weakness of the financial system and bad economic policies combined with capital outflows led to financial crises in 1994 and 2001. Those incidents confirmed the

importance of capital flows on the Turkish economy. In this study, I investigate the determinants of the portfolio investments to Turkey, hoping that knowing the influences may lead to better policy formation and to avoidance of further crisis.

The findings of this study show that net portfolio investment (inflows minus outflows) increases as a result of an increase in the domestic interest rates. It can be said that higher interest rates makes investing in Turkey more attractive for foreign investors. This outcome is in line with the previous studies on Turkey and on other developing countries. On the other hand, analyses on the sub-periods indicate that Turkish interest rate loses its power in determining the amount of portfolio investments in Turkey after 2001. The reason of this might be the structural changes Turkey went through after February 2001 financial crisis, such as moving to floating exchange regime and application of more solid monetary policies.

On the other hand, the results imply that the US interest rate affects the amount of portfolio investments in Turkey positively in the period from 2002 to 2008. This means, as the level of US interest rate increases, Turkey receives higher amount of portfolio investments. This result is in contrast with previous studies that have found a negative relationship between the capital flows and international interest rates. The difference might be due to the fact that this study examines the portfolio flows whereas most of the other studies in the literature investigate both direct investments and portfolio investments. In this study, we do not offer a good story for this influence, but present it as a finding that requires further investigation.

It is also founded that a decrease in the ISE price index increases the portfolio investments in Turkey. This can be explained with the tendency of the investors to buy stocks when their prices are low with the expectation that they will increase in the future. Just like the domestic interest rate factor, ISE price index loses its power in determining portfolio investments in the sub-period 2002:01 – 2008:12.

Nominal exchange rate is found to have a positive relationship with portfolio investments in the post-2001 period, meaning that as the Turkish Lira loses value against USD, Turkey receives more portfolio investments. This might be indicating that the investors prefer to invest on a Turkish Lira with a lower value against US dollar. However, it should be noted that exchange rate does not have a significant influence on the portfolio investments before 2002 according to the results. This change might be the result of moving to flexible exchange rate regime after the February 2001 crisis. These results combined, indicate that the interest rate and the stock market index that were influential on determining the portfolio flows to Turkey until 2002 were replaced by the exchange rate factor after the implementation of the floating exchange rates.

Current account balance is implied to have a negative relationship with the portfolio investments to Turkey. It means, a decrease in the current account deficit will cause the level of portfolio investments to increase. This result points out that current account balance is perceived as an indicator of economic and fiscal stability by the foreign investors and influence their confidence towards Turkish market.

In sum, the results of the analytical investigations point out that one of the main determinants of the portfolio investments in Turkey is the domestic interest rates especially in the pre-2002 period. However, this variable loses its impact starting from 2002, and the value of the TL as well as US interest rates become more explanatory on the amount of portfolio investments in Turkey. On the other hand, we fail to find significant effects of some pull factors such as inflation level and budget balance on the portfolio investments although some other studies in the literature concluded that those variables are effective on the capital flows. This fact indicates that the determinants of portfolio flows and the determinants of capital flows differentiate from each other in the sense that domestic factors are more influential in determining the overall capital flows than in determining the portfolio investment component.

