OPTIMALITY FOR THE FOREIGN PORTFOLIO INFLOWS: EVIDENCE FROM TURKEY

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Optimality for the Foreign Portfolio Portfolio Inflows :Evidence from Turkey
(Yabancı Portföy Yatırımlarının Optimumu: Türkiye Örneği)

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ÖZET

Bu çalışma, portföy yatırımlarının Türkiye gibi gelişmekte olan ülkelerdeki yükselen finansal piyasalar üzerinde belirli bir optimum noktada yararları olduğu ve ülkenin sermaye yapısından kaynaklanabilecek risklerin uygun para ve mali politikalarıyla kontrol edilebileceği varsayımına odaklanmaktadır. Bu varsayımın desteklenmesinde ilk olarak İstanbul Menkul Kıymetler Borsası risk serisi ile portföy yatırımları arasındaki ilişki irdelenmiştir. Borsa risk serilerinin kullanılmasındaki temel prensip gelişmekte olan ülkelerin yükselen borsalarındaki dalgalanmaların finansal krizler için gösterge niteliğinde olmasıdır. Portföy yatırımları ile finansal piyasalar arasındaki doğrusal ilişkinin tespiti, portföy seviye ve birikimlerinin muhtemel finansal krizleri tetikleyebileceğini dolayısıyla iktisat politikası uygulayıcıları tarafından yönetilmesi gereken önemli faktörlerden biri olduğunu ortaya koymaktadır.

Çalışmanın ikinci bölümünde portföy yatırımlarını etkileyen faktörler, akımların miktar ve yönlerinin yönetilebilmesi için Türkiye örneği kapsamında incelenmiştir. Çalışmanın son bölümünde ise alternatif bir yaklaşım olarak piyasa riski ve portföy yatırımlarının merkez bankası rezervlerine oranı arasındaki ilişkiler Türkiye'deki finansal kriz dönemleri dikkate alınarak incelenmiştir. Sonuçlar gerek ekonomik politika belirleyiciler gerekse bireysel ve kurumsal portföy yatırımcıların politika ve yatırımlarını belirlemede portföy yatırımlarıyla beraber merkez bankası

rezervlerini de dikkate alması gerektiğini ortaya koymaktadır. Yapılan çalışma kriz öncesi dönemde merkez bankası rezervleri ile portföy yatırımları arasındaki oransal ilişkinin piyasadaki çöküşten once düşüşe geçtiğini göstermekte ve merkez bankasının rolü düşünüldüğünde bu durum "insider information" a işaret etmektedir.

Bu çalışmada daha az riskli piyasaların oluşabilmesi için portföy yatırımlarının tamamiyle kısıtlanması düşüncesi reddedilmiştir, çünkü petrol gibi değerli yeraltı kaynaklarına sahip ülkeler dışındaki diğer tüm gelişmekte olan ülkeler yatırımlarının finansmanında portföy yatırımlarına ihtiyaç duymaktadırlar.

ABSTRACT

This study focuses on the view that international portfolio flows have benefits on the financial markets of developing countries like Turkey at an optimum point that the risk arising from the capital structure of the country can be offset with the appropriate fiscal and monetary policies. To support the idea, initially the relation between ISE risk series and portfolio inflows is investigated since ISE100 risk series may be seen as an indicator for financial crisis. This allows us to define that portfolio inflows have a direct effect on the market risk which means the level and stock of portfolio investments flow is a crucial determinant that should be managed by policymakers to prevent possible financial crisis. Secondly the determinants of portfolio inflows are investigated to define alternative policies for managing the size and way of portfolio flows under Turkish evidence. Finally an alternative approach for the relation between market risk and net portfolio flows to central bank reserves ratio is investigated for financial crisis period in Turkey. The results of the researches that both government policy makers and investors should take into consideration the portfolio flows and central bank reserves together especially for developing countries like Turkey. Our study shows that the portfolio outflows start before the risk arises in the financial markets which lead to the possibility of insider information about central bank policies.

The idea that the portfolio flows should be fully restricted for a less risky market structure is rejected under this approach since all developing countries, excluding ones having huge natural resources like oil, need portfolio inflows to finance the investments for the sustainable growth.

TABLE OF CONTENTS

LIST OF TABLES AND FIGURES

LIST OF TABLES

LIST OF FIGURES

ABBREVIATIONS

ARCH: Auto Regressive Conditional Heteroscedasticity

ECB: European Central Bank

EMH: Efficient Market Hypothesis

EMU: Economic and Monetary Union

FED: Board of Governors of the Federal Reserve System

FDI: Foreign Direct Investments

GARCH: Generalized Auto Regressive Conditional Heteroscedasticity

GDP: Gross Domestic Product

IMF: International Monetary Fund

ISE: Istanbul Stock Exchange

MFI : Monetary Financial Institutions

MPT: Modern Portfolio Theory

PI: Portfolio Inflows

PPP: Purchasing Power Parity

SVAR: Structural Vector Auto Regressive

TCMB: Central Bank of the Republic of Turkey

TRY: New Turkish Lira

US: United States

USIPI: United States Seasonally Adjusted Manufacturing Industry Production Index

VAR: Vector Auto Regressive

1. INTRODUCTION

Cross border capital flows were mainly foreign direct investments and international loan contracts between governments till the end of 1970's. Following the fall of Bretton Woods monetary system, liberalization of national economies have found acceptance by policymakers and economists especially in developing countries. The developments in the communication technologies have fastened the transition period in financial markets and national financial markets became more integrated with the rest of the world. Additively investors' attitude for international portfolio diversifications supported the revolution in cross border capital markets. Certainly, Markowitz's (1952) portfolio selection theory (MPT) and Tobin (1958), Sharpe (1964), Lintner's (1965) international capital asset pricing model (ICAPM) have became more popular and basics for portfolio investments in financial markets.

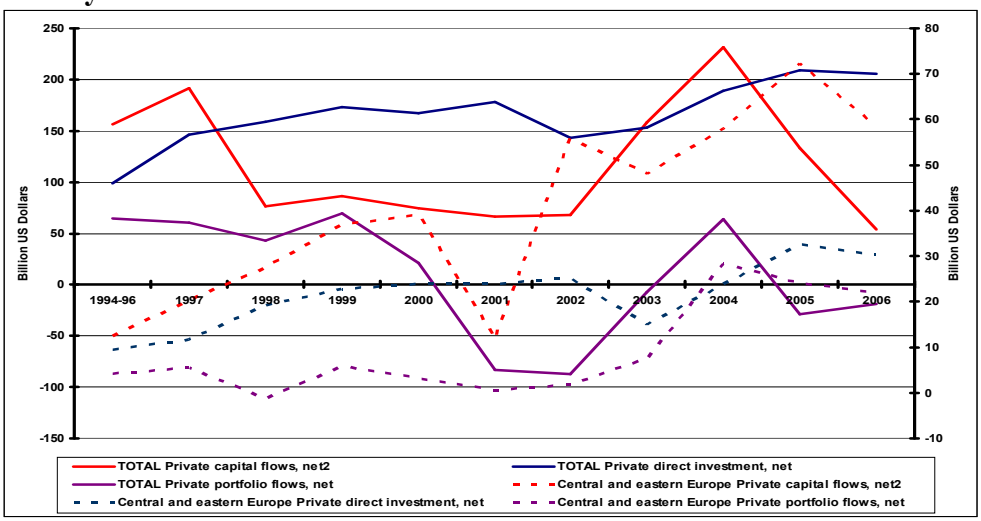
Increasing trend in the volume of individual portfolio flows have aggregately reached to critical volumes affecting macroeconomic balances and policies of emerging market economies in 1990's as it is still relevant today. The consequences of the new capital system are highly discussed by financial and economic authorities in the last two decades.

Today, discussions are mainly convened on the effects of short term profit oriented portfolio investments in emerging markets since such flows are

crucial for the stability in financial markets and sustainable growth policies of local governments. Furthermore, conjunctures in portfolio flows can quickly change due to any profit or risk preferences of investors which aggregately may have destructive effects on financial markets.

The European Central Bank's (ECB) monthly and quarterly bulletins make sense about how quickly portfolio flows may change. Securities represent about 20% of the monetary financial institutions' (MFI) consolidated balance sheet in the Euro area by the end of 2007, thus making an increasingly important component of broad money. Furthermore, there is an extreme shift in the direction of net portfolio inflows and FDI inflows to Euro area from a 45.4 billion Euro to net outflow of 109.2 billion Euros from 2005 to 2006.

Figure 1.1: Capital Flows; World and Eastern Europe including Turkey



Source: IMF

In addition to ECB statistics, the financial crisis in Latin America, Asia and finally in Turkey at the last two decades are the evidences for possible risks of economic policies when adopted with hot money financing. Most of the economists and financers participate to the criticism that the weakness of such IMF stabilization policies is the abiding of stabilization packages on the hot money transfer financing since the financial systems in such countries collapsed and crisis got deeper with the effects of rapid portfolio outflows.

In the evidence of financial crisis and governments responses to crisis by increasing the interest rates have raised another question as whether increase in the mobility of capital flows due to higher interest rates, so a higher premium in the returns is positively correlated with the financial markets or is a factor of more risky structure. The financial instability in emerging economies like Turkey has also brought the discussions about the benefits and risks of allowing the capital to flow freely across national borders.

The uncertainty of whether international portfolio inflows have beneficial or harmful effects on financial markets and macroeconomic stabilization policies is another complementary and confusing topic that have gained a crucial importance for structuring of government's stabilization policies. The importance of such policies is higher for emerging markets since these

countries have to develop well-functioning financial markets to support the sustainable growth levels and development of real sector.

At this point, central banks roles become more important in liberal economies where the portfolio flows affect the monetary policy tools just like the foreign exchange rates, foreign currency reserves, money supply and inflation.

A large volume of literature is assigned for depicting the gains and risks from diversification of portfolio investments across national boundaries. Grubel (1968), Levy and Sarnat (1970), Solnik (1974) focused on the risk lowering benefits of portfolio inflows where some of others point the risks of portfolio inflows on the financial markets. Both approaches seem to be fair for different economic conditions and countries.

The deviations in the policies may create uncertainty and inefficiencies by affecting investors' expectations. By the view of high elasticity of capital flows, momentary and high volume of capital inflows and outflows increase the volatility in the financial markets. The asymmetric information between the market conditions and investor expectations is a result of these variances that is contradictory to the "efficient market hypothesis" (EMH).[1] Hoggarth and Sterne (1997) also support this idea by indicating that the capital flows

[1] The **efficient market hypothesis (EMH)** asserts that financial markets are "informationally efficient", or that prices on traded assets, e.g., stocks, bonds, or property, already reflect all known information and therefore are unbiased in the sense that they reflect the collective beliefs of all investors about future prospects (Eugene FAMA, 1965).

may lead to an increase in volatility of financial indicators and cause ineffectiveness of monetary policies.

On the other hand, portfolio flows have also positive effects for both investors and capital receiving countries. The investors support their risk allocation needs and increase their returns where countries find opportunity to finance their investments, increase their growth and public investments. Modern portfolio theory (MPT)[1] supports for the higher profit opportunities from portfolio diversifications. The MPT and ICAPM are used widespread by financial analysts for diversification of individual and corporate level portfolio investments. Erdoğan (1994), have also analyzed an optimum strategy for a global portfolio using 19 stock exchange indexes under MPT and ICAPM approaches. The result of Erdogan's research proves the opportunities from diversification and depicts on the need for exchange rate hedging for more efficient portfolio diversifications. The need for hedging supports the investors' awareness for volatile exchange rate markets and frequent exchange rate crisis in emerging markets like Turkey at the last three decades. Erdogan and Schmidbauer (1997) also analyzed the correlation between the stock market volatility and foreign exchange rate volatility by a multivariate conditional variance model, "MGARCH-BEKK

[1] **Modern portfolio theory** (**MPT**) proposes how rational investors will use diversification to optimize their portfolios and how a risky asset should be priced. According to the theory, it's possible to construct an "efficient frontier" of optimal portfolios offering the maximum possible expected return for a given level of risk. This theory was pioneered by Harry Markowitz in his paper "Portfolio Selection," published in 1952 by the *Journal of Finance*.

Model", for Turkey evidence and the models output shows a significant relation between the stock market and FC market which in turn also supports the investors preferences and risk awareness between the two markets.

The aim of this study is to define a model depicting an optimum point for risk lowering characteristics of portfolio flows under Turkish evidence. In the following sections theoretical background for the liberalization and determinants of portfolio flows under different approaches are initially studied for understanding the theory behind the portfolio inflows and depicting the possible approaches to portfolio inflows. The EMU experience is studied as a complementary perspective at an implied example for accomplishing different theories.

Secondly the historical background for the capital flows at global and a narrower view for Turkey is reviewed for combining the theory and reality about the portfolio inflows.

Third part of this study is structured for investigating the relation between the market risk and portfolio flows under Turkish evidence to support the evidence that portfolio flows can be a tool for managing the risk in market for developing countries. Further investigation at the last part is made for depicting the factors affecting the portfolio flows by SVAR model to create a flow figure for using different alternative economic policies. Singh (1997)

and Krugman (1998) also states that the financial crises happen due to bad management of financial risk factors. The argument for the importance of managing the portfolio investment gains a crucial importance for countries like Turkey. Our model aims to be a map for managing the portfolio flows for the optimum point that is best with respect to market and country conditions.

2. THEORETICAL REVIEW

2.1 Financial Liberalization

Financial liberalization has started with the end of “golden age” which covers a period of 30 years between the end of World War II (1939- 1945) and end of 1970’s. The period is called as “golden age” since it was more egalitarian and social when compared with the following period. Kazgan (2001) defines the period as beneficial for the developments of underdeveloped countries where welfare globally increased with growing economies of all countries due to basics of the economic and financial system. The system at golden age was based on the increasing profitability of real sector and distribution of the income between stipendiary people to create demand for such products. In other words, system was structured as financing the production by the internally created demand. The demand and income would dimensionally increase each other by circular reasoning of higher production needs however a stagflation period started after the decease of profitability by the collapse of Bretton Woods monetary system and oil shocks in 1970’s. The failure of the old system has raised the need for other alternatives and stagflation period in the world have made well

developed western economies to start adopting post-fordism[1] in manufacturing industry and full liberalization in financial markets.

The capital flows among countries developed to a global level as a result of rapid liberalization trend in the world and the integration of communication and information technologies from the beginning of 1980's. The unplanned but rapid financial liberalization movements have taken place against the public entity aspect of social government approach since these entities were bearing loss and seen as a factor for high current account deficits. On the other hand the validity of portfolio theory have found acceptance with more rational investors. The opportunity of higher profits from the risk differentiation between countries in 1980's have brought a newly introduced capital flow approach with more mobile short term profit oriented portfolio flows rather than long term direct investments.

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[1] **Post-Fordism** is the mode of production and associated socioeconomic system theorized to be found in most industrialized countries today. It can be contrasted with fordism, the productive method and socioeconomic system typified by Henry Ford's car plants, in which workers work on a production line, performing specialized tasks repetitively.

Post-Fordism is characterized by the following attributes:

- New information technologies.
- Emphasis on types of consumers in contrast to previous emphasis on social class.
- The rise of the service and the white-collar worker.
- The feminization of the work force.
- The globalization of financial markets.

The predictions of financial liberalization are the most important theory behind the rapid increase in the portfolio flows. Theory basically predicts that the capital should flow to high return investments with the removal of capital controls and limitations, so that the capital allocation would be more effective. McKinnon (1973) and Shaw's (1973) studies bases the financial liberalization theories on the concepts of financial coercion[1] and financial depth at their different books and journals. Both of the authors state that not only the coercion and interventions on financial markets should be released but also the limitation on foreign trade and capital movements should be released. By this view it can be said that the financial liberalization defines a perfect environment for the flow of portfolio investments across countries.

Alternatively, the outcomes of the financial liberalization theory also supports for the increase in flow of portfolio investments across countries as, the interest rates should increase in the countries where the local savings are low and the excess savings of other countries would flow to these countries for higher returns. The process cooperates with the aim of portfolio owners for cross border investments as the profit maximization with the lowest risk level is crucial for portfolio theory. The theory also supports the beneficial parts as the financial markets approximates to

[1] All of the interventions and constraints on the financial markets are defined as financial coercion by McKinnon and Shaw.

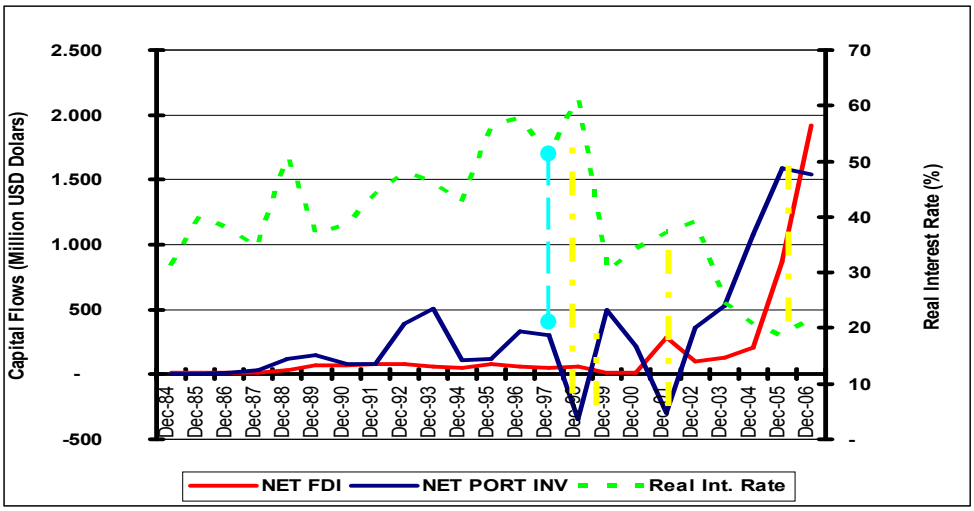
efficiency with lowering the interest rates to world levels with the effect of flows.

On the other hand, the countries on the way of financial liberalization period have faced with many financial problems. Despite the useful effects of financial liberalization on developing countries and international capital markets, Yeldan (2002) stated the liberalization in the foreign exchange rate regimes at developing countries have limited the opportunities of applying independent monetary, interest and exchange rate regime policies for the related country growth policies. Countries like Turkey experienced instable real interest rates, devaluations and high inflation rates that lead to shocks on the real sector and loss of wealth.

Turkey experienced the gradual financial liberalization starting from 1980. 1989 is critical for the way on liberalization since the convertibility of the TRY is happened at 1989. Figure below shows the relation between real interest rate and portfolio flows for the years between 1984 and 2007. It indicates that there is a positive correlation between the portfolio inflows and real interest rates till the first half of 1996. There is a structural change after 1996 as the relation transforms to a negative correlation. Turkey joined the customs union at 1996 which is essential for integration of Turkey to the global economy. On the other hand the early portfolio inflows and outflows before the extreme movements in the real interest rates may be an indicator

for insider information or sudden changes in the expectations since the interest rates after 2001 are defined by Central Bank of Turkish Republic. This characteristic of portfolio flows brings the question for benefits and negative externalities of such flows for developing countries.

Figure 2.1.1: Portfolio Inflows and Real Interest Rate Movements after Financial Liberalization (Turkish Evidence 01.1984 – 12.2006)

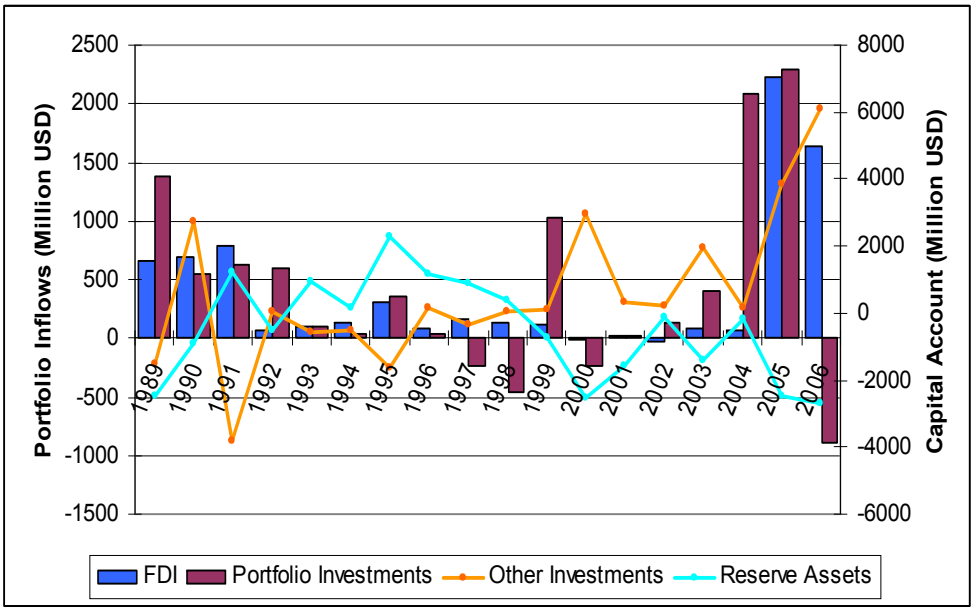


Source: TCMB

Benefit of the portfolio flows for emerging markets is a more complex issue. Empirical studies show that capital flows to developing countries do not lead to decrease of investment returns to developed countries level, so there is no approach between returns that may bring emerging markets to efficient levels (Akyüz, 1993). Additively financial liberalization do not lead to more effective allocation of savings in financial markets since the investments are for short term speculative high returns rather than opportunities of real investments in these developing countries (Kaya,

1998). The distinction between the capital flows and real investment needs create inefficiencies globally for production and growth. The relation between the real flows of goods and capital flows has become too low and the financial arbitrage oriented capital flows towards developing countries came into an increasing trend (Berksoy and Saltoğlu, 1998). Yeldan (2002) also participates the idea that capital flows in 1990's didn't finance the real trade in world and the capital flows in the decade have a growth pattern completely different than the real production and needs of physical investments. Capital flows and portfolio investments share in the capital flows also increased in Turkey after the financial liberalization movements in 1989.