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APPENDICES

APPENDIX A: GRAPHS OF THE SERIES AND THEIR DIFFERENCES

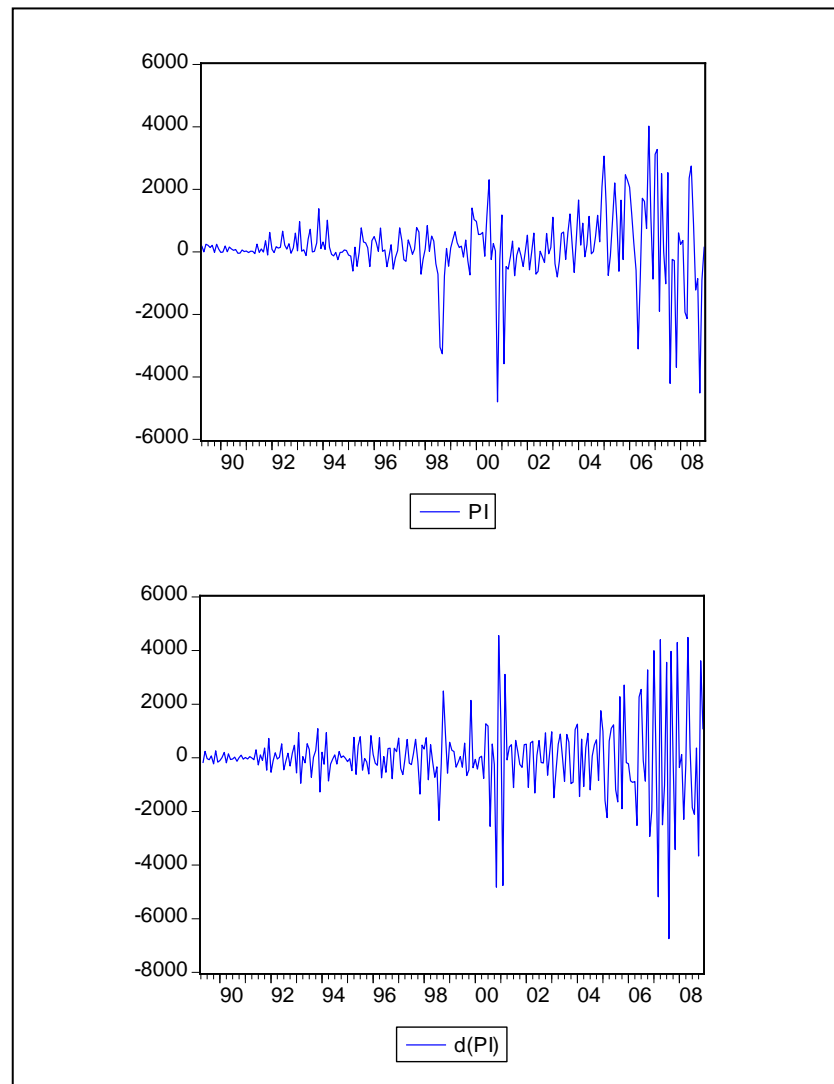


Figure A.1: Graphs of the Series and Their Differences

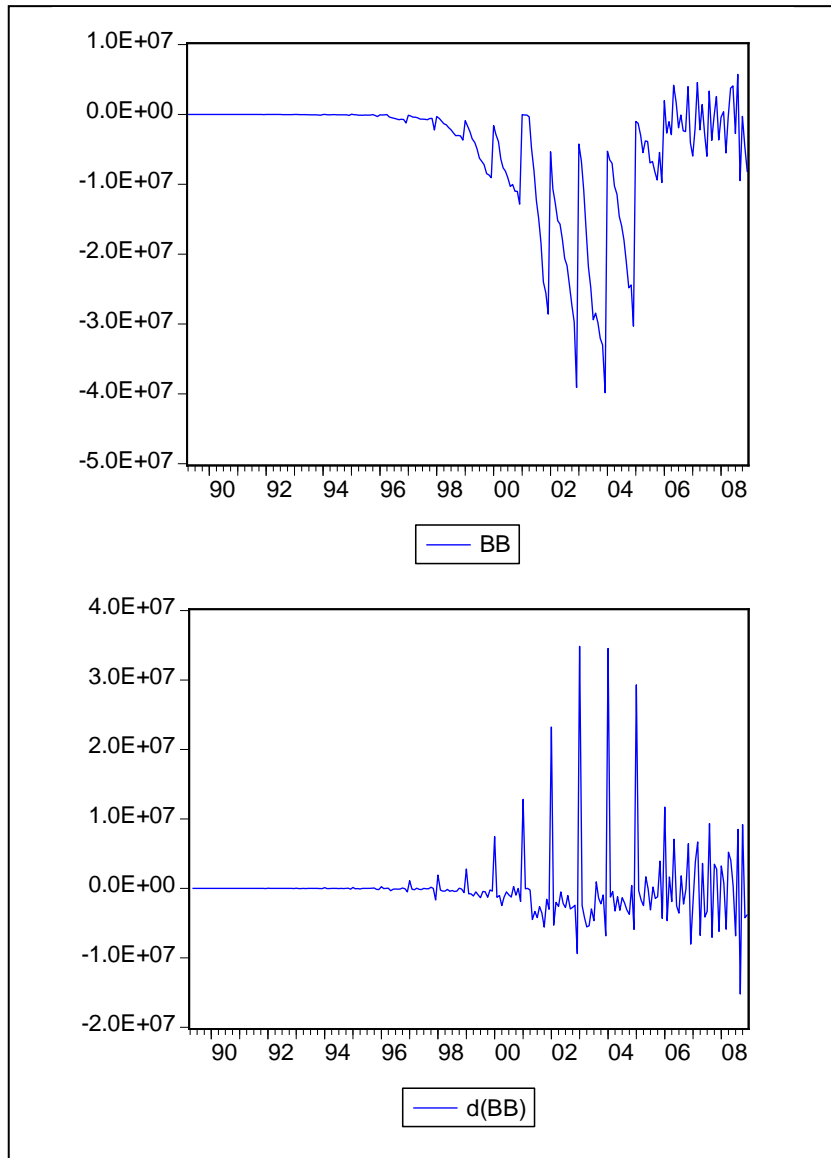


Figure A.1: (Continued)

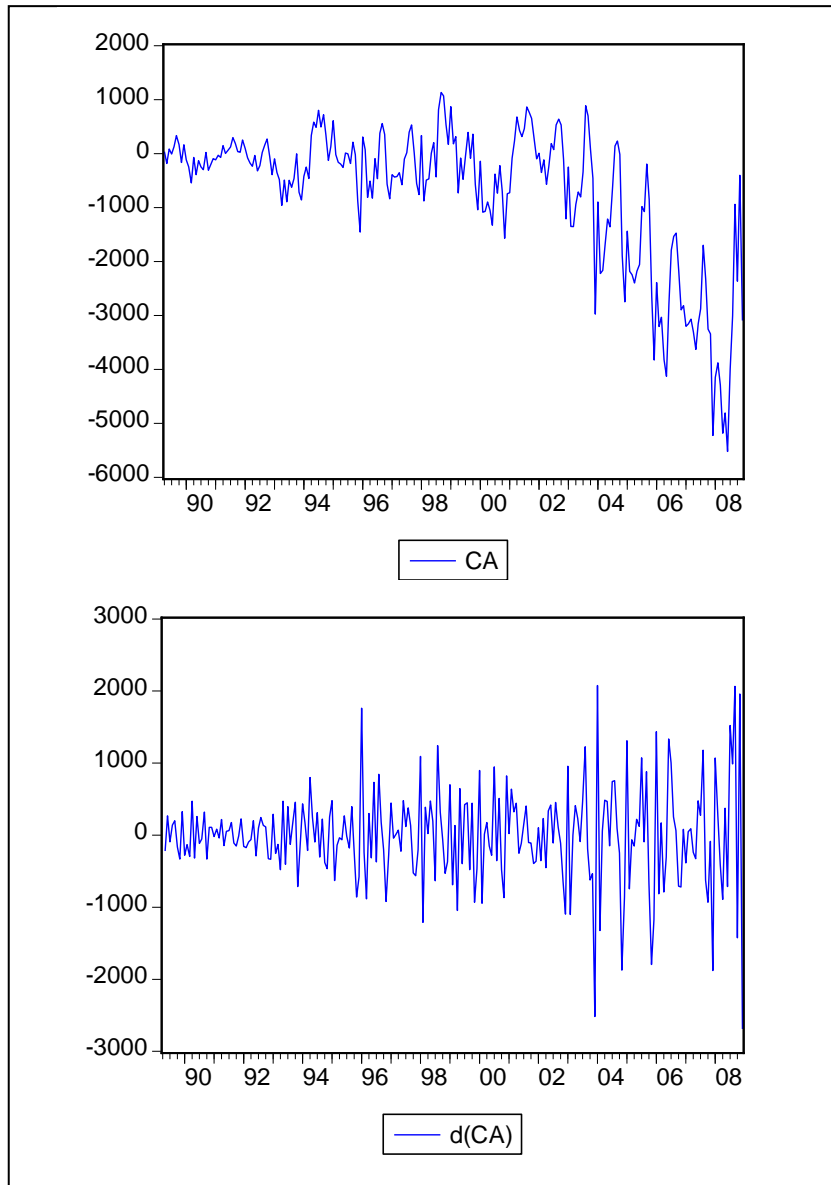


Figure A.1: (Continued)

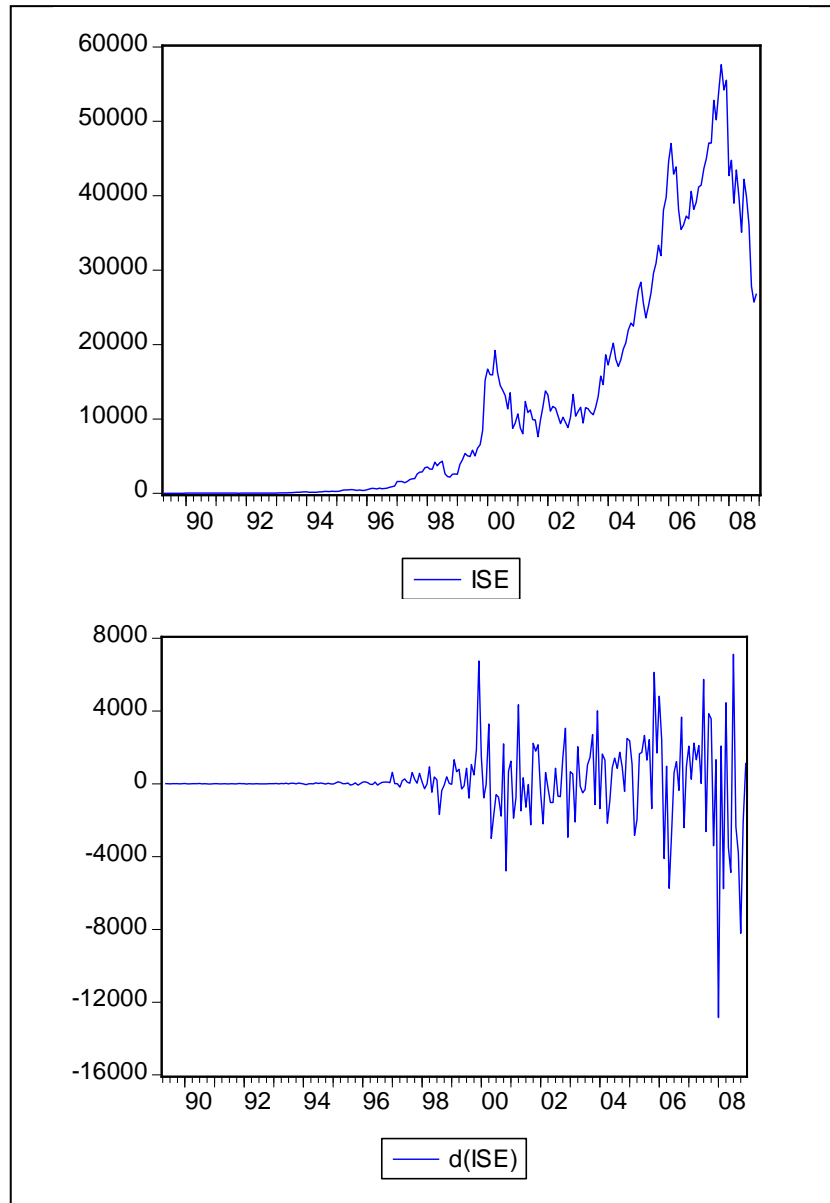


Figure A.1: (Continued)