Figure 2.1.2 Turkey Capital Account Items (1989 – 2006 Million USD)



Source: TCMB

Eventually, the latest researches on the capital flows to developing countries state that most of these flows are short term and speculative flows that may lead to volatility increases in financial markets. The financial liberalization is the basic theory behind the portfolio flows where the theory does not imply a beneficial experience on the financial markets for developing countries as for also Turkey.

2.2 The Determinants of International Portfolio Inflows

There has been a general relaxation for the foreign portfolio investments in most developing and developed countries at the recent two decades. Different approaches for evaluating the determinants of international portfolio investments are enhanced such as “home bias puzzle” and “push pull factors” approaches. Home bias puzzle focuses on the conflict of ability to maximize the portfolio investments’ return with opportunity of variety in market correlations but a little holding of health in foreign assets. On the other hand, push-pull factor approach is focused on the distinction of macroeconomic factors for both domestic and foreign markets as the components of factors for the flow of capital from developed countries to developing and emerging countries. We have reviewed the wide literature for both of the approaches and concluded combination of both rather than the other researches at the following sections.

2.2.1 Home-Bias Puzzle

The home-bias puzzle indicates that domestic investors hold too little of their health in foreign assets when compared with the predictions of standard theory. Many financial researches about portfolio diversification opportunities support the idea behind the standard theory. Tesar and Werner have studied the excess returns on a portfolio of foreign portfolio compared with a portfolio with primarily domestic securities at their journal in 1995. Their study indicates that there are specific gains from international diversification in all countries of their sample (Canada, Japan, the United Kingdom and the United States) except Germany. Erdoğan (1994) also studied on the optimum return for an international portfolio by implementing ICAPM and MPT with stock indices of 19 countries.

Despite the beneficial outputs of studies about international diversifications, a strong domestic bias seems to exist in national equity portfolios. French and Poterba's studies about international equity holdings at 1991 indicates that there is too little cross-border diversification given the correlation structure of the international equity markets which provides great advantage for portfolio diversification. The studies of Shawky, Kuenzel and Mikhail (1997), Cooper and Kaplanis (1994) and Lewis (1999) all concluded with the home bias puzzle despite the benefits of international portfolio diversifications.

As the bias between the high profit opportunities and investor decisions implicate inefficiency for portfolio investments, the reasons behind the home bias puzzle have been an interesting area for researches. Various barriers as transaction costs, differences in taxation, exchange rate and capital market regulations, other restrictions for international investments, informational differences and barriers due to investors' attitudes are also investigated for other possible explanations. The details are given below:

The differences in relative portfolios are initially explained by international pricing models, however Cooper and Kaplanis (1994) showed that the magnitude of deviations from PPP combined with plausible deadweight cost estimates would be able to explain observed home bias only if investors have very low levels of risk aversion.

The transaction costs are unlikely to explain the home bias. Tesar and Werner (1995) have found that the turnover of foreign portfolio holdings is much higher than the turnover on the domestic market. Also French and Poterba's (1991), Cooper and Kaplanis's (1994) researches showed that the differentials in taxations for investment in different countries doesn't fully cover the home bias in these countries where the capital market regulations were abolished at 1980's in developed countries.

Political risks still exist and will always exist for investors playing at the abroad market however Frankel's (1991) measures for the political risks as

reflected in interest rate differences indicate that they are too small in order to explain a significant part of the observed home bias.

Asymmetric information is also suggested and found to be a determinant for international portfolio inflows by the empirical researches of Low(1992), Chuhan (1992), Gehrig (1993), Gordon and Bovenberg (1996), Kang and Stultz (1997), and Brennan and Cao (1997). Kang and Stultz have investigated for the determinants at a large country with no capital restrictions and where there is no company level data on foreign ownership available, Japan. They have found that the large and well known companies of the domestic market, takes the larger proportion of the portfolio inflows[1]. Brennan's model also predicts that although domestic investors have an informational advantage when compared to international investors, the international portfolio inflows will be still positively related to current return on the market indexes where these indexes is a measure of the overall performance of the market. Domestic investors may also suffer from information asymmetries as Coval and Moskowitz (1999) found that a mutual fund had a local equity preference and suggest informational difference as an explanation.

The foreign ownership may be another explanation for the home bias however it also seems to be irrelevant for countries like Japan, Turkey and

[1] However, their results were inconsistent with existing models predicting that foreign investors hold national market portfolios or portfolios tilted towards stocks with higher expected returns.)

Finland. As Japan, Turkey and Finland are currently countries where foreign ownership constraints are not binding, prior to 1990's, foreign ownership was restricted by government in Turkey but after the liberalization movements in Turkey the restrictions on foreign ownership was abolished with few exceptions. The foreign ownership of the shares of Turkish listed companies has since then rapidly grown and also the market. On the other hand the foreign ownership of these companies has came to a point where the representatives of the industry and political parties discuss the need to protect domestic ownership e.g. by the means of privatization of public companies and the purchase of these biggest companies by foreigners and the foreign investments in the banking sector. The major concern is the probability of moving company headquarters outside Turkey and so resulting with the higher unemployment levels. Besides, empirical results of Pajarinen and Ylä-Anttila (1998) do not support this idea by their research on the domestically owned companies in Finland versus the foreign ones and they found that the foreign owned companies are operating more positive than others. Foreign companies paid higher wages and were more profitable and more efficient according to several measures used.

2.2.2 Push-Pull Factors Approach

Push-Pull Factors Approach discusses the factors for portfolio flows at the point of external and internal factors depicting domestic and foreign factors for attracting or keeping away the capital movements to related markets.

There are many researches for different countries at the view of push-pull factors approach. Calvo, Leiderman and Reinhart (1993) have examined the determinants of capital flows from developed countries to developing and emerging market economies. Other studies of Chuhan, Claessens and Mamingi (1993), Fernandez-Arias (1996), Taylor and Sarno (1997), Kim (2000), Dasgupta and Ratha (2000), Mody, Taylor and Kim (2001), Ying and Kim (2001), Hernandez, Mellado and Valdes (2001) have followed the studies for the determinants of international portfolio investments. All of the studies are based on the push and pull factors as push factors refer to external determinants of capital flows from developed countries to developing and emerging markets such as interest rates, money supply, and economic activity in industrial countries. On the other, hand pull factors refer to domestic determinants of capital inflows in a particular emerging market such as domestic interest rates, foreign exchange rates, stock market indices, macroeconomic stability, price levels, domestic credit level and domestic production dynamics.

Push-pull factor analysis brings out the importance of the determining relative roles of push pull factors respectively for the policy makers since if capital flows are determined by push factors, domestic policymakers will have little to do to control the capital flows, on the other hand, to the extent that capital flows are determined by pull factors, domestic policymakers will

have more power on capital flows by introducing sound macroeconomic policies.

Controlling the capital flows for the countries like Turkey is a crucial factor for the stability of macroeconomic policies since the portfolio investments are external pressures on the money supply. The sudden monetary inflows/outflows at high volumes with mass psychology from/to abroad bring the risk on interest rates and foreign exchange rates may trigger the inflation so demand of higher risk premium by the debt financer countries. The higher risk premium means higher costs for the country and may lead to financial crisis as it was seen in Turkey, Brazil and Argentina in 1990's.

The relative roles of push and pull factors vary across different empirical studies. Calvo, Leiderman and Reinhart (1993), and Fernandez-Arias (1996) argue that push factors, particularly low US interest rates, have a dominant role in driving capital flows into developing countries. Likewise, Kim (2000) found that push factors such as decreases in world interest rates and/or recessions in industrial countries have a dominant role in driving capital flows. Similarly, Ying and Kim (2001) found that push factors such as US business cycles and foreign interest rates account for more than 50 percent of capital flows into Korea and Mexico.

Nevertheless, Mody, Taylor and Kim (2001), and Dasgupta and Ratha (2000) states that, in general, pull factors have a heavier importance in

determining capital flows. Hernandez, Mellado and Valdes (2001) show that private capital flows were determined mainly by pull factors, and push factors were not significant in explaining the capital flows.

Alternatively to the opposite approaches, Taylor and Sarno (1997) state that push and pull factors are equally important in determining the long-run movements in equity flows, while push factors are more important than pull factors in explaining the dynamics of bond flows. Chuhan, Claessens and Mamingi (1993) similarly argue that about half of the explained increase in flows to the Latin American countries can be attributed to push factors, whereas pull factors are estimated to be three to four times more important than push factors in motivating the capital flows to the Asian countries.

2.2.3 Home-Bias Puzzle versus Push Pull Factors

Theories of both "Home-Bias Puzzle" and "Push-Pull Factors Approach" are discussed at the sections above for a better understanding of global and domestic habitat of international portfolio investments. Both approaches seem to be identically different for international portfolio investments where home bias investigates the investor preferences for portfolio diversifications and push-pull factor approach investigates for the factors affecting these preferences at the view of domestic and global market conditions. Despite the different aspects of two theories, they complete each other.

Home bias puzzle approach analyzes the investors' preferences where push-pull factor approach analyzes these preferences by allocating the effective factors as external and internal. The combination of two is the complete picture for the reasons to invest in foreign securities and factors to take a position against these reasons. Baxter and Jermann (1997) have shown that the home bias puzzle imposed by the lack of fact that the heavily over weighted portfolios with domestic securities with the opportunity costs of not optimizing with foreign investments, so diversification lack, deepens if the human capital in asset portfolios held by individual investors. This hypothesis is also supported by the study of Lewis (1999) implementing that the home bias puzzle is not valid for portfolio investments but also for consumption. Both of the studies show that the human capital and identical factors affecting the preferences of human capital should be combined for a better understanding of portfolio investment allocations.

2.3 The Impact of EMU (Economic & Monetary Union) on International Portfolio Investments

The home bias puzzle is investigated by two possible explanations at the previous section. We have reviewed literature for the asymmetric information, barriers and transaction costs however the inertia of institutional restrictions is not discussed yet. It is hard to discriminate two explanations about the home bias puzzle however the launching of EMU provides an experiment on this issue.

The inertia can explain why things are changing slowly however it can hardly explain investors' active portfolio allocation decisions. Portfolio theory predicts that the investors should dislike an increase in the correlation between the returns so a drop of equity investments in the EMU area is expected. Stock returns are also empirically negatively rather than positively correlated with domestic inflation. Since the introduction of the monetary union will increase the correlation in country specific inflation rates the fact that the FX-risk is eliminated should again make portfolio holdings in the other EMU less, not more attractive. Obstfeldt and Rogoff (2000) explained the investors' decision by taking trading costs and proper distribution elasticity between domestically produced and imported good into account one can explain the observed home bias in portfolio holdings.

On the other hand the information based system predicts that the decrease in the transaction costs should increase the trade so portfolio investment flows into EMU area. Rose (1999) studied international trade between 186 countries for the period 1970-1990 and found a strong evidence for an expected increase in trade. He finds that countries using same currency, trade three times as much as they would with different currencies.

Another explanation for the increase of portfolio investments in EMU is that the EMU area countries are more attractive for the investors since it reduces the foreign exchange and inflation risks of investments into these countries. Erdoğan states the need for exchange rate hedging for Turkey

and global portfolio investments at his different researches in 1994, 1997 and 2003. Instead, Solnik (1974), Sercu (1980) and Adler & Dumas's (1983) international capital asset pricing model reveal that ,for the hedging motive to justify a bias towards home currency denominated holdings, these holdings should provide a hedge against domestic inflation.

EMU's impact on cross-border transaction costs within the area is another advantage for investing in the area. The use of one common currency within the union eliminates all costs from the use of different currencies in cross-border transactions within the area. The reduction in the cost consist the bid-ask-spreads charged by brokers and also the costs for hedging any exchange risks between currencies. The estimates, for the savings incurred by this point of view, is about 0.5-1 % of the GDP in the area. Savings within EMU are higher for smaller countries with more exotic currencies than for others like Germany and France.

Anyhow, the increase in the trade volume with EMU is due to two factors. Initially there should be trade creation since some trades that were not seen worth will now become profitable with the decreasing costs. Secondly there is a redistribution of trade with shifting the trade done from other countries outside the EMU to EMU countries. Both of these factors contribute to a higher trade volume within the union but a lower level with the rest of the world. The effect of the increase in trade to portfolio investments is quite

similar since the reduction in cost is also relevant for portfolio investments. Markowitz's (1952) portfolio theory was first applied on international portfolio holdings by Grubel (1968) and Levy (1970). Portfolio theory leads us to expect that the correlation between returns on stocks listed in the foreign EMU country and returns on domestic returns should be of decisive important so that if the correlation between stock returns listed on EMU countries increases more than the correlation with stocks in other countries, then portfolio investments into the EMU area will be less attractive. The impact of EMU on the correlation between stock returns for the countries included in monetary union comes from the expectation of the fact that the stock prices are sum of discounted expected future returns of the related prices. The earnings of a firm are roughly the difference between its sales and costs.

Consequently this approach is means of a higher correlation between sales of the firms within the country. The same conclusion seems to hold for costs. This leads to a higher level of sales and lower costs for the countries within EMU so a conclusion of concerning firms' higher future earnings, so stock prices, should become more correlated between firms residing in different Euro countries as a consequence of EMU. Chen and Zhang (1997) found support for the conjecture that stock returns tend to be correlated more strongly for countries which have strong economic ties than for those that have weak tie. They investigated a number of stock markets in Pacific-

basin area, and found that the flow of trade between countries is strongly related to the corresponding correlation coefficient between stock market returns.

Trade is an important component for the portfolio investments but not because of its effect on the correlation coefficients between markets, it is important because trade implies flow of information between countries. Portes and Rey (1999), at their study between 14 countries, found that there is a significant correlation between distance and bilateral equity flows in addition to obvious controlling variables like market capitalization of the receiving company. The study of Portes and Rey supports the importance of asymmetric information on portfolio investments since distance at least to some extent measures the information costs. Explicitly for Finnish investors Aba Al-Khail (1999) found that the basic form of a gravity equation is able to explain about 80 percent of the variance in the dispersion between countries of Finnish foreign portfolio investments in 1997. On the basis of these results it seems that the information-based explanation has some support in the data.

Briefly there are two possible approaches for the effect of EMU's impact on the portfolio inflows to/from countries within the EMU. Initially the portfolio theory based arguments imply that closer link between the countries in the union relates to increase in the correlation between the stock

returns so a less attractive stock markets within the EMU. Secondly information based approaches refer to increases interaction between EMU countries that reduce asymmetric information and so creates more attractive stock markets for investors. As Berglund and Aba Al-Khail's (2002) study on Finnish market for the impacts of EMU on portfolio investments, the countries with relatively high foreign exchange related transaction costs in the pre EMU era become more attractive for the portfolio investments. The overall result was that considerations related to the flow of information between countries tend to have substantially more power than hedging motives in explaining the distribution of foreign portfolio investments. Despite Turkey has different and more complicated dynamics when compared to Finland, it is rational to expect same effects on Turkey since the share of foreign exchange related transaction costs are very high. The risk level, premium between local and foreign currency, is about 0,48311 % between Euro and Turkish Lira where it is 0,00777 % zero in UK between Sterling and Euro as of 05.04.2007. The proportional reduction in the risk premium will lead to an increase in the portfolio investments for Turkey.

2.4 Capital Flows to Developing Countries

Following the Great depression period at 1930's, World War II and negotiations at post war period for reconstructions of the new world have brought a new finance system where capital between countries should increase and flow faster. Much of the policy makers at that period were

focused on the financing the economic and real sector reconstruction of Western Europe. United States was leading for the reconstruction since the economic development and growth of USA could only be carried on with the market at Europe. A desolate Europe couldn't support the supply of America's production and great depression period had trailed bad memories for United States. United States' policies seem to be relevant when the policies are combined with the reality of Golden Age. The central argument with the fall of Bretton Woods was about changes in the prevalent rules and norms for cross border transactions. The discussions were also focused on the trade of goods and services which is exclusion for our study. The historical development of financial markets is so important for understanding the ascending importance of capital flows to developing countries.

International capital movements expanded after 1950's by the effect of post war economic recovery but more stimulated by the development of offshore currency markets where financial transactions were subject to much lighter controls.

The 1960's were the years where countries were subject to pressure due to surges of short term capital flows between major currencies, surges which overwhelmed Bretton Woods system of exchange rates. As the size of flows increased, the controlling and responding to capital movements have

became more popular. The unshackled increases of the movements have brought the progressive liberalization of capital account transactions. As the importance of the international financial system increased with the size and effects on the economic balances, the private actors in financing also became more active and paralleled for external financing for developing countries during 1970's and 1980's. The destabilizing spillovers from the financial crisis in Asia and Russia on the financial markets and firms in industrial countries in 1980's have provided additional impetus on the progressive integration of emerging economies into the network of international financial markets. The period starting with the crisis in 1990's have increased importance of external financing for emerging markets and consideration of systemic reform of international financial governance.

The growth of emerging markets increased rapidly parallel to capital inflows to developing countries from the beginning of 1990's. Developing countries in Asia and Latin America have received an amount of nearly USD 670 billion of foreign capital in the five years from 1990 to 1994, as measured by the total balance on the capital accounts of these countries (Calvo, Leiderman and Reinhart, 1996). Although there has been a decline in the capital flows to developing countries in the wake of the Mexican crisis, capital inflows have begun to increase again by mid 1990s. This period also witnessed a change in the composition of the private capital flows, with a marked increase in the share of portfolio and short-term capital flows. Total capital flows to developing and

emerging market economies was on the order of nearly USD 192 billion in 1997, but has declined again by the end of 1990s following the East Asian financial crisis.

The currency crisis that broke out in East-Asia at mid 1997 has been followed by a tumult in international financial markets for almost a year and it had a deep impact on the emerging market economies like in Turkey. Most of such countries increased domestic interest rates for preventing the economy from the capital outflows and that might lead to deeper financial crisis and further exchange rate collapses. The increase in the domestic interest rates had depressed the capital investments and so real sector production. The level of capital per worker was low in these countries and so has held the output level down.

Alternative policies to solve the structural problems mentioned above are implemented by governments at 2000's. The macroeconomic policies are based on the financial policies. Net foreign investments flows and current account deficits are considered as increasing factors for the capital accumulation and growth in these countries. A part of the capital inflows, FDI, also transferred managerial and technological know-how from developed to developing countries in some circumstances. The portfolio investments and foreign bank borrowings are used to support the domestic financial sectors and this lead to ascending importance of portfolio flows.

Eatwell (1996) and Obstfeld (1998) have studied the potential benefits of the capital inflows on the support for open financial markets amending IMF to place capital account convertibility on the same level of desirability as a convertible current account.

Today, capital flows to developing countries have reached to a record $647 billion in 2006 with the span of liberalization. World Bank Global Development Finance 2007 reports indicate that the emerging Europe attracts an increasing share of the overall flows and equity financing grows much faster than debt. The report also predicts that higher interest rates and emerging capacity constraints will slow the very fast growth of developing countries in the past few years, with global growth falling from 4 percent in 2006 to around 3.5 percent in 2009.

Despite the benefits of capital inflows to developing countries, opening financial markets to international transactions created additional risks that are supported by the recent currency crisis. Such crisis are explained by the wrong macroeconomic policies of the governments by populist and loose policies however the recent currency crisis in Latin America and East Asia with reasonably successful policy regimes have become the support for disclaiming the such explanations. Today's crisis recall bank runs and financial panics with sudden exchange rate change attacks and liquidity in mostly developing countries. The liquidity problems starts when countries

foreign assets and liabilities' maturities mismatch and the outsourced reason is mainly this. When markets are stressed the market can't fix itself since the governments are drawn in by their commitments about the fixed exchange rate system. The long term financial positions of the banks in countries like Turkey make the depression deeper in the financial sector of the countries and lead to heavy outflow of the portfolio investments that triggers wider and deeper effects on the economy. The process between the start of the crisis and government interventions, mostly the devaluations, is an avalanche. As the crisis formation is a result of complicated process, an initial movement triggering investment diversifications at a dynamic risk structured markets may fasten this process.

The current policy discussions implicitly accepts the notion that open capital markets are beneficial and proposals for reform have been directed toward reducing the risks of financial instability and crisis so that capital flows can continue unabated. However the increases on rewards for good policies and penalties for bad ones is seen as a factor for more disciplined macroeconomic policies and so a reduction in the policy errors.

2.5- Foreign Direct Investments versus Portfolio Investments

The direct investments are entrepreneurial investments that involve a significant element of ownership, control and management. These types of investments are stable remarkably on financial crisis as it was on East Asian global crisis at 1997-1998. The resilience of foreign direct investments was also evident for Mexican Crisis 1994-95 and Latin American debt crisis on 1980's. On the other hand the portfolio investments are non-controlling investments that involve no important element of ownership, control or management. These types of investments are subject to large reversal outflows at crisis period opposite to foreign direct investments.

The main argument around the two concepts, Foreign Direct Investment (FDI) and Portfolio Investments (PI) is that only FDI can support sustainable economic growth since portfolio investments are high volatile flows that can not ensure sustained economic growth. The reasons for volatility differences of the two investment types can be explained by their aims as FDI is a well established investment type where PI is provisional cash flows having a high mobility due to changes in the economic environments. Despite the aim of the investor types finance and economy is more concerned about the risks and their effects on the economies on both micro and macro cases.

The literature recognizes that the risk associated with portfolio investments are due to difficulties in realizing the foreign direct investments. Investing in a foreign country brings higher entry costs for direct participation due to initial setup costs and uncertainty about the fundamentals like asymmetric information. The higher costs are also relevant at the exit level due to difficulties of reselling a firm. The common knowledge that direct investors information advantage on where, when and why to invest in particular sectors of the host country reduces the resale price that a direct investor may get when deciding to exit from host country. This cost increasing effect for direct investors reveals that only long term direct investors with superior managerial skills will undertake direct investments. This implies why empirically portfolio investments exhibit a much larger volatility than direct investments.

Despite the opposite characteristics in terms of risk/return and effects on recipient countries' growth, both FDI and PI are still reciprocally plausible investment choices. The contributions of FDI over the domestic investments and growth dominate the contributions of portfolio investments. As Razin, Sadka and Coury (2002) states, the gains from foreign direct investments are determined by the information value of FDI since the hands-on-management style of direct investments enables foreign direct investors to operate only in sectors having good economic growth prospects. This spurs domestic investors so the economy to invest in particular sectors which in

turn is the leader effect for economies of scale and positive spill over to the rest of the economy. The depth of the latter effect is more related to nature of the investment technology and degree of trade openness of the recipient economy

Multiple equilibrium may also arise between foreign direct investments and portfolio investments since there is an information-based trade off between direct investments and portfolio investments (Gold-stein and Razin, 2003). Informational asymmetries and the degree of transparency at the view of institutional, capital markets and corporate governance can substitute investors' decisions between FDI and PI. Razin, Sadka and Coury (2002) point out how an economy might go through "boom-bust cycles of investment supported by self-full-filling expectations".