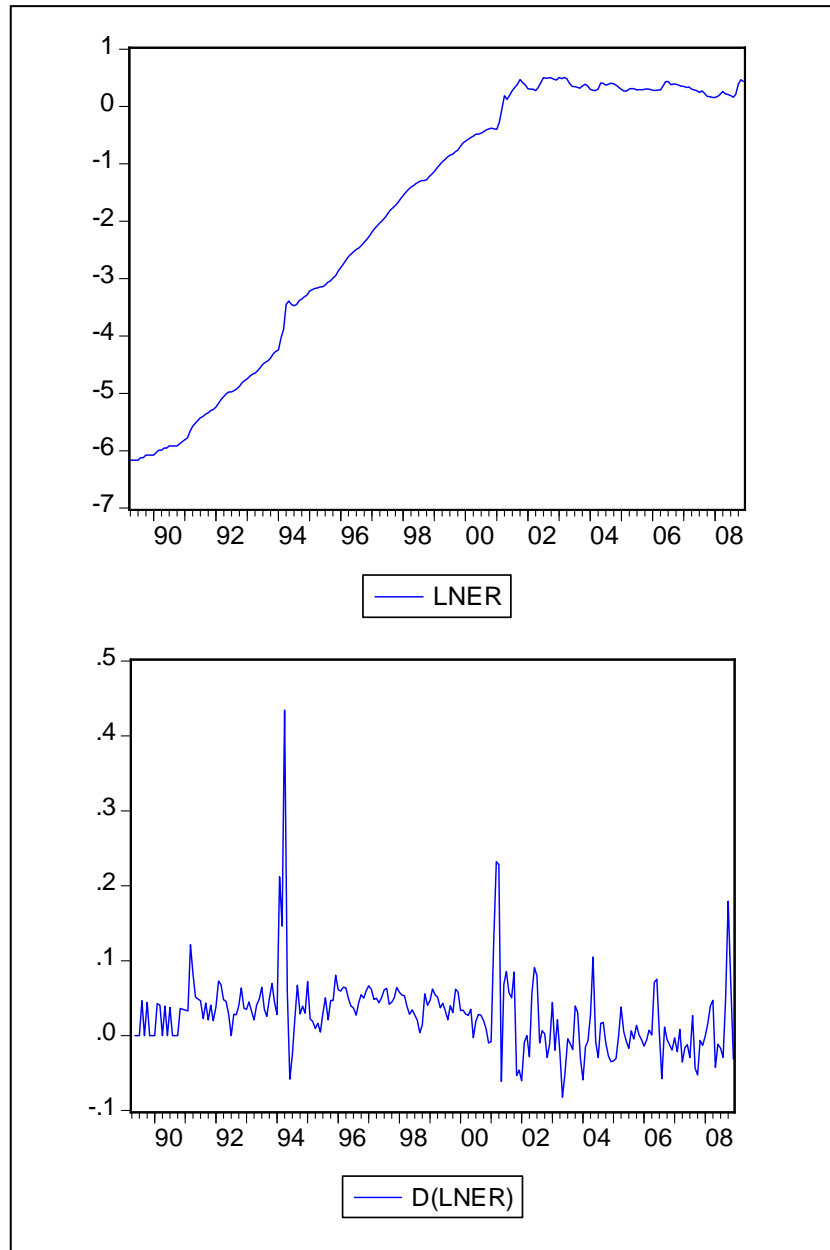


Figure A.1: (Continued)

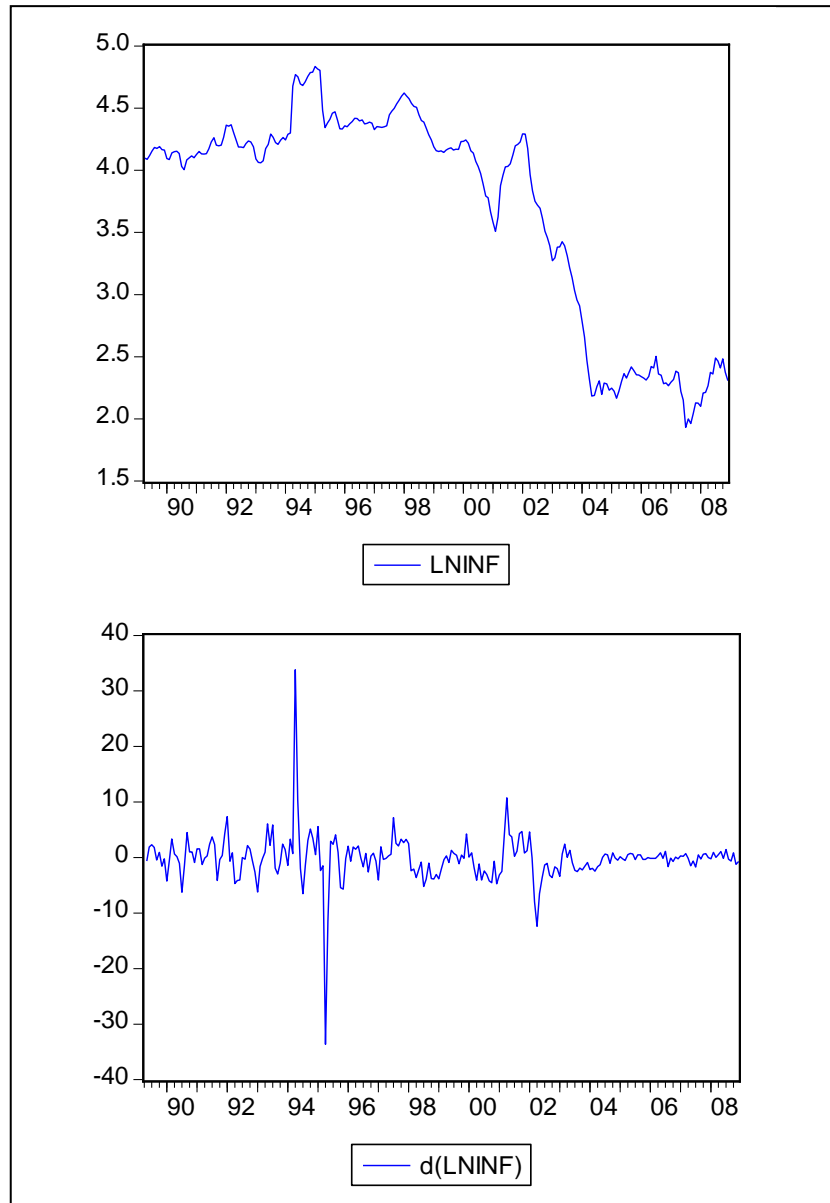


Figure A.1: (Continued)

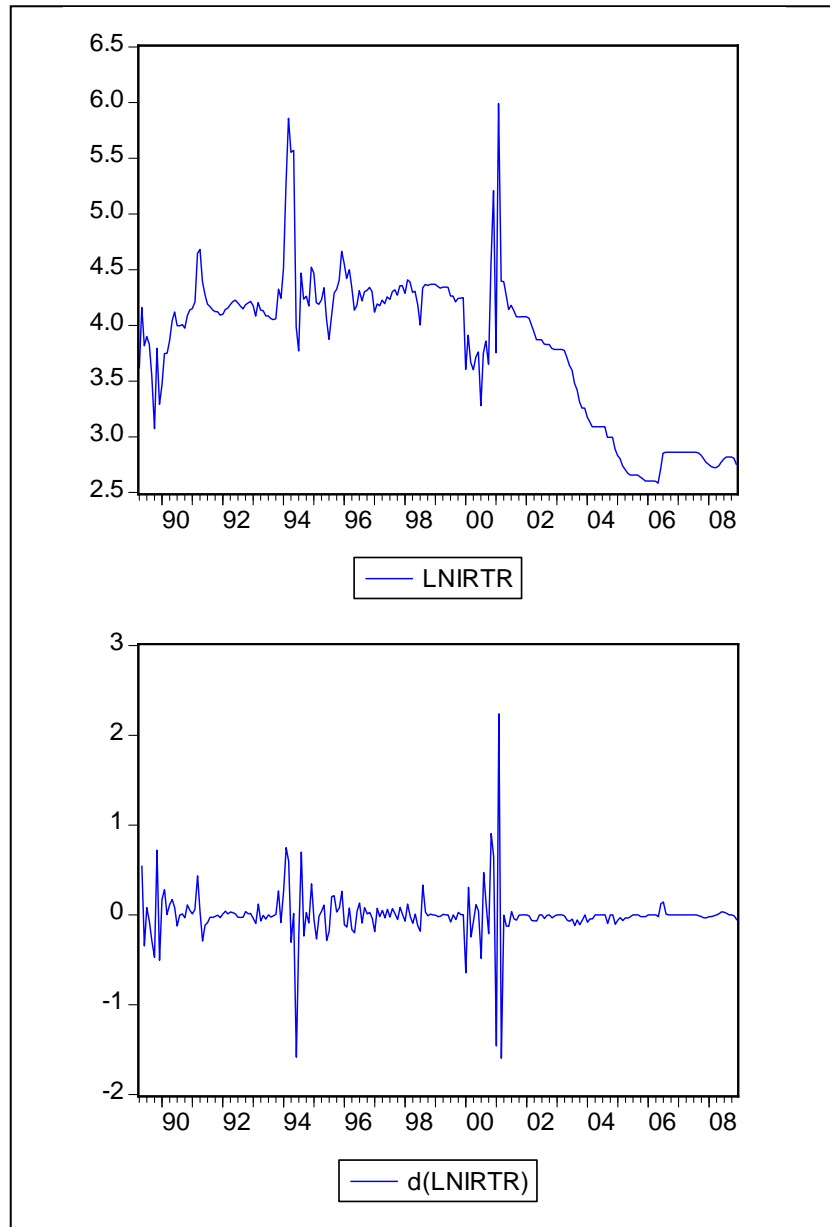


Figure A.1: (Continued)

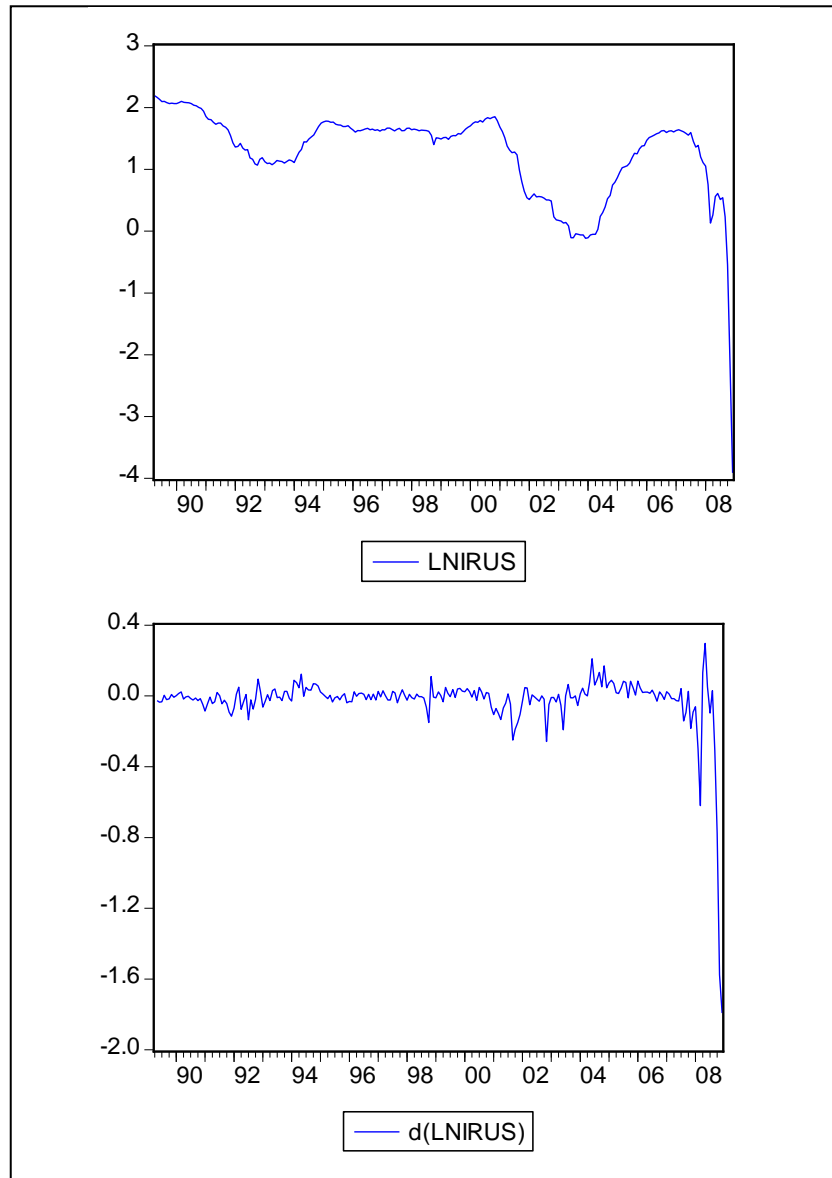


Figure A.1: (Continued)