Increasing the transparency in host country may lead to a higher direct investment share and so a lower volatility differential between portfolio and direct investments so in the financial markets. Goldstein and Razin (2003) also confirmed the importance of transparency by implying that the volatility differential between direct investments and portfolio investments are lower for developed countries when compared with developing countries. Importance of transparency is also confirmed by Gelos and Wei at their empirical study on 2002.

On the other hand, Yamin Ahmad, Pietro Cova and Rodrigo Harrison's study on 2004 shows that uncertainty doesn't by itself imply a multiplicity of investment outcomes even when there is an information based trade off between direct investments and portfolio investments and noise in the degree of transparency. Their work shows that the conditions linking portfolio investments and direct investments always leas to a clear-cut outcome about investment decisions since in their framework uncertainty about the degree of transparency always helps pin down an equilibrium (i.e. state-contingent) strategy and hence an equilibrium outcome from the set of possible multiple equilibria that exist.

2.6- Capital Movements

2.6.1 The World

The international capital flows around the world have shown a rapid change at the last 50 years. The sources and channels of globally integrating financial markets have increased the volume of the financial markets. The increase in the volume is a meaning of bigger causes and effects of financial flows both in the positive and negative sides.

The capital flows after World War II were structured by the Bretton Woods Conference and most of them were the legal borrowings for financing plans, projects and basic unbalances of national economies. The Bretton Woods Conference (1941) has brought the Gold standard in monetary

system which was a limiting factor for free money supply of countries, accordingly for capital.

The policies decided and implemented with Bretton Woods Conference have increased the productivity till 1970's. Overall wealth level in the countries has increased by the developments in technology, decreases in the prices of raw materials, financial aids of World Bank and other institutions. However at the beginning of the 1970's the profit ratios decreased as a result of decrease in the productivity capacity of the technological improvements and increase in raw material prices. The decreases in the profit margins lead to decreases in the investments and growth levels (Kaya, 1998). The structure of new world economy and related capital flows planned in Bretton Woods Conference, have collapsed with the economic crisis in 1970's. There had been a fundamental change in the global economy and accordingly in the cross border capital flows. A liberalization period has commenced which would lead to structural changes of globalization in the future. One of the basic features of the new globalization period was the increase in mobility and less regulations for the international capital flows. The most striking event for the period can be defined as the shift of investors from real investments to financial investments.

1980's

The 1980's were the years where the liberalization movements in the world fastened especially in the developing countries due to certain problems in these countries. Developing countries started to suffer problems of paying external debt at the beginning of 1980's and public debts of such countries have increased steadily in the period. The imbalances in the macroeconomic indicators due to public debt problems of such countries lead to increases in the interest rates. There was also stagflation in the world.

General crisis in the financial markets got deeper with the increases in the current account deficits of developing countries. These crises lead to deep changes in the economic policies as many countries have given up state control policies for financing capital needs and started to implement liberal policies. Developed countries have decreased the states roles in the economy. Developed countries reactions against the crisis period have become an alternative for developing countries to get over the economic crisis. Developing countries have entered into a period of structural accommodation after the crisis period and this made them to restructure their macroeconomic balances with respect to dynamics of an open economy. The controls over foreign exchange were removed in a short period at some countries where some others have removed the foreign exchange controls in a graded period. Developing countries' need for

sources of developed countries increased with the increased trade volume of open economy dynamics. Most of the developing countries liberalized their national foreign exchange rate regime and capital accounts, formed and improved their financial markets. Such new markets are called emerging markets and they serve attractive opportunities for capital inflows where new foreign exchange regimes have increased the mobility for capital inflow and outflow. This led to an increase in the both volume and mobility of capital flows.

The period have created opportunities for capital owners however the capital flows of the period hasn't been sustainable. The foreign capital that developing countries used for financing their investments haven't been sustainable in any period and country and in some countries it has earned speculative incomes by using current conditions and left the countries in a short time with the earnings of it (Berksoy and Saitoğlu, 1998).

1990's

The great increase in the international capital flows in 1990's is due to two big developments in the decade;

Initially the developing countries have increased their international integration level to global capital markets by liberalizing their financial markets, foreign exchange regimes and capital accounts and opening these

to foreign investors. Developing countries have supported the formation of more liquid and deeper capital markets and increased investment opportunities by privatization of public entities.

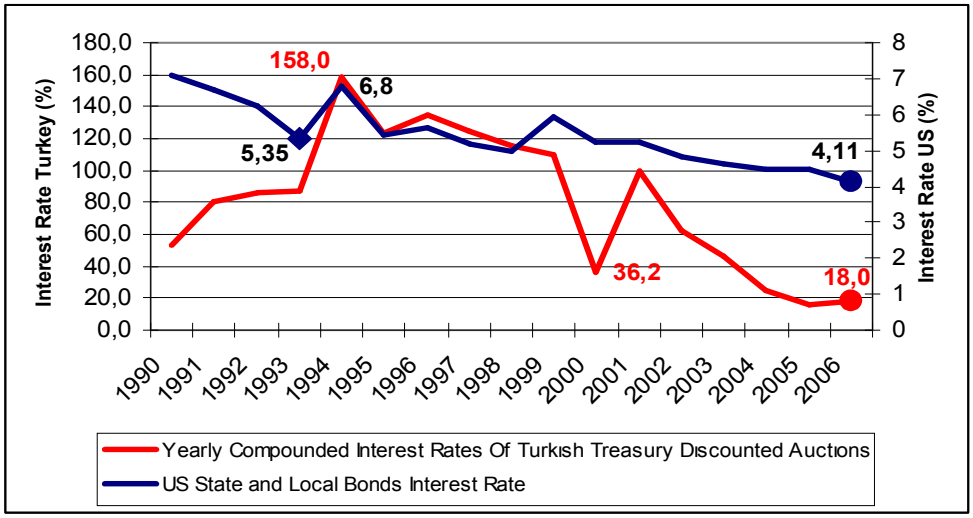
Secondly, the developments in information and communication technologies have made following and valuing of global investments and this lead to flow of developed countries funds globally. Especially the developments in the information technologies lead to convenience in obtaining information and so formation of more effective financial instruments in risk management and these supported the foreign flows of international investments (Moreno, 2000).

In 1990's rather than the structural changes in developing countries there is also global effects on the developments of capital flows. The capital inflows to Latin American countries in the second half of 1990's were reasoned as internal factors such as the implementation of right economic policies and more powerful economic performance however today it is stated that the capital flows formation is a global case and it may effect countries in many ways. The research of Yeldan (2002) shows that not only capital flows took place in the countries which have implemented right macroeconomic policies but also to countries which have absolutely different macroeconomic structures and policies. For example in the first half of 1990's there were high capital inflows to countries having successful

accommodation policies such as Chile, Argentina and Mexico however there was also high inflow to Brazil at the same years where Brazil's public debt was increasing rapidly and economic indicators were going down. This case proves the importance of the global factors.

The initial and may be the most important factor for the rapid increase of capital flows in 1990's is the steady decrease in the US short term interest rates (Calvo and others, 1993). The decreases in the US interest rates lead to outflow of capital from US as the other countries interest rates is opportunity cost for the risk free return that can be earned in US. The short term interest rate of US was decreased to lowest level since 1960's at the end of 1992.

Figure 2.6.1.1 Government Bonds Interest Rates of US & Turkey (January 1990 – April 2007)



Source: FED & Turkish Treasury

At the same period the high interest rate opportunities in developing countries of Latin America and East Asia have pulled high volume of capital flows to these countries.

Table 2.6.1.1 Emerging Market and Developing Countries Capital Account Balance (Billion US Dollars)

	Change in reserves	Direct investment	Official flows	Other private capital flows	Private capital flows	Private portfolio flows	TOTAL
1990	(22.458)	20.930	21.378	25.182	42.113	(3.999)	**83.146**
1991	(45.306)	36.369	33.138	23.786	79.623	19.468	**147.078**
1992	(56.928)	37.884	11.865	22.968	102.516	41.665	**159.970**
1993	(65.282)	54.144	23.423	9.409	150.355	86.803	**258.852**
1994	(67.205)	80.353	5.897	(65.650)	100.378	85.675	**139.448**
1995	(129.962)	100.301	45.712	45.146	168.709	23.263	**253.169**
1996	(94.619)	114.745	(5.861)	(0.514)	200.236	86.006	**300.507**
1997	(105.224)	146.191	28.439	(15.337)	191.690	60.835	**306.594**
1998	(34.840)	158.629	55.986	(125.002)	76.220	42.594	**173.587**
1999	(93.395)	173.178	18.295	(156.675)	86.006	69.502	**96.911**
2000	(113.224)	166.987	(52.079)	(113.718)	74.277	21.008	**(16.749)**
2001	(115.909)	178.560	(0.586)	(28.831)	66.157	(83.572)	**16.405**
2002	(185.654)	142.740	10.609	13.019	68.205	(87.554)	**(38.635)**
2003	(364.617)	153.420	(61.726)	12.102	158.246	(7.276)	**(109.851)**
2004	(517.386)	189.080	(80.990)	(21.121)	231.966	64.007	**(134.444)**
2005	(510.394)	209.186	(137.074)	(47.695)	132.888	(28.604)	**(381.693)**
2006	(506.767)	206.050	(139.286)	(133.304)	53.787	(18.960)	**(538.480)**

Source: IMF

The capital flows in 1990's have reached the level in 1970's. With the effect of globalization the main difference between the two periods is that the capital flows in 1990's are mainly arbitrage oriented short term speculative flows and they are more volatile and mobile.

The globalization in the financial markets and liberalization of capital, lead to shift of capital flows from public channels to private ones. With the integration of financial markets countries preferred to borrow from financial markets rather than the other countries. With the effect of this, against from Bretton Woods System, the relation between the international capital flows and national economy unbalances are weakened and the opportunity of joining international markets have increased for developing countries.

The capital flows in 1990's also depart from 1970's flows at the view of reasons. The reason behind the flows in 1990's was similar to 1980's as the speculative attacks for arbitrage due to unbalances between the interest rates and foreign exchange rates. However in 1970's there were many factors like the need for reentering of oil dollar funds "petrodollar fonları, (Berksoy and Saltoğlu 1998)" to financial markets after the steady increases in oil prices and the decrease of real interest rates in developed countries while real interest rates was increasing in developing countries. The arbitrage oriented capital flows in 1990's bear to developing countries with steady increases and capital flows became more selective, mobile, speculative and shorter term. The inflows of capitals lead to valuation of local currencies and increases in foreign currency reserves of developing countries (Yeldan and others, 2002). The capital flows to Latin American countries at the beginning of 1990's was due to differentiation in the short term returns. The higher interest rates and overvalued currency in Latin American countries

have raised the arbitrage opportunities for investors. These capital flows financed the increasing current account deficits and increased the foreign currency reserves of such countries at this period (Calvo and others, 1993). At this point the risk factors of such capital flows can be argued however the risk is not seen so high since the rapid inflows by the bureaucratic convenience gained with liberalization of capital markets are also subject to rapid outflows.

The capital flows after 1990's are hesitated by the crisis in Latin American countries, especially in Mexico. By this view understanding the reasons and possible effects of such crisis becomes more important.

Financial Crisis

The volatility sensitivity of the capital flows over the economies has become more important after the Mexican Peso Crisis in 1994-1995 and Asian crisis in 1997. The role of sudden capital outflows on the crisis has realized to be more effective when compared with previous decades. The potential of capital flows for causing crisis is higher in twentieth century when compared with nineteenth century. The basic difference between the globalization phases of 19th and 20th centuries is that the globalization was organized over goods and gold standards in 19th century where the globalization in 20th century was sensitive to local currency exchange rates

valuations and local currencies exchange rates were only nominal values which weren't supported by any gold or similar valuable items.

The uncertainty in the national currency exchange rates creates high risk for financial markets. The sensitivity of capital flows to nominal items have violated the relation between financial and real sectors, and decreased the relation between current account and capital flows. Consequently the increased mobility is separate from real production.

There are strong similarities between the crisis happened in emerging markets in 1990's. The common property between almost countries that had financial crisis was that short term and foreign borrowings ratio to international reserves of such countries was high. Many of the developing countries have liberalized their financial markets for the needs of developed countries sources before completing their financial developments. High level of debt financing when compared with scarce international liquid assets have increased the sensitivity and confidence crisis after rapid liberalization trends. This situation leads to outflow of scarce capital from related countries and triggered crisis in many of the countries (Rodrik and Velasco, 1999). The delays in the needed regulations or insufficient regulations in the capital outflow periods in such countries have increased the sensitivity and risk levels. Consequently high volume of capitals has left the emerging markets that were once offering high level of returns and

opportunities to investors. The international reserves of such countries have decreased to risky levels and their local currencies have overvalued in real terms. After all, countries subject to these capital outflows had different level of crisis and left implementing the fixed exchange rate regimes (Edwards, 2000).

Although all crisis weren't globally structured the recent crisis are deeper and costs are very high for countries when compared with the previous ones. In a world where high mobility of capital flows exists, little changes in the international portfolio diversifications may cause high volatilities in capital flows. The sudden decreases in the flows causes countries to arrange their exchange rates/or interest rates, and rapid outflows leads to create dangerous cycles by decreasing credibility of the countries (Edwards, 2000).

2.6.2 Turkey

Changes in the global portfolio investment flows is a cause of economic volatility in national financial markets and sometimes these volatilities create inefficiencies in the way of deep financial crisis at developing countries. Turkey as an emerging market has also experienced difficulties about debt financing strategies and financial distress periods usually ended with financial crisis in 1990's and at the beginning of 2000's. The factors for the periods defined in the previous sections are also valid for Turkey as Turkey can't be distinguished from the World's reality.

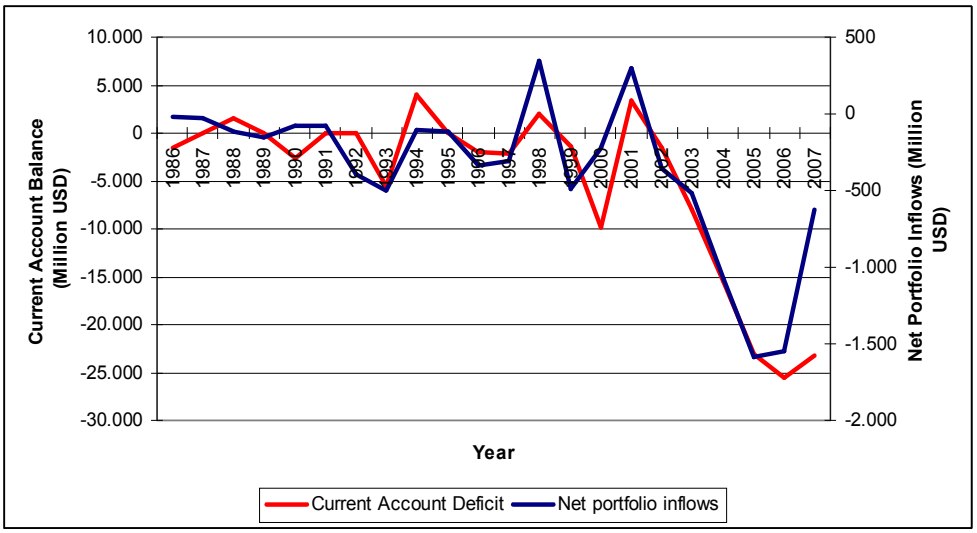
Turkey is especially affected by the global economic flows in 1990's since Turkey has become an open economy with the removal of regulations after 1989. The convertibility of TRY is the most important step for cross border transactions in Turkey.

The growth pattern in the Turkish economy at 1980's was a consequence of increasing economic activity due to the increase in demand side at 1990's. The liberalization of Turkey's capital accounts at 1989 has prepared the way for flow of short term capitals to local asset accounts. Following the period, deep economic recession at Gulf War period started after 1991. The economic loss of the country is estimated to be more than 100 billion US dollars for the war period. The indefinable loss from the outflow of capital and unusable opportunities is not accounted for this estimation. Following the war period, there had been high volatilities in net portfolio flows in 1993. The increase in net portfolio inflows happened to be 3,9 billion dollars to 6,7 billion dollars from 1993 to 1998. Such capital inflows increased the accelerated public spending and temporarily helped the pressure on total demand in domestic goods market by decreasing the cost of imports. On the other hand the performance of long term foreign direct investment had been low.

Complete liberalization of current and capital accounts, and reforms in financial sectors have developed the depth and improvements in financial

markets. However management of macro economy became more complex with higher volatility and sensitivity (Agenor and others, 1997). Integration of financial markets and more correlated macroeconomic policy tools have made it more complex to estimate the results of government policies and interventions. The strong relation between the portfolio investments and current account balances of countries also brings riskier macroeconomic balances. The figure below shows the relation of CA balance and portfolio flows for Turkey which implement a risky structure for balance of payments of the country at conjectural changes due to portfolio investment flows.

Figure 2.6.2.1: Relation between Current Account Balance and Portfolio Inflows, Turkish Evidence

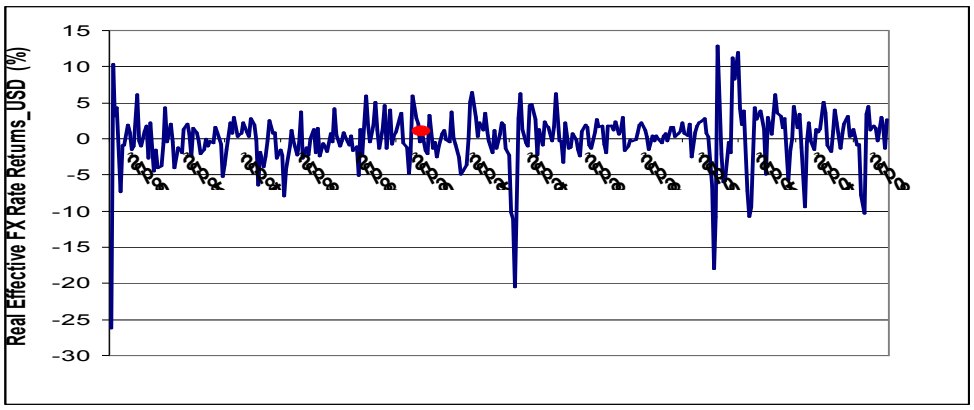


The volatility level in the real exchange rates is also important as a pull factor for financial markets of countries like Turkey. Erdoğan and Schmidbauer's (1997) study on the correlation of foreign exchange and

stock market risk series in Turkey also shows that risk series of both markets are correlated for different periods which makes it more complex and difficult to manage the foreign exchange rates and stock market risk individually.

Figure 2.6.2.2 shows the volatility pattern of exchange rate in Turkey between December 1991 and September 2007. The real exchange rate volatility is between a narrow band except the crisis periods of April 1994 and February 2001. Especially the real exchange rate had a stable period between May 1995 and February 2001 with the exchange rate policy implemented. The crisis periods implement high extreme returns in real exchange rates where the portfolio investments indicate a high level of outflow. The figures support the idea that a material part of the exchange rate volatility is due to outflow of portfolio investments since the investors leave their TRY positions by selling securities in TRY and purchases foreign currency for leaving the country.

Figure 2.6.2.2 Real Effective Foreign Exchange Rate Volatility - Turkey



Source: TCMB

Apart from the relation between the exchange rate, security market and exchange rate, Turkish economy has grown by 14% between 1993 and 1994. The capital flows sourced by legal financing and worker money transfers have converged to private capital flows with liberalization of the capital account. The external debt of the government has increased with the increase in the heavy long term debt payment liabilities. Freely borrowing from international markets is allowed for removing the pressure on the balance of payments. The sum of current account and capital account had been positive balance with strong capital inflows between 1990 and 1995 except the serious capital outflows due to Gulf War period in 1991. However the corrupts in financial balances at 1993 brought the need for Central Bank financing. Government avoided from monetary deficits by increasing the internal borrowings. The international reserves of the Central Bank increased at this period seriously. Flow of excess reserves to banking

sector and uncertainties in the economic expectations had increased the volume of foreign exchange deposits. The increase of "dolarization" and revaluation of Turkish Lira, in other words increase in the purchasing power had happened at the same period. However devaluation was made at the beginning of 1994 for the lack of foreign currency supply of Central Bank at fixed exchange rate system. Many studies about the relation between real exchange rate and capital flows on Turkish evidence have shown that there is a positive correlation between capital flows and real value of local currency. Erdogan and Schmidbauer (1997) studied the relation between the conditional volatility of exchange rate and İstanbul Stock Index by MGARCH-BEKK model and found a close relation between the two risk series. Kaya (1998) studied the relation between real exchange rate and capital flows on Turkish evidence at the view of Granger causality test. The Granger causality test results showed that the capital flows can strongly explain the changes in the real exchange rate where the changes in the capital flows can be weakly explained with changes in real exchange rates. Kaya's (1998) conclusions are similar to Morande's (1998) conclusions on Chile. Yeldan and others (2002) studied on the determinants of short term capital flows after the liberalization of capital account in Turkey by using time series econometric analysis method. They separated capital flows to components of capital inflows as portfolio investments and short term capital flows of banking loans. They have found positive correlation

between capital flows and real revaluation of local currency for the period 1992 – 2002. Erdoğan (2003) also studied on the factors affecting capital flows to Turkey by ARIMA models for the period between 1990 and 2002. His study shows that there is a significant relation between portfolio flows and daily interest rates, stock index returns and 2 period lagged values of portfolio flows. Portfolio flows seem to be positively correlated with the stock index where negatively correlated with interest rates as expected by the theory. Agenor and others (1997) states that the developments after financial liberalization have a relation with financial unbalances, high interest rates, capital flows and appreciation of local currency. The made an analysis under this assumption and made a vector auto regression model for estimating capital flows and found that capital inflows happen at the same time with appreciation of local currency, worsen of financial balances and high interest rates, and found that the real exchange rates react with the positive shocks on interest rates capital flows as expected. Agenor and others (1997) state that capital flows are internal reactions of changes in returns of domestic and foreign assets. The appreciation of Turkish Lira at the beginning of 1990's have slightly effected the growth of exports however it has became an important factor for the increase of imports and current account deficit. The increased volatility in asset prices and corruption in economic activities at the beginning of 1994 is due to loose fiscal policies that were not seen as important by policy makers. By this

view, the fiscal policies should be considered so important for the stabilization of macro economy.