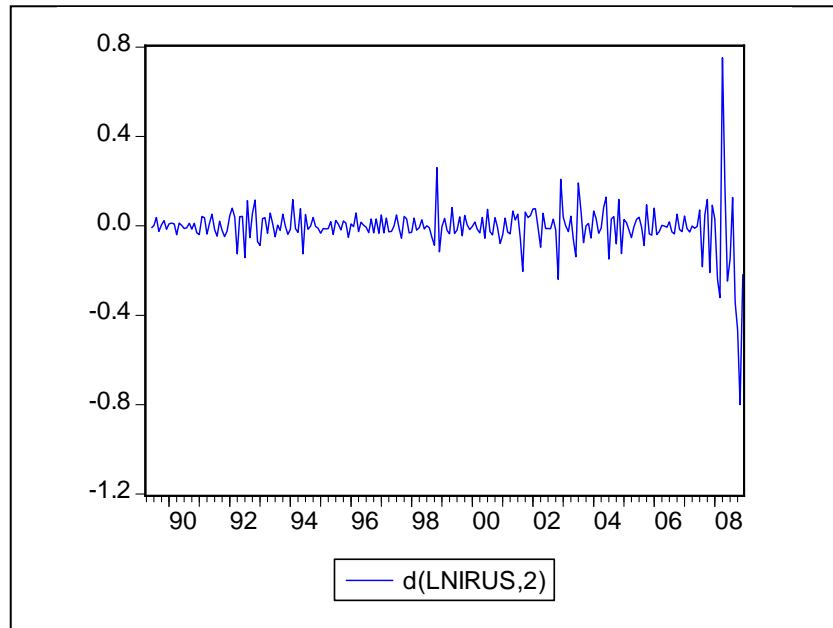


Figure A.1: (Continued)

APPENDIX B: DESCRIPTIVE STATISTICS

Table B.1: Results of the Stability Test for 1989:04 – 2008:12

Root	Modulus
-0.312383 - 0.544964i	0.628148
-0.312383 + 0.544964i	0.628148
0.286757 - 0.469715i	0.550329
0.286757 + 0.469715i	0.550329
-0.514902 - 0.035468i	0.516122
-0.514902 + 0.035468i	0.516122
-0.329551 - 0.391590i	0.511807
-0.329551 + 0.391590i	0.511807
-0.137460 - 0.472129i	0.491732
-0.137460 + 0.472129i	0.491732
0.247332 - 0.258512i	0.357773
0.247332 + 0.258512i	0.357773
0.127220 - 0.325840i	0.349795
0.127220 + 0.325840i	0.349795
0.313321 - 0.092497i	0.326689
0.313321 + 0.092497i	0.326689

Table B.2: Results of the Stability Test for 1989:04 – 2001:12

Root	Modulus
-0.253539 - 0.349254i	0.431579
-0.253539 + 0.349254i	0.431579
0.406862	0.406862
-0.367883 - 0.107327i	0.383219
-0.367883 + 0.107327i	0.383219
0.328908 - 0.182715i	0.376252
0.328908 + 0.182715i	0.376252
-0.33483	0.334825

Table B.3: Results of the Stability Test for 2002:01 – 2008:12

Root	Modulus
0.580349	0.580349
0.413222	0.413222
-0.351714 - 0.043437i	0.354386
-0.351714 + 0.043437i	0.354386
0.331284	0.331284
-0.055675 - 0.130857i	0.142209
-0.055675 + 0.130857i	0.142209
0.098941	0.098941

Table B.4: Results of VAR Residual Serial Correlation LM Test for the Period
1989:04 – 2008:12

Lags	LM-Stat	Prob
1	155.8139	0
2	133.117	0
3	122.8078	0
4	106.534	0.0007
5	76.76762	0.1315
6	95.06549	0.0071
7	66.06818	0.4053
8	94.23067	0.0083
9	120.3509	0
10	103.9138	0.0012
11	87.81844	0.0258
12	356.5148	0

Table B.5: Results of VAR Residual Serial Correlation LM Test for the Period
1989:04 – 2001:12

Lags	LM-Stat	Prob
1	203.209	0
2	140.4243	0
3	95.30446	0.0068
4	104.5225	0.001
5	98.52836	0.0036
6	96.40965	0.0055
7	87.78765	0.0259
8	94.16835	0.0084
9	93.79163	0.009
10	113.2826	0.0001
11	169.9654	0
12	200.5365	0

Table B.6: Results of VAR Residual Serial Correlation LM Test for the Period
2002:01 – 2008:12

Lags	LM-Stat	Prob
1	102.3771	0.0016
2	105.6451	0.0008
3	82.47271	0.0599
4	73.8318	0.1877
5	50.09003	0.8983
6	64.18461	0.47
7	52.28145	0.8524
8	64.14381	0.4714
9	57.21316	0.7133
10	69.32556	0.3026
11	70.80783	0.2611
12	155.5687	0

Table B.7: Results of VAR Residual Normality Test for the Period 1989:04 – 2008:12

Component	Skewness	Chi-sq	df	Prob.
1	-0.44287	7.446438	1	0.0064
2	2.003118	75.9089	1	0
3	-0.14056	0.806625	1	0.3691
4	-0.77599	19.98282	1	0
5	0.189131	1.450173	1	0.2285
6	-3.0568	118.8794	1	0
7	0.340589	4.545629	1	0.033
8	0.581943	12.21111	1	0.0005
Joint		241.2311	8	0
Component	Kurtosis	Chi-sq	df	Prob.
1	3.87791	1.872737	1	0.1712
2	12.46493	4.207179	1	0.0403
3	3.985858	9.357048	1	0.0022
4	9.554075	93.34587	1	0
5	4.220889	12.41202	1	0.0004
6	28.74185	0.664029	1	0.4151
7	8.097599	103.7204	1	0
8	15.85445	323.9984	1	0
Joint		549.5777	8	0
Component	Jarque-Bera	df	Prob.	
1	9.319174	2	0.0095	
2	80.11608	2	0	
3	10.16367	2	0.0062	
4	113.3287	2	0	
5	13.86219	2	0.001	
6	119.5435	2	0	
7	108.266	2	0	
8	336.2096	2	0	
Joint		790.8088	16	0