3- MODELLING FOR OPTIMUM PORTFOLIO INFLOWS

3.1 Hypothesis

This study is based on the null hypothesis that there is an optimum point for portfolio inflows to a country such that the level implies the optimum point for market return with the minimum risk level. Hypothesis is tested by two complementary analyses as the relation between market risk and portfolio flows is tested by causality tests and a linear model. The relation between portfolio flows and market risk supports the idea that there is an optimum point of portfolio inflow for the minimum risk level in the markets. After depicting the strength of relation between portfolio inflows and market risk, a further analysis is made for modeling the portfolio flows. Modeling the portfolio flows by market indicators is a complementary analysis of whether the portfolio inflows can be managed by the defined macroeconomic tools.

Our hypothesis defines the need for direct interventions on model independent variables to manage the portfolio flows for supporting the sustainable economic policies. Since every country has different financial and political dynamics, defining a general level for portfolio flows doesn't seem to be applicable.

3.2 Data and Methodology

The raw data used for investigating the relation between portfolio investment flows and market risk are the monthly net portfolio investment balances and average monthly ISE100 index series. Monthly portfolio flow balances are obtained from TCMB's monthly BOP reports and ISE100 indexes from Istanbul Stock Exchange official web site for the period between December 1991 and September 2007. The portfolio flows data announced by legal authorities is taken for analysis since there is lack of financial data for the discrimination between certain foreign portfolio flows and portfolio inflows of Turkish investors from abroad.

The ISE100 monthly averages are taken rather than the month end values since the portfolio flows are reflecting the net flow for the whole month. Data series are expected to be nonstationary since almost every set of financial time series data required to be nonstationary. Working with nonstationary time series data create spurious regressions which means to fail in telling the relationship between data sets, also the models tell the changes in the dependent variable. Solution to this problem pass through the process of modeling the error terms that are time dependent, time dependent volatility.

The model for defining the market risk series will be a causality model and it will be the AR-GARCH model. ARCH and GARCH models allow

variance to evolve through time and respond to past price changes (Bester C. A., 1999). The test procedure is based on the standardized residuals and their squares obtained from individual AR-GARCH models. Cheung and Ng (1996) illustrate that the cross-correlation statistics offer some useful information on the interaction between time series. Such information can be exploited to build a better model to describe the time-series dynamics of the data. A more detailed methodology for ARCH and GARCH processes will be given in the following sections.

After defining the relation between the market risk and portfolio inflows the portfolio inflows will be modeled by VAR model. VAR models consists all variables as endogenous. The additional data for VAR model will be current account balance, budget balance, real rate of interest on Turkish T-Bill, CB net international reserves, ”Bileşik Öncü Göstergeler Endeksi”, interest rates on USD for Turkey and United States, portfolio flows and ISE100 risk series as mentioned above. Time series data is obtained between December 1991 and September 2007 from TCMB, Turkish Treasury and FED. The main determinants of capital inflows to Turkey have been examined under Push-Pull factors approach.

Vector autoregressive (VAR) models are ally used to investigate the relationships between the variables included in such models. To capture the relative impacts of push and pull factors on capital flows into Turkey, first,

impulse-response functions are produced from the estimated VAR model, and then variance decomposition analysis is employed. More detailed information for VAR methodology is given at the following sections.

3.2.1 ARCH-GARCH Methodology

ARCH and GARCH models are important tools in the analysis of time series data, particularly in financial applications. The financial environment is based upon the functions of the expected mean and variance of rate of related portfolio returns including the financial assets. As Asokan, Chenouri and Mahmoodabadi (2001) mentions at their journal, the shift in asset demand must be associated with changes in expected mean and variance of rate of return, ARCH models are the best suitable models. These models are especially used for the aim of analyzing and forecasting volatility approaches. By another way, it can be said that the standard tools that econometricians use for the analysis of volatility in econometrics are ARCH/GARCH models. The ARCH model, stands for auto regressive conditional heteroscedasticity, is introduced by Robert Engle (1982) and a second approach for the long lag case is introduced by Bollerslev (1986). The logic and source of the ARCH/GARCH models is given briefly in the following sections.

A far-reaching agreement has been formed that returns cannot be regarded as identically independently distributed and at most as being uncorrelated.

However, the least square model assumes that the expected value of all error terms, when squared, is the same at any given point where this assumption is called homoscedasticity. The deviation from this approach is the point where ARCH/GARCH models focus on. These deviations are seen on mainly time series data by the changes in the error terms due to time changes where the error terms are sometimes higher or lower than expected ones. This changes in error terms, so that volatility, for some periods suffers from heteroscedaticity in time series data. The warning of the such situation is that the regression coefficients for an ordinary least squares regression are still unbiased but the standard errors and confidence intervals estimated are observed to be too narrow giving a false sense of precision. Rather than implementing this as a problem, ARCH/GARCH modeling defines heteroscedasticity as a step for the analysis that the error terms (variance) are modeled whenever heteroscedasticity exists at a data set. In ARCH model, the variance is modeled by linear combination of squared previous errors at a specified lag where by GARCH the model is based on squared previous errors at a specified lag and conditional variances of specified lag. (Asokan M.V, Chenouri S., Mahmoodabadi A. K. 2001)

The accuracy of the model outputs is sometimes the main point for the econometrics, the key issue for this concept is the variance of the error terms, and what makes them large. This problem mainly arises while working with financial data such as returns where the variance of the returns

is the risk levels. As first observed by Mandelbrot in 1963 financial markets in general and future markets in particular often exhibit "volatility clustering" The financial analysts define the changes in the amplitude of the returns as "volatility clustering". Gerard H. Kuper (2001) states that the idea behind the volatility is that the volatility shocks today influence the expectation of volatility many periods in the future. The ARCH and GARCH models are designed to deal with such set of issues (Engle R. ,2001).

Engle (1982) modeled ARCH by the following principle:

"To model the conditional mean of Yt given Yt-1, Yt-2,…, write Yt as conditional mean plus white noise. To allow the non-constant conditional variance in the model, multiply the white noise term by the conditional standard deviation.

The model allowed the data to determine the best weights to use in forecasting variance where the older approaches assumed to get an equal weighted average of the observed variances in the past. (Engle R. , 2001

The linear ARCH (q) model is met if the conditional variance is a linear combination of ε^2_{t-1} , ε^2_{t-2} , $\varepsilon^2_{t-q.}$

The process is { ϵ_t } is a linear ARCH if,

$$\varepsilon^t = a_t \times h_t^{1/2}$$

$$\varepsilon_t \left| \psi_{t-1} \sim N(0, h) \right.$$

$$h^t = V(\varepsilon^t \left| \psi^{t-1} \right.) = \alpha_0 + \alpha^1 \times \quad \alpha_1 \times \varepsilon^2{}_{t-1} + \alpha_2 \times \varepsilon^2{}_{t-2} + ... + \alpha_q \times \varepsilon^{t-q}$$

$$\alpha_0 > 0, \quad \alpha_1, \alpha_2, ..., \alpha_{t-q} \geq 0$$

V : variance

Ψ_t : set of all information available untill time at t.

at : Gaussian White Noise process with unit variance

The ARCH (q) process is uncorrelated and its conditional and unconditional means are zero.

GARCH model is based on variety of parameterization for h_t. Arguably Bollerslev's (1986) GARCH (p,q) specification is the most successful parameterization given by:

$$\begin{aligned} h_t &= \omega + \sum_{i=1}^{q} \alpha_i \times \varepsilon^2{}_{t-1} + \sum_{j=1}^{p} \beta_j \times h_{t-j} \\ &= \omega + \alpha \times (B) \times \varepsilon^2{}_t + \beta \times (B) \times h_t \end{aligned}$$

where B is the back shift operator. By rearranging terms of the equation above,

$$\left[1 - \alpha \times (B) - \beta \times (B)\right] \times \varepsilon_t^{\,2} = \omega + \left[1 - \beta \times (B)\right] \times v_t^{\,2}$$

where $v_t^{\,2} = \varepsilon_t^{\,2} - h_t$ v_t.

p: number of auto regressive terms (ARCH effect)

q: number of moving average lags

As Engle confirms, the GARCH models are mean reverting and conditionally heteroskedastic but have a constant unconditional variance (Engle, 2001). The equation above is reflecting the GARCH basis that the best predictor for future variance is a weighted average of the long run average variance and the new information captured by the most recent squared residuals.

Many studies show that GARCH (1,1) process model fits for many financial series and futures prices.

3.2.2 VAR Model

The vector autoregressive (VAR) process is popular for describing macroeconomic time series data since it is a flexible model, easy to estimate and gives a good fit to macroeconomic data. The process is based on Gaussian errors which enables combining the long run and short run information in the data by exploiting the cointegration property. By this view the process becomes more popular.

The complexity of economic relations has made it more useful to use multivariate models. The macro economic environment shows that the variables in the economy are affected by each other. This makes it hard to

classify the variables as either endogenous or exogenous in models. The multivariate equation models offers the VAR model for solving the problems like the distinguishing factors as endogenous or exogenous. Also multivariate models sometimes need restrictions on models for decisions on variables (Darnell,1990 114-116).

These restrictions creates some problems at investigation process however VAR models explains the dynamic relations without implying any restrictions which makes VAR models to be used widely for time series data (Keating,1990:453-454). VAR models are also capable for estimating future predictions since the model includes lagged values of dependent variables. (Kumar,Leona,Gasking, 1995: 365).

Vector autoregressive (VAR) models are capable of capturing the dynamic structure of many time series variables. Impulse response functions are typically used to investigate the relationships between the variables included in such models. In this context the relevant impulses or innovations or shocks to be traced out in an impulse response analysis have to be specified by imposing appropriate identifying restrictions. Taking into account the cointegration structure of the variables offers interesting possibilities for imposing identifying restrictions. Therefore VAR models which explicitly take into account the cointegration structure of the variables, so-called vector error correction models, are considered. Specification, estimation and

validation of reduced form vector error correction models is briefly outlined and imposing structural short- and long-run restrictions within these models is discussed.

Theory-based economic models have traditionally been developed as non-stochastic mathematical entities and applied to empirical data by adding a stochastic error process to the mathematical model1.

In a VAR analysis, the dynamic interactions between the variables are usually investigated by impulse responses or forecast error variance decompositions. These quantities are not unique, however. To identify those shocks or innovations and the associated impulse responses that reject the actual ongoing in a given system of variables, usually also requires a prior assumptions which cannot be checked by statistical tools. Therefore structural VAR (SVAR) models were developed as a framework for incorporating identifying restrictions for the innovations to be traced out in an impulse response analysis.

Economic theory predicts that the relation between variables can only be defined after defining the variables as endogenous and exogenous. Granger (1969), Sims(1972) have identified the causality for such reason (Granger,1980:297). If the two variables affect each other than there should

[1] Dynamic general equilibrium models.

be a feedback relation between two variables. (Granger and Newbold,1986: 220-221). A structural model is defined for investigating this relationship.

$$Yt=\Sigma\alpha iyt\text{-}i +\Sigma\beta i\ X\ t\text{-}i + u1t$$

$$X\ t=\Sigma\alpha i\ Xt\text{-}i +\Sigma\beta iy\ t\text{-}i + u\ 2t \quad (2.1)$$

The model is based on the lagged values and if $\beta i = 0$ than, xt, can not be granger causality of yt (Maddala, 1989: 329-330).

After estimating VA

R model, the analyzis of residuals that are observed by the system should be made rather than explaining the coefficients in the model for estimation of future values. The shocks given on residuals of model variables and its effects on other variables may be measured by Impulse-Response functions. As Enders (1995: 305-311)' states , the Variance Decomposition is another method for analyzing the residuals that the model is defined by models residuals and measures the estimated residual variances. This technique shows the effect of statistical shocks on the variables. The economic relations between variables are defined better by calculating the explanatory rate for the effect of shock given to one variable's residuals on an other variable. A variable can be defined as endogenous if the shock on a variable's residual can be explained by the estimated residual variance of another variable. (Lütkepohl,1993:56-57).

3.3 Descriptive Statistics

Monthly average ISE100 returns and portfolio flows are taken from Central bank of Turkish Republic and Istanbul Stock Exchange official websites for the period between December 1991 and September 2007. The monthly data is used since central bank announces the portfolio flow amounts monthly from the beginning of December 1991. There is no more frequent data available for Turkey. The monthly announcements of TCMB's for portfolio flows is taken since there is no data available for the net portfolio flows for foreign investors.

The data for VAR analysis is also taken as monthly basis for the facts mentioned above. The explanatory variables that are thought to be the best to explain the portfolio flows to Turkey are defined under "push-pull" approach. The data covers the period for December 1991-Sempember 2007 and given below in more detail.

Push Factors:

USINT: Average interest rate on 30-Day AA Financial Commercial Paper Interest Rate.

Average interest rate on 30 day financial commercial is the alternative rate of return for the investors in capital exporting countries and it is minimum borrowing costs for the recipient country since US interest rates on bonds

are seen as risk free rate in the world. In other words, the interest rate in the recipient country should be higher than the rates of US Treasury bills to pull the portfolio flows. It is expected that a rise in US interest rates is negatively correlated with the capital flow into Turkey.

USIPI: United States seasonally adjusted manufacturing industry production index.

United states manufacturing industry production index is taken as the second push factor since the USIPI indicates the changes in the funds available for investment abroad, thus there may be a positive correlation between portfolio inflows to Turkey and USIPI. However an increase in USIPI indicates an accelerated growth rate in US, so higher inflation and higher interest rates. Consequently there might be a negative correlation between USIPI and portfolio inflows to Turkey by the indirect effect of USIPI on the inflation, thus on interest rates.

Pull Factors:

TRINT: Real rate of interest on Turkish T-Bill.

An increase in the real rate of interest on Turkish T-Bills is expected to raise the capital flows to Turkey since it indicates an increase in the return of debt securities. The real rate is computed as the weighted average compound Treasury auction rates deflated by consumer price index.

ISE: ISE100 index series

An increase in the ISE100 index is expected to be positively correlated with the portfolio inflows. An increase in the domestic stock market indicates higher investment opportunities and improved economic fundamentals in Turkey. The ISE100 index is an indicator for capital owners abroad at the view of equity investments part of portfolio flows.

CA: Current account balance

Current account balance, as an indicator of fiscal fragility and external sector fragility s also expected to create a negative impact on capital inflows. The current account balance is also followed by the international capital owners for the systematic risk level of the recipient country economy.

CBRES: Turkish Central Bank net international reserves

Net international reserves of central bank is also important for currency risk aversion of the investors abroad since countries like Turkey could have foreign exchange crisis under the fixed exchange rate system. Turkey has experienced a currency crisis in 1994. The CBRES is expected to positively effect the capital flows into Turkey.

BONCU: Compounded Forward Indicators Index “Bileşik Öncü Göstergeler Endeksi”

Central bank of Turkey prepares the compounded Forward Indicators Index with OECD to forecast the growth and recession periods for the economy. Basic steps while calculating the BONCU are;

- Choosing the reference series for economic activity
- Choosing the macroeconomic variables that is expected to related with the economic activity (potential indicators)
- Calculating different indicator indexes and analyze of their performances
- Deciding the index with the best performance.

The reference series for the economic activity indicator is manufacturing industry index rather than the GDP since GDP is announced quarterly and one period lagged. The frequency of industry index is higher than the GDP and announced monthly. The potential indicators for BONCU are :

- Amount of electricity produced

- Weighted treasury auction interest rate (weighted with sales amount)

- Intermediary products imports

- Central Bank Economic Tendency Inquiry - Question about the amount of product stock

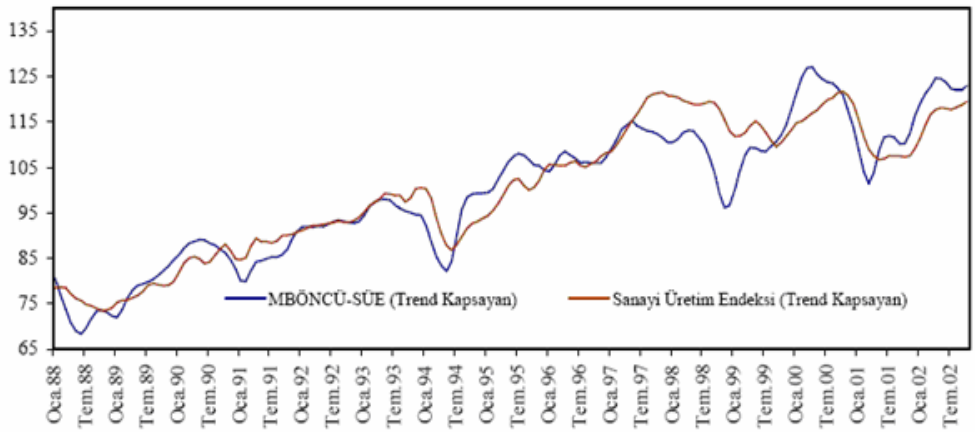
- Central Bank Economic Tendency Inquiry - Question about the amount of new advances taken from the market

- Central Bank Economic Tendency Inquiry - Question about export opportunities

- Central Bank Economic Tendency Inquiry - Question about the total employment

The seasonality of series are removed by TRAMO/SEATS method. The success of the index can be seen from Figure, the comparison of index and reference series index, below:

Figure 3.3.1: Manufacturing Industry Index with trend and MBÖNCÜ SÜE



Source: TCMB

3.4 Econometric Analysis of Relation between Market Risk and Portfolio Flows

The analysis of the raw data must be made to find the best model for defining the market risk and portfolio flows. Initially we should check whether the data sets of ISE100 index and portfolio flows are stationary or not. As we mentioned above in part 3.2, almost every financial time series are expected to be nonstationary and working with the nonstationary time series data create spurious regressions that fail to define relation between data sets. The ADF tests are implied as unit root tests to define the stationarity of ISE100 Index series and portfolio flows. The ADF test statistics of portfolio flows and ISE100 is given at the table below:

Table 3.4.1: ADF Test Statistics: P-Values

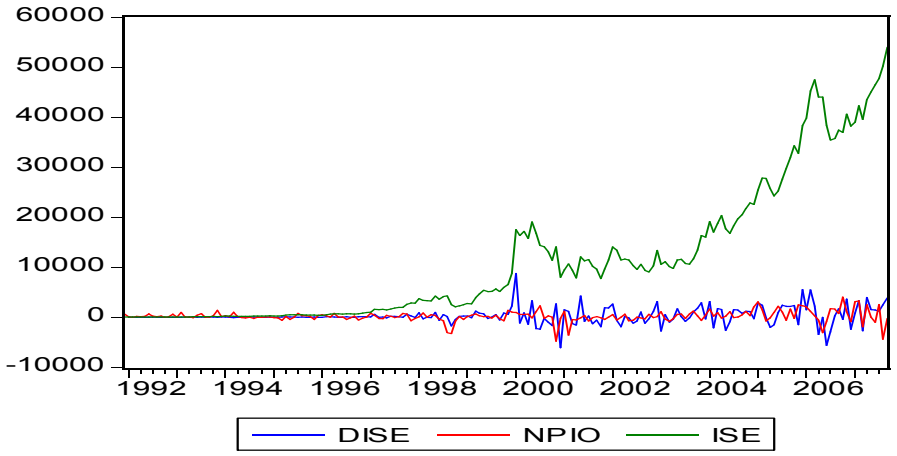
Ho: Non-Stationary		
Ha: Stationary		
Data	**p-value**	**Test**
Ise	0.9998	*Not Rejected*
Dise (ise-ise(-1)	0,0000	*Rejected*
Npio	0.0000	*Rejected*

The table above shows that portfolio flows series are stationary at the level series where ISE100 index series is not stationary at the level series base. The econometric implications on financial time series data shows that differencing the series can solve the non stationary problem. The difference of the ISE100 series is taken and seen that the ISE100 time series become stationary at the first level. The unit root tests above shows that working

with returns series of the market gives better opportunity to describe the market so the risk level of the market. In other words, investigating the relation between portfolio flows and market returns may give us better information.

The Figures below shows the series of ISE, ISE returns and portfolio flows.

Figure 3.4.1: Comparison of ISE100 index and ISE returns with Portfolio Flows to Turkey



The next step is to define whether there is relation between the market returns and portfolio flows so we have implied a linear regression between portfolio flows and market returns. We have implied Granger Causality test to define the causality between ISE returns and portfolio flows and found DISE as dependent variable and NPIO as independent variable. The outcome of the causality test is given below.

Pairwise Granger Causality Tests
Date: 12/02/07 Time: 15:00
Sample: 1991M12 2007M09
Lags: 2

Null Hypothesis:	Obs	F-Statistic	Probability
NPIO does not Granger Cause DISE	187	15.2693	7.4E-07
DISE does not Granger Cause NPIO		2.00157	0.13809

Next we have implied a linear regression and the output of the model is given below:

Dependent Variable: DISE
Method: Least Squares
Date: 01/10/08 Time: 13:43
Sample (adjusted): 1992M01 2007M08
Included observations: 187 after adjustments

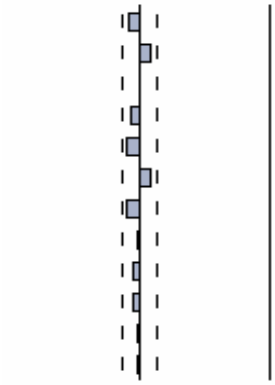
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	224.7241	121.8798	1.843817	0.0668
NPIO	0.241746	0.108255	2.233110	0.0267

R-squared	0.026248	Mean dependent var	273.7172
Adjusted R-squared	0.020985	S.D. dependent var	1656.934
S.E. of regression	1639.457	Akaike info criterion	17.65275
Sum squared resid	4.97E+08	Schwarz criterion	17.68731
Log likelihood	-1648.533	F-statistic	4.986779
Durbin-Watson stat	2.173044	Prob(F-statistic)	0.026740

The model above shows that there is a significant relationship between market returns and portfolio flows with 5 % significance level however only 2.1 % of changes in portfolio flows can be explained by the changes in market returns. This may be spurious due to correlation in the residuals of the model so it is better we check the stationarity of the models residuals. The correlogram of the model with lag 12 shows us that there is no auto

correlation in the residuals so that the relation between the market returns and portfolio flows is not spurious.

Date: 01/10/08 Time: 13:44
Sample: 1992M01 2007M08
Included observations: 187



Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
		1	-0.096	-0.096	1.7385	0.187
		2	0.083	0.075	3.0675	0.216
		3	0.008	0.022	3.0786	0.380
		4	-0.062	-0.066	3.8102	0.432
		5	-0.108	-0.125	6.0907	0.297
		6	0.088	0.080	7.6168	0.268
		7	-0.113	-0.080	10.143	0.181
		8	-0.010	-0.045	10.163	0.254
		9	-0.041	-0.050	10.504	0.311
		10	-0.046	-0.049	10.932	0.363
		11	-0.019	-0.017	11.007	0.443
		12	-0.022	-0.051	11.106	0.520

The Breusch-Godfrey serial correlation LM test also implicates a probability of 0,370095 which means we can not reject the null hypothesis where the Ho is “there is no serial correlation in the residuals.

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	1.341556	Prob. F(2,183)	0.263997
Obs*R-squared	2.702141	Prob. Chi-Square(2)	0.258963

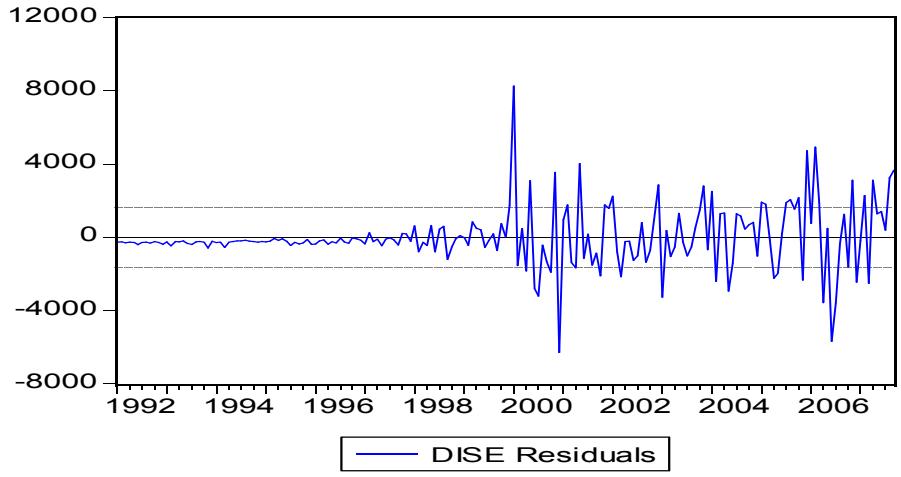
Test Equation:
Dependent Variable: RESID
Method: Least Squares
Date: 01/10/08 Time: 13:51
Sample: 1992M01 2007M08
Included observations: 187
Presample and interior missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	2.324254	121.6806	0.019101	0.9848
NPIO	-0.015752	0.108560	-0.145099	0.8848
RESID(-1)	-0.090253	0.074680	-1.208522	0.2284
RESID(-2)	0.078021	0.075429	1.034355	0.3023

R-squared	0.014450	Mean dependent var	1.95E-14
Adjusted R-squared	-0.001707	S.D. dependent var	1635.043
S.E. of regression	1636.438	Akaike info criterion	17.65959
Sum squared resid	4.90E+08	Schwarz criterion	17.72870
Log likelihood	-1647.172	F-statistic	0.894371
Durbin-Watson stat	1.977280	Prob(F-statistic)	0.445198

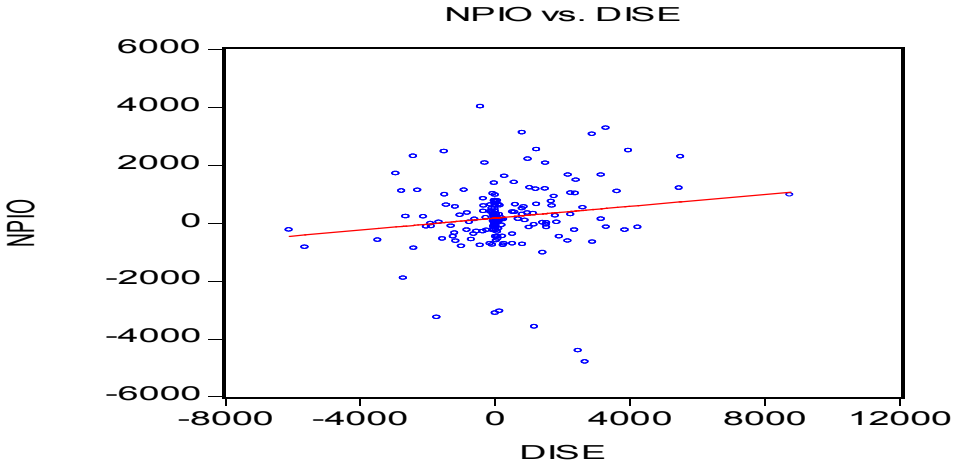
Residual Graph of the model seems to fit except crisis and post crisis periods. The figure below shows the residual graph of the model obtained by the difference between actual and fitted values of the linear model derived by least squares method.

Figure 3.4.2: Residuals of the Regression between DISE & NPIO



Scatter plot of the regression between ISE100 returns and portfolio flows are given at the following Figure. Figure indicates a relation between the two variables however it also shows the failure of the linear model for estimation.

Figure 3.4.3 NPIO and ISE100 Relation Figure



Following the fact that we couldn't observe a strong relation between ISE100 and portfolio flows we have decided to check the relation between the modeled market risk and portfolio flows. The modeled market risk series may give us better implication of market risk series since GARCH process implies conditional variance model and conditional variance is a mean of previous period risk affecting the risk for the next period due to risk aversion of the players. In other words we can imply the expectation of the fact that the portfolio investors make their decisions with respect to variance at the one period before. The modeled series also implicate a systematic relation in the risk series which indicates elimination of unsystematic or unobservable factors like political changes and disasters.

We have applied GARCH(1,1) process for differentiated series of ISE100 and observed that the ARCH and GARCH terms of the model is significant under 1% significance level.

Dependent Variable: DISE
Method: ML - ARCH (Marquardt) - Normal distribution
Date: 12/27/07 Time: 18:05
Sample (adjusted): 1992M01 2007M09
Included observations: 189 after adjustments
Convergence achieved after 43 iterations
Variance backcast: ON
GARCH = C(1) + C(2)*RESID(-1)^2 + C(3)*GARCH(-1)

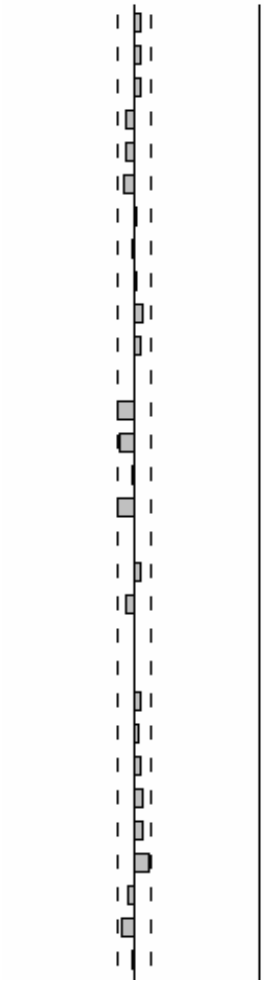
	Coefficient	Std. Error	z-Statistic	Prob.
Variance Equation				
C	2.199889	10.89084	0.201994	0.8399
RESID(-1)^2	0.682315	0.076379	8.933271	0.0000
GARCH(-1)	0.676406	0.040665	16.63363	0.0000
R-squared	-0.029383	Mean dependent var		285.7143
Adjusted R-squared	-0.040452	S.D. dependent var		1671.215
S.E. of regression	1704.682	Akaike info criterion		15.35941
Sum squared resid	5.41E+08	Schwarz criterion		15.41087
Log likelihood	-1448.464	Durbin-Watson stat		1.948446

Next, we checked the ACF and PACF Figures of the residuals and squared residuals of our GARCH(1,1) model for the risk of autocorrelation in the residuals. This may implement a spurious model. The ACF and PACF plots are given on the next Figure:

Figure 3.4.4 Correlogram of GARCH(1,1) model for ISE100 risk series.

Correlogram of Standardized Residuals

Date: 12/27/07 Time: 18:09
Sample: 1992M01 2007M09
Included observations: 189



	AC	PAC	Q-Stat	Prob
1	0.050	0.050	0.4762	0.490
2	0.047	0.045	0.9017	0.637
3	0.050	0.046	1.3965	0.706
4	-0.067	-0.074	2.2740	0.686
5	-0.071	-0.070	3.2763	0.657
6	-0.085	-0.075	4.6882	0.584
7	0.015	0.037	4.7352	0.692
8	-0.012	-0.004	4.7618	0.783
9	0.016	0.014	4.8115	0.850
10	0.079	0.062	6.0807	0.808
11	0.057	0.044	6.7366	0.820
12	0.003	-0.013	6.7390	0.874
13	-0.141	-0.153	10.812	0.627
14	-0.116	-0.107	13.577	0.482
15	-0.010	0.032	13.596	0.556
16	-0.140	-0.100	17.697	0.342
17	-0.003	0.004	17.699	0.408
18	0.041	0.021	18.056	0.452
19	-0.061	-0.087	18.839	0.467
20	-0.002	-0.032	18.840	0.532
21	0.003	-0.015	18.843	0.595
22	0.051	0.045	19.397	0.621
23	0.038	0.066	19.714	0.659
24	0.051	0.070	20.277	0.681
25	0.065	0.055	21.220	0.680
26	0.078	0.071	22.578	0.657
27	0.116	0.099	25.565	0.543
28	-0.053	-0.071	26.205	0.562
29	-0.104	-0.141	28.626	0.485
30	-0.013	-0.009	28.662	0.535

The Figures implement that there is no partial and auto correlation in our model. It supports that GARCH (1,1) process fits for modeling ISE risk series. ARCH-LM Test of the residuals also support this idea where the F statistic indicates that the joint significance of all residuals can not be rejected (p = 0,859123).

ARCH Test:

F-statistic	0.031590	Prob. F(1,186)	0.859123
Obs*R-squared	0.031925	Prob. Chi-Square(1)	0.858193

Test Equation:
Dependent Variable: WGT_RESID^2
Method: Least Squares
Date: 12/27/07 Time: 18:18
Sample (adjusted): 1992M02 2007M09
Included observations: 188 after adjustments

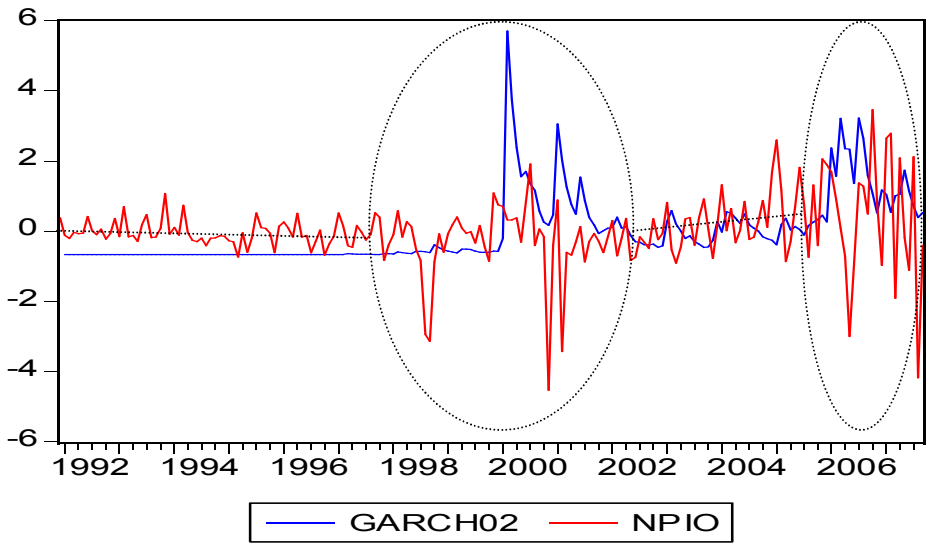
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.989671	0.196976	5.024318	0.0000
WGT_RESID^2(-1)	0.013030	0.073313	0.177737	0.8591

R-squared	0.000170	Mean dependent var	1.002666
Adjusted R-squared	-0.005206	S.D. dependent var	2.501349
S.E. of regression	2.507851	Akaike info criterion	4.687311
Sum squared resid	1169.813	Schwarz criterion	4.721741
Log likelihood	-438.6072	F-statistic	0.031590
Durbin-Watson stat	1.998222	Prob(F-statistic)	0.859123

At the next step, we checked the relation between the risk series obtained by GARCH(1,1) model and portfolio flows. This process allows us to investigate for a systematic relation between market risk and portfolio flows. We have generated the variance series of the model and empirically checked for the relation.

The multiple figure of the GARCH(1,1) variance series and portfolio inflows are given below:

Figure 3.4.5 Market Risk vs. Portfolio Inflows by GARCH (1,1) Process



The granger causality test again implicates that neither each of the variables Granger cause each other however the crisis periods empirically indicates that there is an outflow of portfolio investments before the crisis periods in the market.

As we check the GARCH(1,1) model outputs R-Square and Adjusted R-square also indicates the model fails to describe the changes in the market risk. R square indicates how much of the changes in the dependent variable is described by the independent variables in the model. The R squares are negative as indicating to possibilities for the result:

- There is a calculation error

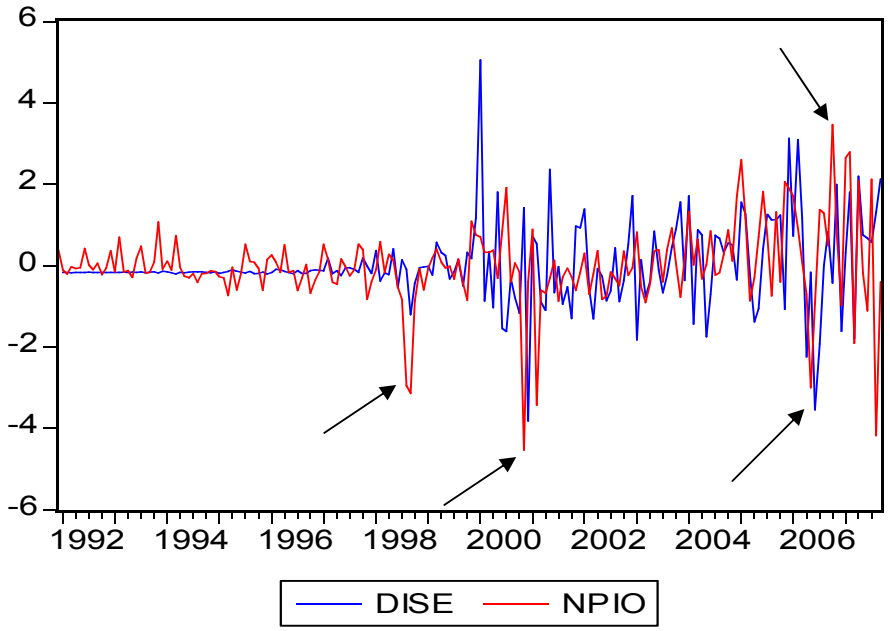
- The results are reporting an "adjusted" R-squared. The adjusted R-squared reduces the R-squared by how much fit would probably happen just by luck. Sometimes this reduction results in a negative adjusted R-squared.

The first possibility is not valid as the calculations are made at e-views software. The second one is more relevant for our GARCH model. The dynamics of the Turkish financial market and the dominant effects of the systematic risk maybe factors for preventing the success of modeling the market risk.

Another reason for the failure of GARCH models is due to frequency of data. ARCH/GARCH models fit better for daily return series. Since ARCH/GARCH process indicates better results with low frequency data since the returns of financial markets are effected by the closest previous period movements. Monthly series may not be a good indicator for describing one period further risk. The dynamics of the current financial markets are affected by the momentary changes which supports the idea behind the failure of the model for monthly ISE series.

Rather than a proof with model, the relation can be indicated as the portfolio inflows result with the increases in the market returns as the some portion of the portfolio inflows are invested in equity markets. There is a positive relation between the market and portfolio inflows.

Figure 3.4.6 Market Return vs. Portfolio Inflows



The econometric analysis of the relation between the market risk and portfolio flows do not imply a definite relation however the Figures above indicates that there is a close relation between the portfolio flows and market risk especially in the crisis period. Another implication from the analysis above is that there is a structural change in the market risk after the financial crisis period in 2001 where the period shows that the close relation between the market risk and portfolio flows is weakened with the structural changes by the political regulations and increase in the credibility due to these changes. It can be seen that the portfolio outflows happen such before the decreases in the market returns so that the portfolio outflows may trigger the deep financial crisis. The lack of describing the relation between the market risk and portfolio flows may be due to two factors;

I – The frequency of the data used

II – The market may be more affected by political and economic expectations of the domestic investors rather than the risk approach of foreign investors. Turkey as a dynamic country with all the political developments around the country and within the country may affect the expectations so quickly that the market dynamics are affected by many factors.

III – Turkey as a country offering extreme returns for debt securities of government pulls the portfolio flows dominantly to debt securities and this cause inefficiency in the equity markets.

Consequently the relation between the market risk and portfolio inflows doesn't seem to be applicable since GARCH models fail to describe the market risk for Turkey. However the empirical investigation by the linear model and visual analyzes with multiple graphs show that the financial markets are affected by the portfolio flows in both direction. There are extreme inflows and outflows when the stock market shows similar return series so sudden changes in portfolio flows increases the risk level in the financial markets.

3.5 Modeling the Portfolio Flows to Turkey

External and domestic factors for determinants of capital flows to Turkey are empirically examined at the first part of this section. Turkey is considered as a small open economy and push-pull factors are defined under this approach. Since US macroeconomic and financial indicators are directly affecting the capital flows in the world, external (push) factors are defined as US industrial output and US -1 month interest rates on treasury bills. The domestic (pull) factors are considered as current account balance, central bank reserves, monthly weighted average interest rates on foreign exchange accounts-USD, ISE risk series modeled by GARCH process, monthly weighted average interest rates on TRY and real effective exchange rate index based on the PPI. Net portfolio inflows can be modeled as follows:

$$NPIO_t = f(u_t^{USINT}, u_{tt}^{USIPI}, u_t^{TRINT}, u_t^{ISERISK}, u_t^{CA}, u_t^{CBRES}, u_t^{BONCU}, u_{t}^{TRUSINT}, u_t^{NPIO})$$

Equation defines the capital flows as a function of shocks on US interest rates, US industrial production, interest rate on Turkish treasury bills, stock exchange risk, fiscal balance, current account balance, BONCU Index, central bank reserves and shocks on portfolio flows itself.

Initially the unit root tests are implied to factors since the variables in the VAR models should be stationary to prevent from obtaining spurious models implicating strong but null relations. Augmented Dickey Fuller

Tests are implied to define at which level the variables become stationary. The level means at which stage the variables become stationary by differencing the series. The ADF tests statistics are based on the equation below:

$$\Delta Y_t = \alpha + \beta Y_{t-1} + \sum_{i=1}^{k} \Delta Y_{t-i} + \varepsilon$$

Akaike criterion is used to define the lag of the change in Y_t will be used at the right side of the regression. The table below is the summary of ADF test statistics to define the proper level for making the series stationary.

Table 3.5.1 Unit Root Test P-Values Summary

ADF TEST STATISTICS			
P – VALUES			
	I(0)	I(1)	I(2)
BONCU	0.9744	0.0447	**0.0000**
BOP	**0.0000**	-	-
CA	0.8711	**0.0135**	-
CBRES	1.0000	**0.0000**	-
ISE	0.9998	**0.0000**	-
NPIO	**0.0001**	-	-
REKI	0.7519	**0.0000**	-
TRUSINT	0.3161	**0.0000**	-
USINT	0.4185	**0.0095**	0.0021
USIPI	0.6427	0.0454	**0.0001**

The null hypothesis for ADF test is that the Y_t has a unit root. The table above shows that budget balance and portfolio flows are stationary at I(0) where current account balance, , central bank reserves, ISE100 Index, real effective foreign exchange index, interest rates on USD in Turkey and

interest rate on USD in US become stationary by differentiating them for one period I(1). BONCU index and US Industrial Production Index become stationary by differentiating the series twice.