Table B.8: Results of VAR Residual Normality Test for the Period 1989:04 – 2001:12

Component	Skewness	Chi-sq	df	Prob.
1	-0.30461	2.437036	1	0.1185
2	0.900351	17.00801	1	0
3	-0.02872	0.022513	1	0.8807
4	1.248012	27.82728	1	0
5	0.06137	0.10264	1	0.7487
6	-2.8548	75.48215	1	0
7	0.316072	2.616444	1	0.1058
8	-0.12885	0.449948	1	0.5024
Joint		125.946	8	0
Component	Kurtosis	Chi-sq	df	Prob.
1	4.817825	15.19045	1	0.0001
2	11.74948	97.96927	1	0
3	3.125696	0.614222	1	0.4332
4	11.46804	46.55967	1	0
5	6.656932	52.96266	1	0
6	23.62507	0.000115	1	0.9915
7	4.093162	5.863156	1	0.0155
8	7.599952	71.44677	1	0
Joint		290.6063	8	0
Component	Jarque-Bera	df	Prob.	
1	17.62748	2	0.0001	
2	114.9773	2	0	
3	0.636735	2	0.7273	
4	74.38695	2	0	
5	53.0653	2	0	
6	75.48227	2	0	
7	8.4796	2	0.0144	
8	71.89672	2	0	
Joint		416.5523	16	0

Table B.9: Results of VAR Residual Normality Test for the Period 2002:01 – 2008:12

Component	Skewness	Chi-sq	df	Prob.
1	-0.22313	0.790093	1	0.3741
2	1.395367	19.89459	1	0
3	-0.17598	0.494937	1	0.4817
4	-0.48334	3.476704	1	0.0622
5	0.322125	1.614354	1	0.2039
6	-1.35525	19.10005	1	0
7	-0.30312	1.435636	1	0.2308
8	0.907067	10.41165	1	0.0013
Joint		57.21802	8	0
Component	Kurtosis	Chi-sq	df	Prob.
1	2.143864	3.922677	1	0.0476
2	5.210444	14.20415	1	0.0002
3	2.245848	2.349943	1	0.1253
4	3.655903	0.620325	1	0.4309
5	2.427171	2.080202	1	0.1492
6	6.993077	0.001308	1	0.9711
7	4.038563	4.633842	1	0.0313
8	8.381792	27.20719	1	0
Joint		55.01964	8	0
Component	Jarque-Bera	df	Prob.	
1	4.71277	2	0.0948	
2	34.09874	2	0	
3	2.84488	2	0.2411	
4	4.097029	2	0.1289	
5	3.694556	2	0.1577	
6	19.10136	2	0.0001	
7	6.069478	2	0.0481	
8	37.61884	2	0	
Joint		112.2377	16	0

Table B.10: Results of VAR Residual Heteroskedasticity Test with Cross Terms
for the Period 1989:04 – 2008:12

Joint test:					
Chi-sq	df	Prob.			
7091.962	5616	0			
Individual components:					
Dependent	R-squared	F(156,76)	Prob.	Chi-sq(156)	Prob.
res1*res1	0.82033	2.224351	0.0001	191.137	0.0291
res2*res2	0.972299	17.09976	0	226.5456	0.0002
res3*res3	0.888185	3.869853	0	206.9472	0.004
res4*res4	0.93635	7.166918	0	218.1697	0.0008
res5*res5	0.796637	1.908441	0.001	185.6165	0.0528
res6*res6	0.5846	0.685615	0.9752	136.2117	0.8715
res7*res7	0.914203	5.191129	0	213.0094	0.0017
res8*res8	0.988247	40.96425	0	230.2615	0.0001
res2*res1	0.935516	7.067923	0	217.9753	0.0008
res3*res1	0.854198	2.854187	0	199.028	0.0113
res3*res2	0.941167	7.793535	0	219.2919	0.0006
res4*res1	0.899409	4.355986	0	209.5623	0.0027
res4*res2	0.923908	5.915326	0	215.2706	0.0012
res4*res3	0.862017	3.04353	0	200.8499	0.009
res5*res1	0.891354	3.99691	0	207.6854	0.0036
res5*res2	0.864397	3.105505	0	201.4045	0.0083
res5*res3	0.759698	1.540188	0.018	177.0097	0.1196
res5*res4	0.916139	5.322177	0	213.4603	0.0015
res6*res1	0.770774	1.638141	0.0085	179.5903	0.0949
res6*res2	0.864958	3.120431	0	201.5352	0.0082
res6*res3	0.742865	1.407468	0.048	173.0876	0.1656
res6*res4	0.884364	3.725861	0	206.0568	0.0045
res6*res5	0.956016	10.58916	0	222.7518	0.0004
res7*res1	0.854421	2.859311	0	199.08	0.0113
res7*res2	0.97363	17.98767	0	226.8558	0.0002
res7*res3	0.864191	3.100064	0	201.3565	0.0084
res7*res4	0.912677	5.0919	0	212.6538	0.0017
res7*res5	0.728843	1.30949	0.0943	169.8204	0.2125
res7*res6	0.92076	5.660969	0	214.5371	0.0013
res8*res1	0.952906	9.857573	0	222.027	0.0004
res8*res2	0.958804	11.33865	0	223.4013	0.0003
res8*res3	0.956362	10.67704	0	222.8324	0.0004
res8*res4	0.961372	12.12476	0	223.9996	0.0003
res8*res5	0.855487	2.884006	0	199.3285	0.0109
res8*res6	0.821647	2.244368	0.0001	191.4438	0.0281
res8*res7	0.876464	3.456452	0	204.2162	0.0057