After creating the stationary series, the next step before estimating the VAR model is to define the common lag for series in the VAR model. As mentioned above Akaike criterion is used to define the best lag for the model. The Akaike criterions for a maximum of 6 periods are given below:

Table 3.5.2 Summary for Akaike Criterion Values

	Akaike at Lag					
Variable	1	2	3	4	5	6
DBONCU	33,47053	**33,37912**	33,39118	33,39565	33,40978	33,42641
BOP	17,26876	**17,21957**	17,23420	17,24988	17,26521	17,41892
CA	**15,69823**	15,70892	17,70505	15,71650	15,71981	15,70579
CBRES	17,62713	**17,61593**	17,63143	17,64463	17,66000	17,66592
ISE	**17,70345**	17,71694	17,72594	17,73837	18,87368	17,76471
NPIO	16,85680	16,78858	**16,75590**	16,75861	16,77102	16,78544
REKI	**5,59032**	5,57191	5,58494	5,57850	5,59141	5,60585
TRUSINT	1,64389	1,49271	1,46558	**1,44724**	1,46342	1,47792
USINT	-0,46403	**- 0,56326**	- 0,56204	- 0,54902	- 0,56036	- 0,56192
USIPI	4,88653	4,81408	4,78273	4,55222	4,40771	**4,39863**

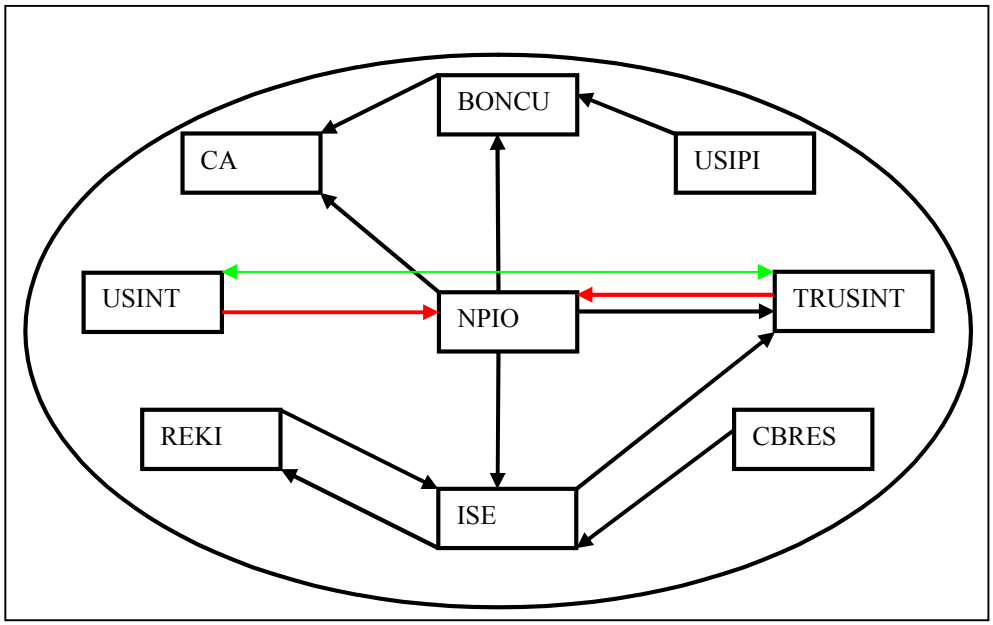
Lowest Akaike Information Criterion (AIC) is chosen for the best lag that fits for unit root test. Lag 2 is chosen for VAR model since most of the series best fit for lag 2. After defining the lag, Granger causality test is implied to see whether the variables in the system affect each other and in which way do they affect. The order of the variables is important for VAR models and following analyzes will be used to identify the proper order. The significant causality test results are given below:

Pairwise Granger Causality Tests
Date: 12/08/07 Time: 15:47
Sample: 1991M12 2007M09
Lags: 2

Null Hypothesis:	Obs	F-Statistic	Probability
DBONCU does not Granger Cause DCA		4,30538	0,01490
DUSIPI does not Granger Cause DBONCU	186	3,36129	0,03687
NPIO does not Granger Cause DBONCU	182	4,15455	0,01725
DISE does not Granger Cause DCA	187	4,23390	0,01595
DCA does not Granger Cause DUSIPI		7,62370	0,00066
NPIO does not Granger Cause DCA	183	3,58577	0,02974
DCBRES does not Granger Cause DTRUSINT		3,06267	0,04918
DCBRES does not Granger Cause DISE		1,05815	0,00005
DUSINT does not Granger Cause DCBRES	187	4,86958	0,00871
DCBRES does not Granger Cause DUSINT		8,66815	0,00025
DISE does not Granger Cause DTRUSINT	187	3,28007	0,03986
DTRUSINT does not Granger Cause DUSIPI		4,18102	0,01678
NPIO does not Granger Cause DTRUSINT	183	4,77437	0,00955
DREKI does not Granger Cause DISE	187	3,56905	0,03017
DISE does not Granger Cause DREKI		3,18768	0,04358
DISE does not Granger Cause DUSINT		3,30409	0,03895
NPIO does not Granger Cause DISE	183	2,02047	0,00000
NPIO does not Granger Cause DUSINT	183	5,19938	0,00639
DUSINT does not Granger Cause NPIO		3,50524	0,03213

Granger Causality Test helps us to create the model below that indicates the flow of effect between the variables in the VAR model and which variables are necessary for the model.

Figure 3.5.1: Mechanism between the Portfolio Inflows and Macroeconomic Indicators



The Figure above shows the relation between the portfolio inflows and macroeconomic and financial indicators. The Figure supports the idea with the VAR model. Mechanism shows that the portfolio inflows are dominantly affected by the push factors as US interest rates. Pull factors seem to be not as much important as the push factors however the importance of the portfolio inflows over the whole economy can be seen by the Figure. The interest rates affect the portfolio flows and portfolio flows directly affect the financial markets as Istanbul Stock Exchange index, interest rates in Turkey over US dollars, current account balance and industrial production in Turkey. The industrial production in Turkey directly affects the production in Turkey as BONCU where the BONCU is a matter

of current account balances. Portfolio inflows central bank reserves and real effective exchange index is affecting the stock exchange as supporting the risk aversion of investors in the way of foreign currency crisis in Turkey before 2001. The reciprocal flow between the real effective exchange index and Istanbul Stock Exchange is another supporting flow for the relation between the risk in stock exchange market and foreign exchange rate. For the last, the green arrow indicates that the US interest rates and Turkey interest rates on USD is cointegrated which means there is a long run relationship between the two series although no relation between the two series can be observed for the short term by the econometric models. Pls. see Appendix B for the cointegration test results between the DUSINT and DTRUSINT. The linear regression between ISINT and TRUSINT seems to be spurious in the short term since the residuals of the model is correlated however the interest rates on the USD in the domestic countries is directly affected by the interest rates in US for developing countries open markets. Pls. see various tests implying the relation between the USINT and TRUSINT at Appendix B.

The Determinants of Portfolio Flows: Econometric Evidence

The importance of the portfolio inflows on the market risk and macro economic indicators are specified above and a more focused econometric identification of the factor effectiveness is tested at the following section.

The main determinants of portfolio flows to Turkey are investigated using structural vector auto regression time series model. The relative impacts of push pull factors are captured by impulse response analysis on SVAR model and variance decomposition analysis is employed. The push and pull factors are defined in the sections above and portfolio inflows can be defined as follows:

$$NPIO_t = f(u_t^{USINT}, u_t^{TRUSINT}, u_t^{ISE}, u_t^{BONCU}, u_t^{CA}, u_t^{USIPI}, u_t^{CBRES}, u_t^{REKI}, u_t^{NPIO}) \quad (1)$$

Equation one defines the net portfolio inflows as a function of the interest rates in United States and Turkey, Istanbul Stock Exchange Index, BONCU Index, current account balance, central bank reserves and real effective exchange rate index.

Since the structural shocks in Equation 1 are unobservable, additional identifying restrictions are necessary to uncover the underlying structural shocks in the data. A nine variable VAR model has been considered in order to extract the seven structural shocks. Following Ying and Kim (2001), VAR model can be specified as follows:

$$Y_t = \sum_{i=0}^{\infty} A_i U_{t-i} = A(L)U_t$$

Where

$$Y_t = (USINT, TRUSINT, ISE, BONCU, CA, USIPI, CBRES, REKI, NPIO)', U_t = (u_t^{USINT}, u_t^{TRUSINTt}, u_t^{ISE}, u_t^{BONCU}, u_t^{CA}, u_t^{USIPI}, u_t^{CBRES}, u_t^{REKI}, u_t^{NPIO})'$$

And $A(L) = \sum_{i=0}^{\infty} A_i L^i = \{a_{ij}(L)\}$ as L lag operator. A_i is the matrix of impulse responses of endogenous variable to structural shocks.

We have defined long run effects of structural shocks by defining a number of restrictions on the impulse matrix A_i. The restrictions are defined with respect to Figure 3.5.1 which was drawn by the causality tests performed. Following restrictions are made for implementing long run structural shocks:

1. Shocks to other variables in the system have no long-run effects on US interest rate. US interest rates appear to be the most exogenous variable of the system. This assumption leads to the restrictions a12(L) = a13(L) = a14(L) = a15(L) = a16(L) = a17(L)= a18(L) = a19(L)= 0.
2. US industrial production is assumed to be affected only by shocks to US interest rate. This restriction is incorporated as a23(L) = a24(L) = a25(L) = a26(L) = a27(L) =a28(L) = a29(L)= 0.

3. Interest rate on USD in Turkey is assumed to be affected by shocks to US interest rate, Istanbul Stock Exchange Index, central bank reserves, real effective foreign exchange index and net portfolio flows. This restriction is incorporated a32(L) = a36(L) = a37(L) = 0

4. Istanbul Stock Exchange is assumed to be affected by interest rate on USD in Tırkey, central bank reserves, real effective foreign exchange index and net portfolio inflows. This restriction is incorporated a41(L) = a42(L) = a46(L) = a47(L) = 0.

5. Central Bank reserves seem to be the other most exogenous variable in the system as the shocks to other variables has no long run effects on the reserves. This restriction leads to a51(L) = a52(L) = a53(L) = a54(L) = a56(L) = a57(L)= a58(L) = a59(L)= 0.

6. Current account balance is assumed to be affected by shocks to interest rate on USD in Turkey, industrial production in US, interest rates on USD in Turkey, BONCU index and net portfolio flows. This restrictions leads to a63(L) = a64(L) = a65(L) = a68(L) = 0.

7. BONCU index is assumed to be affected by shocks to interest rates on USD in US, US industrial production, interest rates in

Turkey, current account balance and net portfolio inflows. The restrictions leads to a74(L) = a75(L) = a78(L) = 0.

8. Real effective foreign exchange index is assumed to be affected by Istanbul stock exchange index, central bank reserves and net portfolio inflows. These restrictions leads to a81(L) = a82(L) = a83(L) = a85(L) = a86(L) = 0.

9. Shocks to all other variables are assumed to affect portfolio flows to Turkey in the long run hence it is determined endogenously in the system.

The 36 long run restrictions mentioned above help us to create an over-identified system for portfolio flows. The new system can be presented as the matrix form given below:

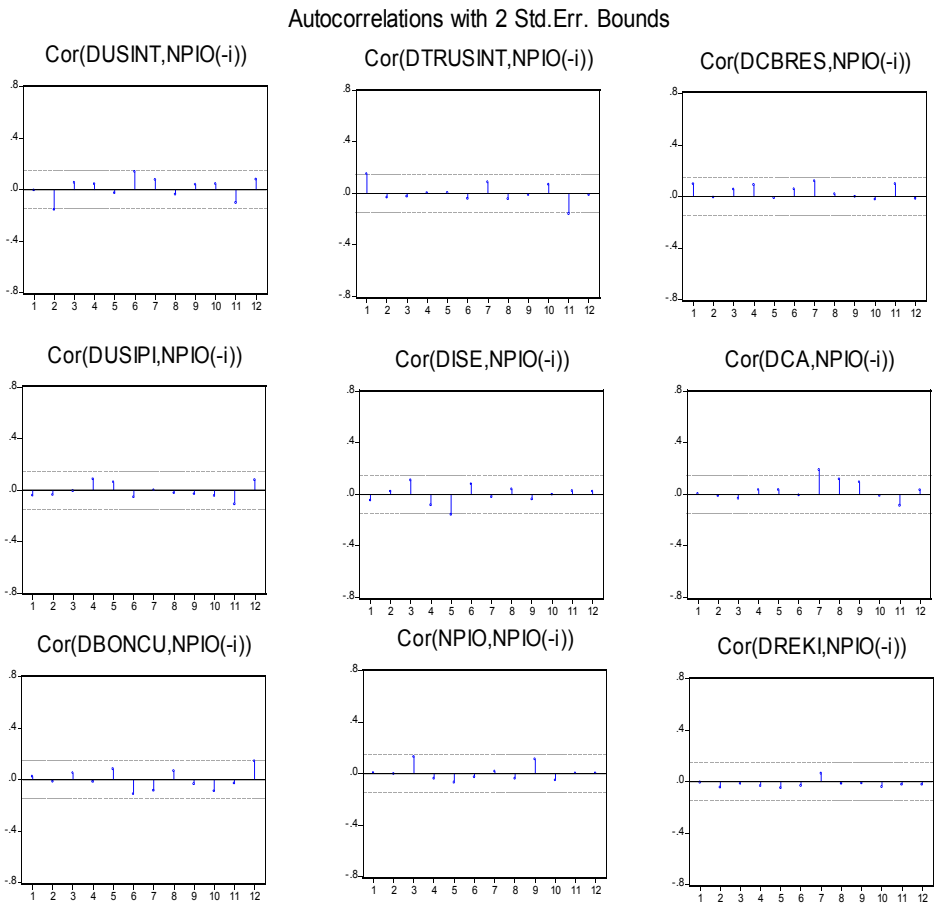
$$\begin{bmatrix} USINT_t \\ USIPI_t \\ TRUSINT_t \\ ISE_t \\ CBRES_t \\ CA_t \\ BONCU_t \\ REKI_t \\ NOPIO_t \end{bmatrix} = \begin{bmatrix} * & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ * & * & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ * & 0 & * & * & * & 0 & 0 & * & * \\ 0 & 0 & * & * & * & 0 & 0 & * & * \\ 0 & 0 & 0 & 0 & * & 0 & 0 & 0 & 0 \\ * & * & * & 0 & 0 & * & * & 0 & * \\ * & * & * & 0 & 0 & * & * & 0 & * \\ 0 & 0 & 0 & * & * & 0 & 0 & * & * \\ * & * & * & * & * & * & * & * & * \end{bmatrix}$$

The imposition of the long run restrictions into the impulse-response matrix A_i, allows us to uncover structural shocks from the VAR model.

After defining the long run restrictions in the VAR model we have estimated VAR model with the restriction matrix above. The estimation output of the SVAR model is given at Appendix C.

The residuals of the VAR model for estimating NPIO is tested by investigating correlogram. The correlogram of NPIO series estimated by the SVAR model is given below:

Figure 3.5.2 Correlogram of NPIO series estimated by SVAR Model



The corelograms above indicate there is no serial correlation problem for the residuals of NPIO series modeled by the SVAR model.

Impulse Response Analysis

After checking model residuals the impulse/response analysis is used to investigate the effects of shocks given to push and pull factors. The whole sample 1992:01 and 2007:09 have been presented at the Figures 3.5.3 and 3.5.4 Figure 3.5.3 shows the effect of push factors as the response of portfolio flows to one standard deviation shocks to US interest rates and US industrial production index.

Figure 3.5.3: Impact of Push Factors: Response of NPIO to Structural One S.D. Innovations to USINT and USIPI (1992:01 – 2007:09)

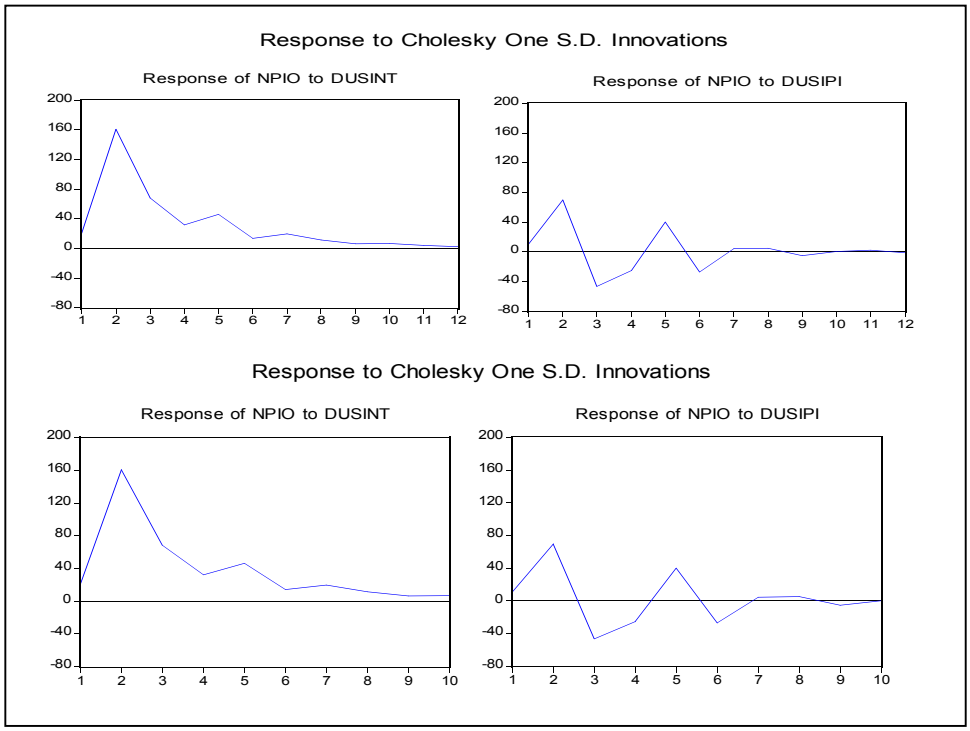


Figure 3.5.3 indicates different structure of effects by the shocks given to US interest rates and US industrial production index.

Response of NPIO to USINT Figure tends to low inflow of portfolio investments at an amount of almost 20 mio USD for the first month however the portfolio inflows tend to increase sharply between the first and second half at an amount of 160 mio USD. After the second month the capital inflows seem to happen till the 12^{th} month after the shock but with a decreasing trend. The decreasing trend shows that the model comes to balance after 12 months the shock is given. On the other hand the structure is meaningful since the negative relationship is expected between the US interest rates and portfolio inflows. The capital owners tend to invest their short term portfolios in Turkey rather than US when the investment opportunities in Turkey become relatively more profitable. Also the portfolio investments are too mobile the time interval for changing the portfolio diversifications, home bias puzzle and structural strength of US financial markets may be a reason for the lagged increase in portfolio inflows to Turkey.

Response of NPIO to shocks on US industrial production index tends to an increase in the portfolio inflow in the first two months and a volatile structure with both outflows and inflows at 2 month periods. An explanation for the volatile effect of the shock can be made by two different aspects.

Firstly, an increase in the USIPI tends to higher volume of capital in the short term which means higher capital outflows from US. The excess capital in US due to high production flows to countries like Turkey for higher return opportunities. Secondly a shock in USIPI has effects on investor expectations. An increase in USIPI leads to an expectation of interest rate increases in US which may lead to portfolio outflow. Consequently the USIPI seems to have a low level of impact on NPIO and the effect disappears after 10 month immediately.

Figure 3.5.4: Impact of Pull Factors: Response of NPIO to Structural One S.D. Innovations to TRUSINT, ISE, CA, CBRES, BONCU, REKI (1992:01 – 2007:09)

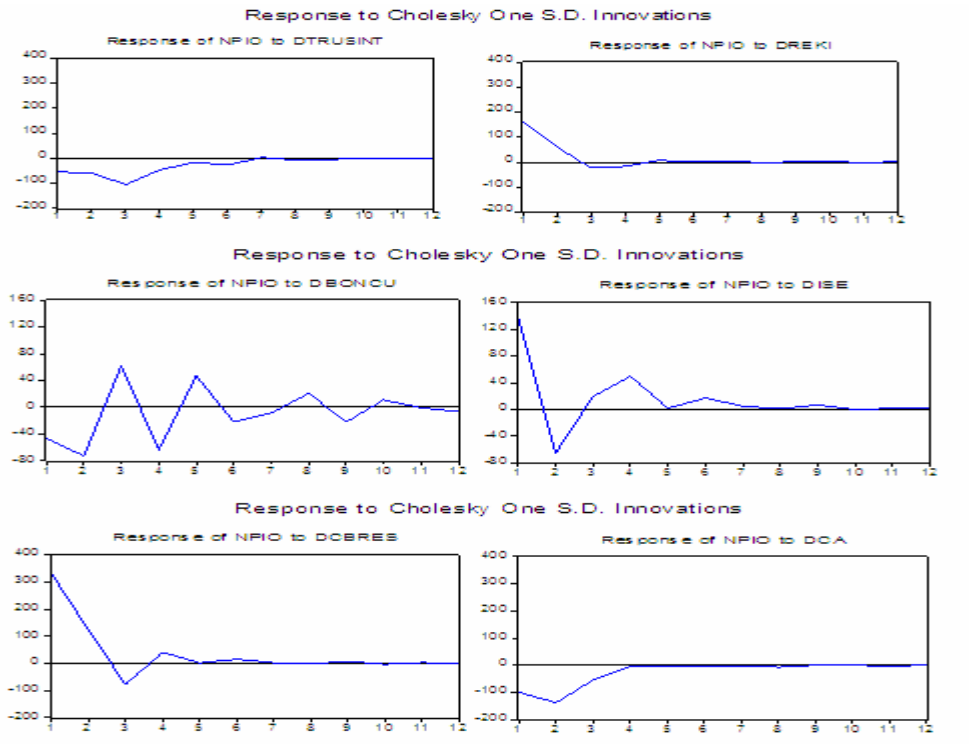


Figure 3.5.4 shows the response of the portfolio inflows by a shock given to macroeconomic and financial variables in the model.

Domestic interest rates and current account balance seems to have the same effect on the portfolio flows to Turkey as a shock given to both of them respectively implies an outflow of portfolio investments. The shocks seem to stem an outflow of portfolio investments at an increasing trend for the first 2-3 months and a smoothing trend by decrease in the volume of the outflows for the 4-7 months. Interest rates in Turkey seems to be more effective on portfolio flows since the volume of the flow is higher and it takes longer to stabilize the model. The interest rates in Turkey and portfolio inflows seem to be negatively related since a sharp increase in the interest rates do not only imply higher returns but also higher risks for financial crisis. The stability of the high interest rates is more important for the investors rather than the extreme returns. Current account balance is also negatively correlated with portfolio inflows since the increases in the current account deficits tend to high risk levels for currency crisis in Turkey.

Shocks given to Istanbul Stock Exchange Index and central bank reserves also seem to have similar responses on portfolio flows by the structural trends seen in portfolio flows. Both of the shocks tend to increase of portfolio inflows with decreasing trends for the first 3 months. The portfolio flows seem to be strongly effected as the positive shocks are not seen

sustainable so that there is a low outflow of portfolio investments at the fourth months. The effect of ISE Index shocks seem to be so weak when compared with the other variables. The reason behind the weakness may be the extreme returns on government bonds and treasury bills in Turkey. The portfolio investors see the government bonds and treasury bills with lower risks when compared with the speculative stock market. Central Bank reserves on the other hand are more effective for the risk potential of currency crisis especially between 2000 at fixed rate system.

The figure for the effects of shock to real effective exchange rate index seems to have increasing effect on the portfolio flows. A shock given to real effective exchange rate index causes an inflow of portfolio inflows as expected by the economic theory since a sharp increase in exchange rates imply an increase in the return opportunities for portfolio investment from abroad. The increase in the real effective exchange rate is an indicator for stable and less risky financial markets. The impulse response Figure indicates the positive effects of the real exchange rate shocks disappear after the third month and transforms to low portfolio investment outflows for the following 2 months. The overall effect real exchange rate index shocks seem to completely disappear after 5 months.

The last figure for the shock given to BONCU index is quite interesting since the shock causes a high volatility in the portfolio flows both on the

two sides. As BONCU is an index with OECD for forecasting the growth and recession periods for the economy the index mainly implements the expectations. A shock in the expectations of investors causes an initial portfolio outflow from the country and volatility with speculative effects. The Figure indicates how quickly the portfolio flows may change direction with respect to expectations. Although the change in the portfolio inflows is too low with 80 million USD and declining one half at each month.

Variance Decomposition

While impulse response functions trace the effects of a shock to one endogenous variable on to the other variables in the VAR, variance decomposition separates the variation in an endogenous variable into the component shocks to the VAR. Thus, the variance decomposition provides information about the relative importance of each random innovation in affecting the variables in the VAR.

Table 3.5.3 shows the percentage of the forecast error variance due to each shock in the structural VAR model over the twelve-month horizon. Portfolio inflows are explained mostly by its own shocks during the whole sample period however the relative importance of shocks from other variables tends to increase towards the second and third month horizon. Central Bank reserves surprisingly seems to be the most effective shocks on portfolio inflows by almost 11 percent when compared with the other push

and pull factors. The variance decomposition table also indicates that push factors have so little effect on the NPIO for the sample period where the pull factors are more dominant. Jointly shocks to push factors account for 1 percent where pull factors jointly account for 16 percent of the variation in portfolio flows in the first month. The second month for jointly push factors effect on the variance increases to 3 percent as 3 times the first month where the pull factors jointly account for 19 percent. At the end of 12 months the jointly effect of push factors stay at the same level about 3 percent where the pull factors increase to 21 percent.

Table 3.5.3 Variance Decomposition of NPIO

Prd.	S.E.	DUSINT	DUSIPI	DTRUSINT	DISE	DCBRES	DCA	DBONCU	DREKI	NPIO
1	0.181496	0,040506	0,009962	0,274741	1,738921	10,252810	0,901672	0,202782	2,482483	84,096120
2	0.192688	2,236420	0,420986	0,558401	1,957998	10,685930	2,445270	0,633433	2,591327	78,470240
3	0.205937	2,560809	0,588219	1,456453	1,935661	10,885910	2,627447	0,934819	2,562990	76,447700
4	0.210480	2,593198	0,629742	1,599401	2,099222	10,806220	2,576557	1,243646	2,535173	75,916840
5	0.212600	2,750522	0,754062	1,613143	2,087256	10,743640	2,561622	1,414486	2,524525	75,550740
6	0.213779	2,759620	0,811778	1,665506	2,105795	10,737980	2,557246	1,449874	2,519025	75,393180
7	0.214334	2,787641	0,812286	1,664226	2,105283	10,725990	2,554421	1,454158	2,518905	75,377090
8	0.214664	2,796726	0,81374	1,667755	2,104239	10,719960	2,556537	1,488776	2,517802	75,334470
9	0.214829	2,798236	0,815542	1,669350	2,106708	10,717590	2,554943	1,526692	2,516421	75,294520
10	0.214917	2,801403	0,815396	1,669184	2,106327	10,716180	2,554829	1,536438	2,516318	75,283930
11	0.214960	2,802594	0,815693	1,669850	2,106459	10,716410	2,557087	1,536377	2,516234	75,279290
12	0.214984	2,802895	0,815795	1,669836	2,106471	10,715800	2,557633	1,539581	2,516255	75,275730

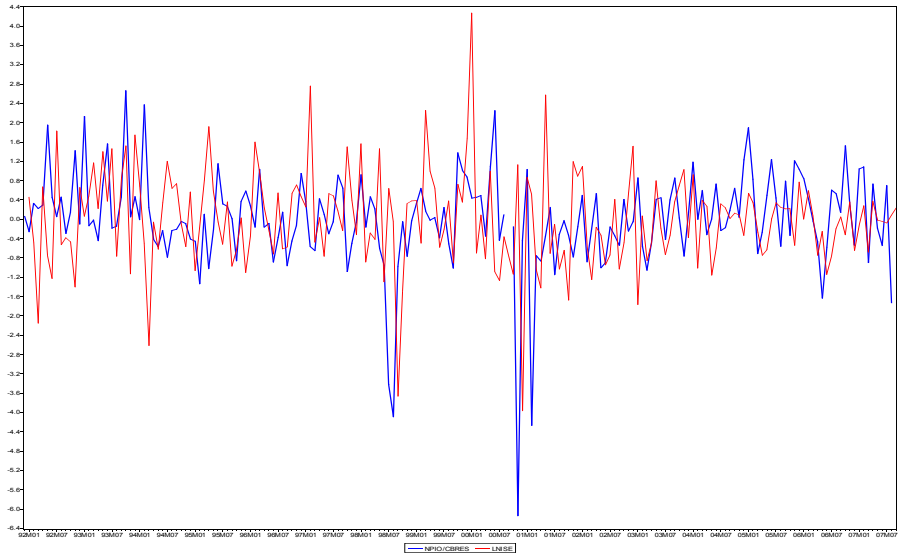
CholeskyOrdering:DUSINTDUSIPIDTRUSINTDISEDCBRESDCADBONCUDREKINPIO

Possible explanation for the dominant effect of pull factors is that the Turkey is a country which experienced many financial crisis after 1990's and the financial crisis of the country have made the pull factors more important for risk awareness of the international investors rather than the global structure. The possibility of high volatility and extreme returns is a very risky structure for the international investors as the currency devaluations and possible high falls in the marketable securities values can create very high losses for the portfolio investors. The incredible increases in the interest rates result with the deep falls in the value of debt securities and currency devaluations at a night also devaluates the portfolios by more than 50 %. The combination of possible currency devaluations and high interest rates also bring the possibility of very high decreases in the stock markets since the stock markets are not deep to cover seasonal or structural shocks.

4. OPTIMUM PORTFOLIO FLOWS MANAGEMENT

The empirical results in the previous sections imply an interesting result for the relation between the portfolio inflows and central bank reserves. The relation between the ISE returns and central bank reserves may be an indicator for the financial crises in Turkey since our findings gives evidence for the fact that the foreign investors in Turkey make investment choices in Istanbul Stock Exchanges mainly with respect to central bank foreign currency reserves coverage for the portfolio investment amounts in the case that all of the investors leaves the market suddenly. Erdoğan's (1994) findings also support the idea how much the exchange rate risk is crucial for optimization of portfolio returns as for Turkey. Since central banks are the main players for exchange rate volatilities, central bank foreign currency reserves may be seen as the determinant for risk awareness of investors. In accordance with our finding above, we have checked the relation between ISE returns and ratio between the net portfolio flows and central bank reserves. The Figure below shows the striking relation between the two variables.

Figure 4.1 NPIO/CBRES and ISE Returns



The figure above gives evidence that the portfolio flows to central bank reserves may indicate a signal for financial crises since the ratio shows a descending trend before the financial crisis where the positive return periods happen to be at the same time with the high volume portfolio inflows. Since ratio between portfolio flows and central bank reservesConsequently we have observed that the previous months portfolio outflow signals for the financial crisis if the portfolio outflows ratio to central bank reserves exceed a defined ratio. The figure below indicates a better understanding for the critical ratios.

Figure 4.2 NPIO/CBRES trend for the crisis periods

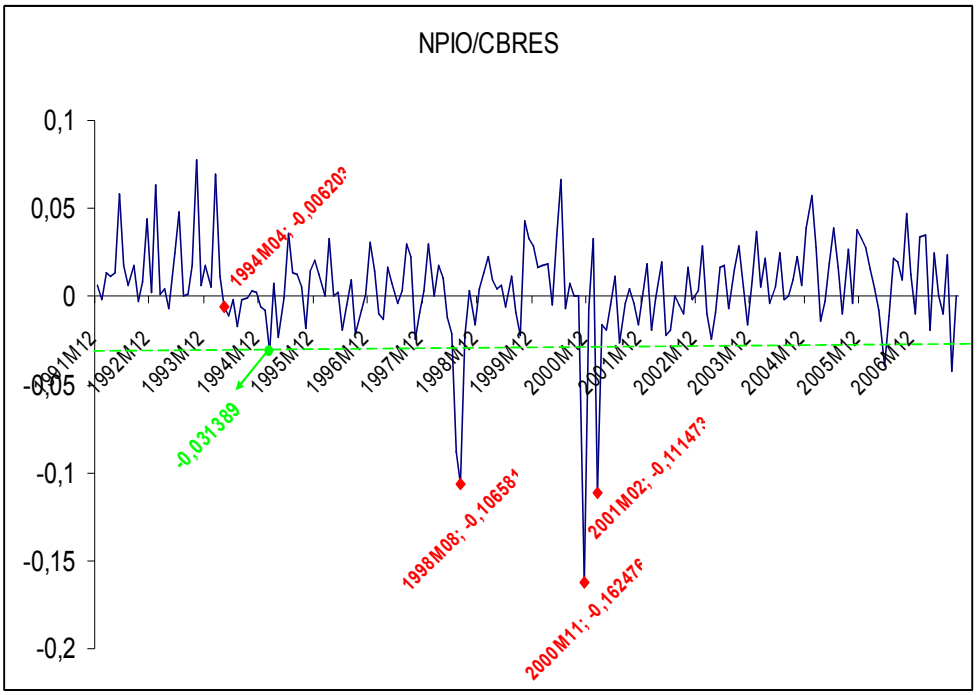


Figure above indicates that the portfolio outflows proportion to central bank reserves imply a signal for the financial crisis in Turkey if the ratio goes to below 3,1389 %. On the other hand the ratio may go more than 10 % for a month which implies the fact that the crises periods longer than 7 months may create a complete collapse in financial markets.

5. CONCLUSION

Several econometric analyses we have made at part 3 indicates inefficiency of defining an econometric evidence for the relation between market risk and portfolio flows. Lack of data frequency and quality used; and complex dynamic factors of Turkey as high sensitivity to political and global risks may be the reasons behind failure of modeling the market risk and its relation with portfolio flows. On the other hand, our empirical findings, the figures for the risk series and portfolio inflows, make a sense for the effects of portfolio flows in the financial markets at crisis periods. The linear models between the portfolio flows and ISE returns also indicate stronger correlation at crisis periods. By this view, accumulation of profit oriented short term portfolio inflows in financial markets may be a reason for deeper financial crisis in emerging markets where the need for controlling the portfolio flows arise. The definition of efficient monetary and fiscal policies to keep accumulation at an optimum point for preventing the financial market players from considering the macroeconomic balances to fail for carrying additional risks of portfolio flows has been the basic idea for the second part of our analysis.

At the second part, the factors behind portfolio inflows are investigated by a Structural Vector Autoregressive model to clarify the effectiveness of the factors that may be used to manage the additional risks arising from the portfolio flows under Turkish evidence. The result of possible interventions

on macroeconomic indicators is defined by impulse response analysis where the relative importance of factors is investigated by variance decomposition methods. Our findings seem to be consistent with the idea that the central bank reserves are the most effective tool for managing the portfolio inflows in Turkey. Strikingly, portfolio flows to Turkey do not seem to be affected much by US interest rates as general theory predicts which in turn supports the reasons behind the failure of econometric models investigating the relation between market risk and portfolio flows. Turkey's financial, economic and political dynamics make local factors more dominant when compared with global factors.

At the last part of our analysis we have investigated the relation between the proportion of portfolio flows to central bank reserves with the ISE stock exchange returns. The ratio of cbres/portfolio is defined as independent variable since it may be defined as the risk coverage of portfolio investors by central bank's reserves; or in other words "funding insurance of central bank for foreign exchange rate risk". By investors' point of view, there is a positive correlation between extreme exchange rate risks and central bank reserves as the Central Bank of Turkish Republic increases the foreign currency supply with liquidating its foreign currency reserves. Our empirical findings on the financial crisis experiences in 1990's, 2000 and 2001 supports the idea that the critical ratio for Turkish government to make interventions on the financial indicators have been 3.13%. Government

interventions seem to be applicable for preventing further portfolio outflows by increasing interest rates or making regulations to change the expectations may be a conservative policy if the ratio goes to a limit defined by above 3.13%. Furthermore investors might increase their risk awareness whenever the ratio goes above the defined level. 3.13% is not a proven point for risk climax however the empirical evidences in Turkey shows that all financial crises at the last two decades are happened just after the ratio goes above 3.13 %.

To sum up, our study initially clarifies the empirical relation between the risk in financial markets and foreign portfolio flows under Turkish evidence. Secondly the factors for managing the portfolio flows is analyzed under SVAR model where the most effective tool is founded to be central bank reserves for Turkey and at the last step the optimal point for the relation between the central bank reserves, portfolio flows and market risk is defined by cbres/portfolio flows as 3.13 % for financial crisis periods.

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APPENDIX

APPENDIX-A

PairwiseGrangerCausalityTests
Date:12/08/07Time:15:47
Sample:1991M122007M09
Lags:2

NullHypothesis:	Obs	F-Statistic	Probability
DCAdoesnotGrangerCauseDBONCU	186	1.26060	0.28596
DBONCUdoesnotGrangerCauseDCA		4.30538	0.01490
DCBRESdoesnotGrangerCauseDBONCU	186	1.33420	0.26595
DBONCUdoesnotGrangerCauseDCBRES		0.49787	0.60865
DTRUSINTdoesnotGrangerCauseDBONCU	186	0.68215	0.50682
DBONCUdoesnotGrangerCauseDTRUSINT		0.76570	0.46651
DISEdoesnotGrangerCauseDBONCU	186	1.72232	0.18157
DBONCUdoesnotGrangerCauseDISE		2.36802	0.09656
DREKIdoesnotGrangerCauseDBONCU	186	0.29101	0.74786
DBONCUdoesnotGrangerCauseDREKI		1.48293	0.22972
DUSINTdoesnotGrangerCauseDBONCU	186	0.12363	0.88378
DBONCUdoesnotGrangerCauseDUSINT		0.07063	0.93183
DUSIPIdoesnotGrangerCauseDBONCU	186	3.36129	0.03687
DBONCUdoesnotGrangerCauseDUSIPI		2.05389	0.13121
NPIOdoesnotGrangerCauseDBONCU	182	4.15455	0.01725
DBONCUdoesnotGrangerCauseNPIO		1.89973	0.15265
DCBRESdoesnotGrangerCauseDCA	187	1.44080	0.23943
DCAdoesnotGrangerCauseDCBRES		0.61563	0.54142
DTRUSINTdoesnotGrangerCauseDCA	187	0.79168	0.45464
DCAdoesnotGrangerCauseDTRUSINT		0.87267	0.41957
DISEdoesnotGrangerCauseDCA	187	4.23390	0.01595
DCAdoesnotGrangerCauseDISE		0.64401	0.52637

DREKIdoesnotGrangerCauseDCA	187	2.46045	0.08823
DCAdoesnotGrangerCauseDREKI		0.83811	0.43419
DUSINTdoesnotGrangerCauseDCA	187	2.69953	0.06993
DCAdoesnotGrangerCauseDUSINT		2.71597	0.06882
DUSIPIdoesnotGrangerCauseDCA	186	0.12372	0.88370
DCAdoesnotGrangerCauseDUSIPI		7.62370	0.00066
NPIOdoesnotGrangerCauseDCA	183	3.58577	0.02974
DCAdoesnotGrangerCauseNPIO		1.81280	0.16620
DTRUSINTdoesnotGrangerCauseDCBRES	187	0.87698	0.41779
DCBRESdoesnotGrangerCauseDTRUSINT		3.06267	0.04918
DISEdoesnotGrangerCauseDCBRES	187	0.53027	0.58935
DCBRESdoesnotGrangerCauseDISE		10.5815	4.5E-05
DREKIdoesnotGrangerCauseDCBRES	187	0.51711	0.59711
DCBRESdoesnotGrangerCauseDREKI		0.20616	0.81389
DUSINTdoesnotGrangerCauseDCBRES	187	4.86958	0.00871
DCBRESdoesnotGrangerCauseDUSINT		8.66815	0.00025
DUSIPIdoesnotGrangerCauseDCBRES	186	0.69749	0.49917
DCBRESdoesnotGrangerCauseDUSIPI		1.53204	0.21888
NPIOdoesnotGrangerCauseDCBRES	183	1.44721	0.23798
DCBRESdoesnotGrangerCauseNPIO		1.68598	0.18821
DISEdoesnotGrangerCauseDTRUSINT	187	3.28007	0.03986
DTRUSINTdoesnotGrangerCauseDISE		1.29721	0.27581
DREKIdoesnotGrangerCauseDTRUSINT	187	1.80628	0.16720
DTRUSINTdoesnotGrangerCauseDREKI		0.48124	0.61880
DUSINTdoesnotGrangerCauseDTRUSINT	187	1.94659	0.14572
DTRUSINTdoesnotGrangerCauseDUSINT		0.41406	0.66158
DUSIPIdoesnotGrangerCauseDTRUSINT	186	1.96495	0.14314
DTRUSINTdoesnotGrangerCauseDUSIPI		4.18102	0.01678
NPIOdoesnotGrangerCauseDTRUSINT	183	4.77437	0.00955
DTRUSINTdoesnotGrangerCauseNPIO		0.63379	0.53177
DREKIdoesnotGrangerCauseDISE	187	3.56905	0.03017

DISEdoesnotGrangerCauseDREKI		3.18768	0.04358
DUSINTdoesnotGrangerCauseDISE	187	1.20946	0.30075
DISEdoesnotGrangerCauseDUSINT		3.30409	0.03895
DUSIPIdoesnotGrangerCauseDISE	186	2.80758	0.06298
DISEdoesnotGrangerCauseDUSIPI		2.59224	0.07763
NPIOdoesnotGrangerCauseDISE	183	20.2047	1.2E-08
DISEdoesnotGrangerCauseNPIO		1.62598	0.19963
DUSINTdoesnotGrangerCauseDREKI	187	0.18701	0.82960
DREKIdoesnotGrangerCauseDUSINT		1.92068	0.14946
DUSIPIdoesnotGrangerCauseDREKI	186	0.03348	0.96708
DREKIdoesnotGrangerCauseDUSIPI		1.81270	0.16616
NPIOdoesnotGrangerCauseDREKI	183	1.31373	0.27141
DREKIdoesnotGrangerCauseNPIO		0.08266	0.92070
DUSIPIdoesnotGrangerCauseDUSINT	186	0.06091	0.94093
DUSINTdoesnotGrangerCauseDUSIPI		2.18388	0.11556
NPIOdoesnotGrangerCauseDUSINT	183	5.19938	0.00639
DUSINTdoesnotGrangerCauseNPIO		3.50524	0.03213
NPIOdoesnotGrangerCauseDUSIPI	182	1.12496	0.32698
DUSIPIdoesnotGrangerCauseNPIO		0.49370	0.61120

APPENDIX B

DependentVariable:DTRUSINT
Method:LeastSquares
Date:12/09/07Time:18:33
Sample(adjusted):1992M012007M09
Includedobservations:189afteradjustments

Variable	Coefficient	Std.Error	t-Statistic	Prob.
DUSINT	0.744114	0.192505	3.865433	0.0002
C	0.011316	0.040200	0.281482	0.7787

R-squared	0.073990	Meandependentvar	0.013757
AdjustedR-squared	0.069038	S.D.dependentvar	0.572714
S.E.ofregression	0.552591	Akaikeinfocriterion	1.662128
Sumsquaredresid	57.10172	Schwarzcriterion	1.696433
Loglikelihood	-155.0711	F-statistic	14.94157
Durbin-Watsonstat	1.474887	Prob(F-statistic)	0.000153

Breusch-GodfreySerialCorrelationLMTest:

F-statistic	6.722925	Prob.F(2,185)	0.001519
Obs*R-squared	12.80584	Prob.Chi-Square(2)	0.001657

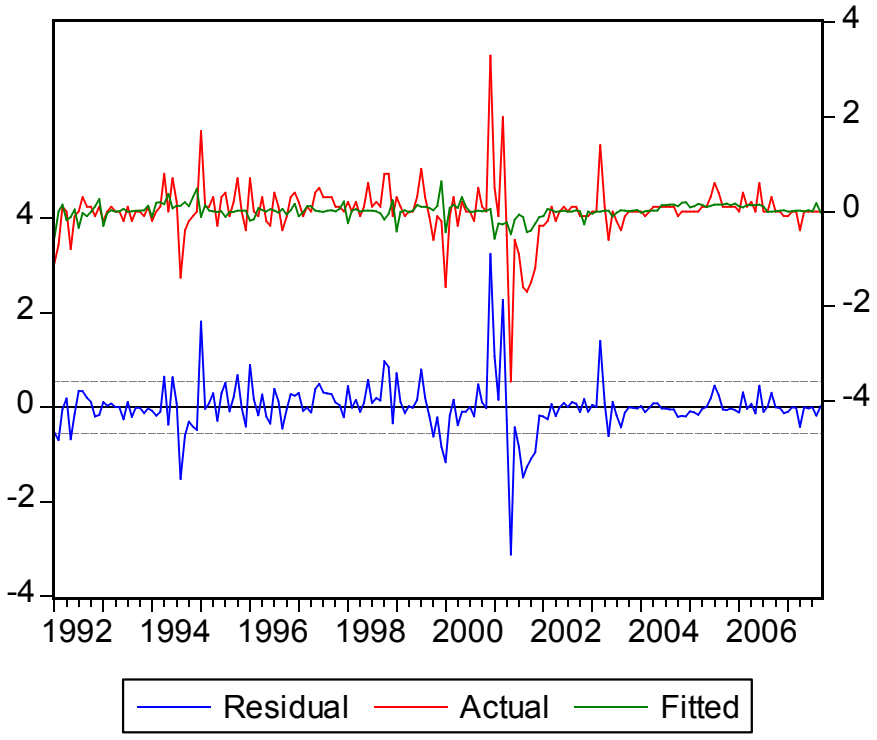
TestEquation:
DependentVariable:RESID
Method:LeastSquares
Date:12/09/07Time:18:39
Sample:1992M012007M09
Includedobservations:189
Presamplemissingvaluelaggedresidualssettozero.