Table B.11: Results of VAR Residual Heteroskedasticity Test with Cross Terms
for the Period 1989:04 – 2001:12

Joint test:					
Chi-sq	df	Prob.			
2937.325	1728	0			
Individual components:					
Dependent	R-squared	F(48,101)	Prob.	Chi-sq(48)	Prob.
res1*res1	0.664825	4.173648	0	99.72375	0
res2*res2	0.979886	102.5061	0	146.9828	0
res3*res3	0.3451	1.108792	0.3274	51.76501	0.3291
res4*res4	0.689446	4.671352	0	103.4168	0
res5*res5	0.844601	11.43627	0	126.6902	0
res6*res6	0.176427	0.450756	0.9986	26.46399	0.9951
res7*res7	0.773732	7.195271	0	116.0598	0
res8*res8	0.607716	3.25972	0	91.15741	0.0002
res2*res1	0.962499	54.00477	0	144.3748	0
res3*res1	0.528262	2.356292	0.0002	79.23934	0.003
res3*res2	0.845373	11.50384	0	126.8059	0
res4*res1	0.723436	5.504091	0	108.5155	0
res4*res2	0.799323	8.381186	0	119.8985	0
res4*res3	0.609292	3.281359	0	91.39383	0.0002
res5*res1	0.839385	10.9965	0	125.9077	0
res5*res2	0.980868	107.8762	0	147.1302	0
res5*res3	0.622102	3.463914	0	93.3153	0.0001
res5*res4	0.888062	16.6935	0	133.2094	0
res6*res1	0.432235	1.601886	0.0245	64.83526	0.053
res6*res2	0.923769	25.49827	0	138.5653	0
res6*res3	0.431007	1.593888	0.0257	64.65108	0.0546
res6*res4	0.679288	4.456752	0	101.8932	0
res6*res5	0.965848	59.50759	0	144.8772	0
res7*res1	0.732307	5.756203	0	109.846	0
res7*res2	0.953512	43.1586	0	143.0268	0
res7*res3	0.706421	5.06312	0	105.9631	0
res7*res4	0.810911	9.02377	0	121.6367	0
res7*res5	0.759017	6.627425	0	113.8525	0
res7*res6	0.933132	29.36336	0	139.9698	0
res8*res1	0.640917	3.755663	0	96.13751	0
res8*res2	0.744283	6.124327	0	111.6424	0
res8*res3	0.423425	1.545258	0.0345	63.51375	0.0661
res8*res4	0.612987	3.332774	0	91.94805	0.0001
res8*res5	0.502076	2.12171	0.0008	75.31136	0.0071
res8*res6	0.56273	2.707884	0	84.40945	0.0009
res8*res7	0.457921	1.777492	0.008	68.68812	0.0266

Table B.12: Results of VAR Residual Heteroskedasticity Test with Cross Terms
for the Period 2002:01 – 2008:12

Joint test:					
Chi-sq	df	Prob.			
1751.319	1584	0.002			
Individual components:					
Dependent	R-squared	F(44,39)	Prob.	Chi-sq(44)	Prob.
res1*res1	0.427357	0.661483	0.9079	35.89797	0.8026
res2*res2	0.784506	3.226816	0.0002	65.89854	0.0179
res3*res3	0.452665	0.733052	0.8413	38.02383	0.7246
res4*res4	0.714238	2.215387	0.0065	59.99596	0.0545
res5*res5	0.767746	2.929997	0.0005	64.49069	0.0236
res6*res6	0.399402	0.589438	0.9549	33.54976	0.8737
res7*res7	0.519626	0.95879	0.556	43.6486	0.4866
res8*res8	0.812661	3.844959	0	68.26348	0.011
res2*res1	0.60206	1.341019	0.1769	50.57308	0.23
res3*res1	0.63105	1.516031	0.0945	53.0082	0.1656
res3*res2	0.766783	2.914238	0.0005	64.4098	0.024
res4*res1	0.681866	1.89977	0.022	57.27675	0.0864
res4*res2	0.769877	2.965327	0.0004	64.66965	0.0228
res4*res3	0.553947	1.100764	0.382	46.53158	0.3686
res5*res1	0.756238	2.749818	0.0009	63.52397	0.0285
res5*res2	0.777243	3.092706	0.0003	65.28845	0.0202
res5*res3	0.674737	1.838703	0.0278	56.6779	0.0952
res5*res4	0.730655	2.404451	0.0031	61.37504	0.0426
res6*res1	0.55628	1.111209	0.3706	46.72749	0.361
res6*res2	0.438986	0.693567	0.8803	36.8748	0.7682
res6*res3	0.749773	2.655873	0.0012	62.98092	0.0316
res6*res4	0.705756	2.12598	0.0092	59.28352	0.0617
res6*res5	0.691358	1.985456	0.0158	58.07409	0.0757
res7*res1	0.812846	3.849643	0	68.27905	0.011
res7*res2	0.660759	1.726421	0.0428	55.50375	0.1145
res7*res3	0.772502	3.009769	0.0003	64.89014	0.0218
res7*res4	0.611627	1.395884	0.146	51.37665	0.2071
res7*res5	0.540835	1.044019	0.4478	45.43017	0.4122
res7*res6	0.356466	0.490975	0.9885	29.94318	0.9477
res8*res1	0.65168	1.658321	0.0555	54.74115	0.1286
res8*res2	0.727611	2.367668	0.0036	61.1193	0.0446
res8*res3	0.893971	7.473232	0	75.09352	0.0024
res8*res4	0.900146	7.990189	0	75.61222	0.0021
res8*res5	0.778696	3.118817	0.0002	65.41044	0.0197
res8*res6	0.801846	3.586742	0	67.35507	0.0133
res8*res7	0.7997	3.538823	0.0001	67.17482	0.0138