Variable	Coefficient	Std.Error	t-Statistic	Prob.
DUSINT	0.005952	0.187182	0.031798	0.9747
C	2.62E-05	0.039024	0.000672	0.9995
RESID(-1)	0.263230	0.073520	3.580405	0.0004
RESID(-2)	-0.012260	0.073657	-0.166443	0.8680

R-squared	0.067756	Meandependentvar	0.000000
AdjustedR-squared	0.052638	S.D.dependentvar	0.551119

S.E.ofregression	0.536418	Akaikeinfocriterion	1.613132
Sumsquaredresid	53.23275	Schwarzcriterion	1.681740
Loglikelihood	-148.4410	F-statistic	4.481950
Durbin-Watsonstat	1.985955	Prob(F-statistic)	0.004605

ActualFittedResidualFigureforLinearRegressionforUSINTandTRUSINT



PairwiseGrangerCausalityTests
Date:12/09/07Time:18:35
Sample:1991M122007M09
Lags:5

NullHypothesis:	Obs	F-Statistic	Probability
DUSINTdoesnotGrangerCauseDTRUSINT	184	2.14745	0.06208
DTRUSINTdoesnotGrangerCauseDUSINT		1.52542	0.18424

Date:12/09/07Time:18:39
Sample:1992M012007M09
Includedobservations:189

Autocorrelation	PartialCorrelation		AC	PAC	Q-Stat	Prob
.|** |	.|** |	1	0.260	0.260	12.982	0.000
.|. |	.|. |	2	0.056	-0.012	13.589	0.001
.|*** |	.|*** |	3	0.364	0.379	39.366	0.000
.|. |	**|. |	4	-0.007	-0.246	39.375	0.000
**|. |	*|. |	5	-0.230	-0.183	49.748	0.000
.|. |	.|. |	6	0.022	-0.001	49.840	0.000
*|. |	.|. |	7	-0.095	-0.050	51.621	0.000
**|. |	.|. |	8	-0.216	-0.016	60.954	0.000
.|. |	.|. |	9	-0.016	0.001	61.006	0.000
*|. |	*|. |	10	-0.114	-0.146	63.648	0.000
**|. |	*|. |	11	-0.235	-0.115	74.845	0.000
.|. |	.|. |	12	-0.047	-0.014	75.304	0.000
.|. |	.|. |	13	-0.055	-0.009	75.917	0.000
*|. |	.|. |	14	-0.157	-0.039	80.985	0.000
.|. |	.|. |	15	-0.024	-0.053	81.104	0.000
.|. |	.|. |	16	0.051	0.012	81.655	0.000
.|. |	.|* |	17	0.037	0.091	81.950	0.000
.|* |	.|. |	18	0.066	-0.011	82.864	0.000
.|* |	.|. |	19	0.067	-0.050	83.820	0.000
.|* |	.|. |	20	0.085	0.030	85.357	0.000
.|* |	.|. |	21	0.080	0.008	86.738	0.000
.|. |	.|. |	22	-0.005	-0.054	86.744	0.000
.|* |	.|* |	23	0.078	0.097	88.080	0.000
.|* |	.|. |	24	0.116	0.055	91.043	0.000
.|. |	.|. |	25	0.042	0.048	91.426	0.000
.|* |	.|. |	26	0.080	0.027	92.830	0.000
.|* |	.|. |	27	0.106	0.035	95.339	0.000
.|. |	.|. |	28	0.002	0.012	95.340	0.000
.|. |	.|. |	29	0.000	0.010	95.340	0.000
.|. |	.|. |	30	0.035	0.032	95.625	0.000
*|. |	.|. |	31	-0.064	0.011	96.561	0.000
*|. |	.|. |	32	-0.083	-0.029	98.134	0.000
.|. |	.|. |	33	-0.012	-0.002	98.167	0.000
*|. |	.|. |	34	-0.084	-0.011	99.820	0.000
*|. |	.|. |	35	-0.104	-0.002	102.38	0.000
.|. |	.|. |	36	-0.010	0.007	102.40	0.000

APPENDIX C

VectorAutoregressionEstimates

Date:12/14/07Time:01:00

Sample(adjusted):1992M042007M08

Includedobservations:182afteradjustments

Standarderrorsin()&t-statisticsin[]

	DUSINT	DUSIPI	DTRUSINT	DISE	DCBRES	DCA	DBONCU	DREKI	NPIO
DUSINT(-1)	0.224303	-0.999207	0.362208	518.3353	1449.767	607.0654	-2442790.	0.125649	705.0842
	(0.07582)	(1.03998)	(0.21538)	(607.073)	(655.383)	(242.509)	(1815471)	(1.64424)	(434.154)
	[2.95820]	[-0.96079]	[1.68168]	[0.85383]	[2.21209]	[2.50327]	[-1.34554]	[0.07642]	[1.62404]
DUSINT(-2)	0.289324	-1.592.164	0.342340	-1.084.033	44.88900	-2.329.467	-185786.7	-0.182526	372.4583
	(0.07819)	(1.07248)	(0.22211)	(626.041)	(675.861)	(250.087)	(1872198)	(1.69562)	(447.720)
	[3.70012]	[-1.48457]	[1.54127]	[-1.73157]	[0.06642]	[-0.93146]	[-0.09923]	[-0.10765]	[0.83190]
DUSIPI(-1)	-0.002364	-1.037.421	0.029408	-7.805.535	10.89752	5.760949	311227.0	-0.042431	41.59855
	(0.00456)	(0.06248)	(0.01294)	(36.4719)	(39.3743)	(14.5696)	(109071.)	(0.09878)	(26.0832)
	[-0.51904]	[-16.6040]	[2.27268]	[-2.14015]	[0.27677]	[0.39541]	[2.85345]	[-0.42954]	[1.59484]
DUSIPI(-2)	-0.000161	-0.532802	0.018493	-3.697.633	-2.848.564	0.030166	201465.1	-0.039641	27.50589
	(0.00467)	(0.06405)	(0.01326)	(37.3859)	(40.3610)	(14.9347)	(111804.)	(0.10126)	(26.7369)
	[-0.03452]	[-8.31904]	[1.39420]	[-0.98904]	[-0.70577]	[0.00202]	[1.80195]	[-0.39148]	[1.02876]
DTRUSINT(-1)	0.012967	-0.638256	0.397125	-7.814.717	325.9873	-3.503.267	940773.1	-0.324200	-7.892.856
	(0.02926)	(0.40133)	(0.08312)	(234.269)	(252.912)	(93.5841)	(700589.)	(0.63451)	(167.540)
	[0.44315]	[-1.59036]	[4.77791]	[-0.33358]	[1.28894]	[-0.37434]	[1.34283]	[-0.51094]	[-0.47110]
DTRUSINT(-2)	-0.009319	1.276036	-0.085929	374.5726	-1.803.535	13.62880	642719.0	0.299652	-1.518.380
	(0.02852)	(0.39112)	(0.08100)	(228.308)	(246.476)	(91.2028)	(682762.)	(0.61837)	(163.276)
	[-0.32680]	[3.26256]	[-1.06083]	[1.64065]	[-0.73173]	[0.14943]	[0.94135]	[0.48459]	[-0.92994]
DISE(-1)	7.34E-06	0.000182	5.74E-05	-0.128622	-0.024513	-0.030195	412.2338	-0.000534	-0.061727
	(1.0E-05)	(0.00014)	(2.9E-05)	(0.08046)	(0.08687)	(0.03214)	(240.633)	(0.00022)	(0.05755)
	[0.73047]	[1.31888]	[2.01112]	[-1.59849]	[-0.28218]	[-0.93939]	[1.71312]	[-2.45102]	[-1.07268]
DISE(-2)	9.65E-06	0.000214	-3.87E-05	0.196816	0.027933	-0.070213	7.056795	0.000357	0.011630

	(9.8E-06)	(0.00013)	(2.8E-05)	(0.07809)	(0.08430)	(0.03119)	(233.524)	(0.00021)	(0.05585)
	[0.98984]	[1.60192]	[-1.39799]	[2.52046]	[0.33135]	[-2.25087]	[0.03022]	[1.68841]	[0.20826]
DCBRES(-1)	-3.23E-05	0.000187	-3.71E-05	0.196267	0.000189	0.064711	165.1156	1.38E-05	0.045650
	(9.4E-06)	(0.00013)	(2.7E-05)	(0.07491)	(0.08087)	(0.02992)	(224.011)	(0.00020)	(0.05357)
	[-3.45403]	[1.46069]	[-1.39487]	[2.62016]	[0.00234]	[2.16256]	[0.73709]	[0.06800]	[0.85215]
DCBRES(-2)	1.51E-05	-0.000119	3.22E-05	0.038638	0.042151	-0.009900	-4.179.363	7.61E-05	-0.015050
	(9.7E-06)	(0.00013)	(2.8E-05)	(0.07762)	(0.08380)	(0.03101)	(232.136)	(0.00021)	(0.05551)
	[1.56007]	[-0.89281]	[1.16888]	[0.49776]	[0.50299]	[-0.31925]	[-1.80039]	[0.36179]	[-0.27111]
DCA(-1)	-2.05E-05	0.001709	-0.000113	-0.091468	-0.067047	-0.182697	-5.718.547	1.17E-05	-0.225379
	(2.5E-05)	(0.00035)	(7.2E-05)	(0.20257)	(0.21870)	(0.08092)	(605.807)	(0.00055)	(0.14487)
	[-0.80988]	[4.92600]	[-1.57738]	[-0.45153]	[-0.30658]	[-2.25766]	[-0.94396]	[0.02141]	[-1.55569]
DCA(-2)	4.98E-05	0.000288	2.11E-05	0.017360	-0.071717	-0.104626	616.4117	-0.000954	-0.183764
	(2.5E-05)	(0.00034)	(7.0E-05)	(0.19646)	(0.21210)	(0.07848)	(587.526)	(0.00053)	(0.14050)
	[2.02973]	[0.85483]	[0.30303]	[0.08836]	[-0.33813]	[-1.33313]	[1.04916]	[-1.79371]	[-1.30792]
DBONCU(-1)	-1.28E-09	-8.94E-08	-1.33E-08	-3.83E-05	7.66E-07	2.54E-05	-1.137.068	2.33E-08	-1.46E-05
	(2.8E-09)	(3.8E-08)	(7.9E-09)	(2.2E-05)	(2.4E-05)	(8.9E-06)	(0.06654)	(6.0E-08)	(1.6E-05)
	[-0.46036]	[-2.34428]	[-1.68251]	[-1.72135]	[0.03189]	[2.86258]	[-17.0893]	[0.38583]	[-0.91866]
DBONCU(-2)	8.65E-10	-1.56E-07	-1.37E-09	-4.23E-05	-1.63E-05	5.88E-06	-0.515954	-8.38E-08	6.22E-06
	(2.9E-09)	(4.0E-08)	(8.3E-09)	(2.3E-05)	(2.5E-05)	(9.4E-06)	(0.07018)	(6.4E-08)	(1.7E-05)
	[0.29514]	[-3.86807]	[-0.16506]	[-1.80398]	[-0.64158]	[0.62760]	[-7.35189]	[-1.31892]	[0.37090]
DREKI(-1)	-0.001188	0.067527	0.015846	53.64061	36.78805	-9.707.133	-22458.88	0.502126	10.58792
	(0.00377)	(0.05166)	(0.01070)	(30.1535)	(32.5530)	(12.0455)	(90174.9)	(0.08167)	(21.5645)
	[-0.31550]	[1.30724]	[1.48123]	[1.77892]	[1.13010]	[-0.80587]	[-0.24906]	[6.14823]	[0.49099]
DREKI(-2)	0.003286	0.019317	0.000884	-4.409.019	-6.125.758	-0.981093	-15063.34	-0.207785	-1.611.297
	(0.00384)	(0.05272)	(0.01092)	(30.7759)	(33.2250)	(12.2942)	(92036.4)	(0.08336)	(22.0097)
	[0.85474]	[0.36640]	[0.08098]	[-1.43262]	[-1.84372]	[-0.07980]	[-0.16367]	[-2.49275]	[-0.73209]
NPIO(-1)	1.76E-05	-0.000284	-0.000129	0.507930	0.018886	-0.108509	830.4527	0.000279	0.132214
	(1.5E-05)	(0.00020)	(4.2E-05)	(0.11815)	(0.12755)	(0.04720)	(353.338)	(0.00032)	(0.08450)
	[1.19421]	[-1.40073]	[-3.06688]	[4.29895]	[0.14806]	[-2.29898]	[2.35031]	[0.87033]	[1.56471]
NPIO(-2)	2.32E-05	0.000505	2.10E-05	0.079459	0.198138	-0.047087	371.4255	-0.000200	0.025391
	(1.6E-05)	(0.00022)	(4.7E-05)	(0.13113)	(0.14156)	(0.05238)	(392.135)	(0.00036)	(0.09378)
	[1.41885]	[2.24963]	[0.45147]	[0.60598]	[1.39967]	[-0.89894]	[0.94719]	[-0.56232]	[0.27076]
C	-0.000950	-0.176038	0.028557	-5.965.071	466.8675	23.48007	-254454.9	0.077831	187.6104
	(0.01501)	(0.20587)	(0.04264)	(120.173)	(129.736)	(48.0057)	(359380.)	(0.32549)	(85.9425)
	[-0.06330]	[-0.85510]	[0.66978]	[-0.04964]	[3.59860]	[0.48911]	[-0.70804]	[0.23912]	[2.18298]

R-squared	0.293939	0.678812	0.273740	0.312948	0.104637	0.233812	0.711220	0.237055	0.137419
Adj.R-squared	0.215969	0.643344	0.193540	0.237077	0.005762	0.149202	0.679330	0.152804	0.042165
Sumsq.resids	5.369338	1010.085	43.32487	3.44E+08	4.01E+08	54924264	3.08E+15	2524.878	1.76E+08
S.E.equation	0.181496	2.489345	0.515555	1453.117	1568.755	580.4814	4345595.	3.935740	1039.210
F-statistic	3.769902	19.13840	3.413198	4.124743	1.058279	2.763415	22.30242	2.813662	1.442654
Loglikelihood	62.37368	-4.142.010	-1.276.363	-1.573.440	-1.587.376	-1.406.436	-3.030.024	-4.975.715	-1.512.425
AkaikeAIC	-0.476634	4.760451	1.611388	17.49934	17.65249	15.66413	33.50576	5.676609	16.82884
SchwarzSC	-0.142150	5.094935	1.945873	17.83383	17.98697	15.99861	33.84024	6.011094	17.16333
Meandependent	0.006978	0.047262	0.020330	275.7410	546.9610	-6.093.407	-8.389.458	0.166484	232.9890
S.D.dependent	0.204975	4.168311	0.574094	1663.643	1573.294	629.3252	7673972.	4.275968	1061.838

Determinantresidcovariance(dofadj.)	1.69E+37
Determinantresidcovariance	6.28E+36
Loglikelihood	-10034.64
Akaikeinformationcriterion	112.1499
Schwarzcriterion	115.1603

Structural VAR Estimates

Date: 12/14/07 Time: 01:00

Sample (adjusted): 1992M04 2007M08

Included observations: 182 after adjustments

Estimation method: method of scoring (analytic derivatives)

Failure to improve after 1 iterations

Structural VAR is over-identified (14 degrees of freedom)

Model: Ae = Bu where E[uu']=I

Restriction Type: long-run pattern matrix

Long-run response pattern:

1	0	0	0	0	0	0	0	0
C(1)	1	0	0	0	0	0	0	0
C(2)	0	1	C(13)	C(16)	0	0	C(24)	C(27)
0	0	C(9)	1	C(17)	0	0	C(25)	C(28)
0	0	0	0	1	0	0	0	0
C(3)	C(6)	C(10)	0	0	1	C(22)	0	C(29)
C(4)	C(7)	C(11)	0	0	C(20)	1	0	C(30)
0	0	0	C(14)	C(18)	0	0	1	C(31)
C(5)	C(8)	C(12)	C(15)	C(19)	C(21)	C(23)	C(26)	1

	Coefficient	Std. Error	z-Statistic	Prob.
C(1)	0.100000	0.074125	1.349074	0.1773
C(2)	0.100000	0.073276	1.364700	0.1723
C(3)	0.100000	0.075577	1.323146	0.1858
C(4)	0.100000	0.075578	1.323141	0.1858
C(5)	0.100000	0.073571	1.359237	0.1741
C(6)	0.100000	0.074798	1.336939	0.1812
C(7)	0.100000	0.074798	1.336932	0.1812
C(8)	0.100000	0.072202	1.384994	0.1661
C(9)	0.100000	46.39343	0.002155	0.9983
C(10)	0.100000	5.155930	0.019395	0.9845
C(11)	0.100000	5.155553	0.019397	0.9845
C(12)	0.100000	46.39817	0.002155	0.9983
C(13)	0.100000	46.39377	0.002155	0.9983
C(14)	0.100000	5.185596	0.019284	0.9846
C(15)	0.100000	46.38887	0.002156	0.9983
C(16)	0.100000	0.074518	1.341953	0.1796
C(17)	0.100000	0.075205	1.329695	0.1836
C(18)	0.100000	0.074857	1.335887	0.1816
C(19)	0.100000	0.073101	1.367973	0.1713
C(20)	0.100000	0.511004	0.195693	0.8449
C(21)	0.100000	0.481590	0.207645	0.8355

C(22)	0.100000	0.510956	0.195712	0.8448
C(23)	0.100000	0.482596	0.207213	0.8358
C(24)	0.100000	0.096137	1.040178	0.2983
C(25)	0.100000	0.522299	0.191461	0.8482
C(26)	0.100000	0.471843	0.211935	0.8322
C(27)	0.100000	46.39879	0.002155	0.9983
C(28)	0.100000	46.38834	0.002156	0.9983
C(29)	0.100000	5.180312	0.019304	0.9846
C(30)	0.100000	5.172585	0.019333	0.9846
C(31)	0.100000	5.180864	0.019302	0.9846

Log likelihood	-2.72E+14		
LR test for over-identification: Chi-square(14)	5.43E+14	Probability	0.0000

Estimated A matrix:

1.000000	0.000000	0.000000	0.000000	0.000000	0.00000	0.00000	0.00000	0.000
0.000000	1.000000	0.000000	0.000000	0.000000	0.00000	0.00000	0.00000	0.000
0.000000	0.000000	1.000000	0.000000	0.000000	0.00000	0.00000	0.00000	0.000
0.000000	0.000000	0.000000	1.000000	0.000000	0.00000	0.00000	0.00000	0.000
0.000000	0.000000	0.000000	0.000000	1.000000	0.00000	0.00000	0.00000	0.000
0.000000	0.000000	0.000000	0.000000	0.000000	1.00000	0.00000	0.00000	0.000
0.000000	0.000000	0.000000	0.000000	0.000000	0.00000	1.00000	0.00000	0.000
0.000000	0.000000	0.000000	0.000000	0.000000	0.00000	0.00000	1.00000	0.000
0.000000	0.000000	0.000000	0.000000	0.000000	0.00000	0.00000	0.00000	1.000

Estimated B matrix:

0.486254	0.002519	-0.003657	-0.000596	-0.000563	-3.34E-05	-7.02E-06	-0.002468	-0.000620
2.784393	2.570001	-0.638042	-0.072881	-0.072593	-0.002019	-0.000222	-0.150684	-0.072924
-0.640438	-0.047881	0.688822	0.067199	0.067221	0.000103	2.00E-05	0.052159	0.067322
547.5073	114.9804	-296.3836	-29.72452	-30.79805	-0.015378	-0.051247	-39.15852	-31.08438
-1507.468	17.58030	-145.6420	-12.14155	-11.18081	-0.117063	-0.007810	-9.884104	-12.31992
-372.4131	-5.646827	21.55821	3.325179	3.180000	-1.302880	-0.144261	-12.85421	-3.503577
2418834.	-512816.5	-1583658.	-155136.5	-154506.3	164.4795	121.9905	120989.1	155845.0
0.067625	0.082158	0.024652	0.073190	0.072941	-0.000935	8.65E-05	-0.708124	-0.073054
-1061.251	-68.97928	230.8967	23.76350	23.68781	-0.493383	-0.125162	-28.69096	-24.51748

Estimation Proc:
==========
LS 1 2 DUSINT DUSIPI DTRUSINT DISE DCBRES DCA DBONCU DREKI NPIO @ C

VAR Model:
==========
NPIO = C(9,1)*DUSINT(-1) + C(9,2)*DUSINT(-2) + C(9,3)*DUSIPI(-1) + C(9,4)*DUSIPI(-2) + C(9,5)*DTRUSINT(-1) + C(9,6)*DTRUSINT(-2) + C(9,7)*DISE(-1) + C(9,8)*DISE(-2) + C(9,9)*DCBRES(-1) + C(9,10)*DCBRES(-2) + C(9,11)*DCA(-1) + C(9,12)*DCA(-2) + C(9,13)*DBONCU(-1) + C(9,14)*DBONCU(-2) + C(9,15)*DREKI(-1) + C(9,16)*DREKI(-2) + C(9,17)*NPIO(-1) + C(9,18)*NPIO(-2) + C(9,19)

VAR Model - Substituted Coefficients:
==========
NPIO = 705.0841888*DUSINT(-1) + 372.4582719*DUSINT(-2) + 41.59854767*DUSIPI(-1) + 27.50588907*DUSIPI(-2) - 78.92856376*DTRUSINT(-1) - 151.8380124*DTRUSINT(-2) - 0.0617274*DISE(-1) + 0.01163048495*DISE(-2) + 0.04564995136*DCBRES(-1) - 0.01505022487*DCBRES(-2) - 0.2253785132*DCA(-1) - 0.1837642611*DCA(-2) - 1.461746366e-005*DBONCU(-1) + 6.224692272e-006*DBONCU(-2) + 10.58791853*DREKI(-1) - 16.11296754*DREKI(-2) + 0.1322140215*NPIO(-1) + 0.02539112498*NPIO(-2) + 187.6104389