

# EXOGENOUS CHARACTERISTICS OF SHORT-TERM CAPITAL FLOWS: CAN THEY BE UNDER CONTROL EVIDENCE FROM TURKEY

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## ÖZET

Çalışmamızda kısa dönemli sermaye hareketlerinin Türkiye ekonomisi koşullarında 'çekiş içerikli' olarak adlandırılacak reel efektif döviz kuru, ticaret dengesi, reel gelir büyüme süreci, yurtiçi enflasyon ve reel faiz yapısı gibi temel bazı makroekonomik göstergeler ile olan dinamik etkileşim süreci araştırılmaya çalışılmaktadır. Sınırlandırılmamış çağdaş vektör ardışık bağlanım (VAB) tahmin yöntemleri kullanılmak suretiyle elde ettiğimiz tahmin sonuçları kısa dönemli sermaye hareketlerinin 'çekiş içerikli' olarak tanımlanan faktörler üzerinde önemli bir etkiye sahip olduğunu göstermiş, bu doğrultuda sermaye girişlerinin reel efektif döviz kurunun değerlenmesine yol açtığı ve ticaret dengesini kötüleştirdiği, reel gelir büyüme sürecini teşvik ettiği ve reel faiz oranlarının azalmasına yol açtığı gözlenmiştir. Ancak 'çekiş içerikli' faktörlerin sermaye hareketleri üzerinde anlamlı bir etkisi bulunamamıştır.

*Anahtar Kelimeler: Sermaye Hareketleri, VAB (Vektör 'Ardışık Bağlanım) Modellemesi, Türkiye Ekonomisi*

## ABSTRACT

In our paper, we give an essay trying to explore whether short-term capital flows can affect and/or be affected by some primary domestic macroeconomic indicators called 'pull' factors such as real effective exchange rate, balance of trade, real income growth process, domestic inflation and real interest structure for the case of Turkish economy. Our estimation results employing some contemporaneous estimation techniques of unrestricted dynamic vector autoregression (VAR) models reveal that short-term capital flows have in fact an important role on the 'pull' factors in the sense that inflows appreciate the real effective exchange rate and in turn deteriorate the trade balance, encourage the real income growth, and decrease the real interest rates. But we could not find any significant effects of the 'pull' factors on the capital flows.

*Key Words: Capital Flows, VAR Modelling, Turkish Economy*

## I. INTRODUCTION

Effects of capital flows in search of high return on real or financial assets have been of special concern for policy makers of developing economies. That the economic agents and policy makers try to attain high growth rates in these countries so as to converge to the developed country cases and that these economies cannot easily succeed in attaining this policy target through insufficient domestic resources make developing country cases highly sensitive to the course of capital flows. The development process of these countries has been severely subject not only to the course of domestic resources and savings of residents but also to the amount of direct investments from abroad as well as to the volatile capital flows attained through foreign savings which surge into these economies. High returns on new investment opportunities in developing countries where capital is scarce compared to those in the developed countries where capital is abundant would be an attractive factor for foreign investors in these countries, and in turn an inflow of foreign capital would relax this constraint and increase the level of domestic investment for developing countries (Mody and Murshid, 2002).

World Economic Outlook by IMF (2006) reports that total net private capital flows comprising net direct investment, net portfolio investment, and other long- and short-term net investment flows in emerging markets and developing countries are about \$200 billion for the 1995-97 period, of which emerging Asia gets a share of \$91 billion, whereas this sum is \$337 billion between all the 1998-2004 period coincided with the decreasing capital inflows especially for the post-1997 East Asian financial crisis. In this period, net private direct investment indicates a stable long-run path of on average \$150 billion per year, but the post-1997 periods witness that initially a decreasing private portfolio inflows and other capital flows and then an increasing private portfolio and other capital

outflows for the 2001-2003 period dominate emerging markets. But there exists an increase again in both flows of private direct investment and portfolio investment for the recent 2004-2006 period yielding about \$821 million in total private capital inflows. Thus portfolio investment and other private capital flows except private direct investment constitute the most volatile part of the capital flows between developing and developed countries.

Such characteristics of private capital flows would have different effects on developing countries, and these effects have not been clear in the sense that even if there exists evidence in favor of that capital flows have been associated with higher growth leading to both consumption and investment booms as well as to the trade deficits due to appreciating real exchange rate and following high level of imports in some country cases, they have also been associated with a higher incidence of crises subject to high volatility of capital flows in some others (Mishra et al. 2001).<sup>1</sup> Insel and Sungur (2003) touch on similar subjects for the case of Turkish economy and estimate that the capital flows in Turkey increase the volatility of the real and financial indicators and thus play an important role in contributing to the economic instability.

Besides, market failures give the justification for government intervention led by divergence between the effects of capital movements and economic fundamentals, and these give rise to policy arbitrages of differences in the quality of countries' economic policy management so as to canalize the capital inflows into their economies (Gutián, 1998). Following López-Mejía (1999), volatility contents of capital flows are able to increase the possibility of large reversals, and these lead to the contagion effects on other developing countries through changes in interest rates and stock market returns. If investments in emerging markets, to a large extent, are used to increase portfolio returns when investments in industrial countries underperform

then the investments will be very sensitive to the changes in industrial countries' interest rates. Trade arrangements and financial links between developing countries and herding behavior of financial investors led by asymmetric information problems can easily cause contagion effects to increase volatility across the developing countries when the policies fail to implement economic fundamentals in one developing country.<sup>2</sup>

In this paper, our aim is to examine the interactions between short-term capital flows and some main domestic macroeconomic aggregates such as real effective exchange rate, trade balance, real income growth, inflation and real interest structure for the Turkish economy. The next section highlights the main factors affecting capital flows, which are diversified between domestic and external factors, and gives some literature review. Interests in data issues and model specification trying to explore both the effects of capital flows on the Turkish economy and domestic determinants of capital flows, if any, leaving possible external determinants out of interest in section 3.

## 2. WHAT FACTORS DRIVE PRIVATE CAPITAL FLOWS?

Many papers for the last two decades of the post-1990 period examine the effects of capital flows on developing countries from two different perspectives following Calvo et al. (1993), of which one can be revealed by means of the *so-called* push factors emphasizing the effects of external factors on domestic macroeconomic aggregates of developing countries that determine the supply of flows to that country, and the other refers to the *so-called* pull factors which are the demand for flows by that country, and emphasizes domestic determinants of capital flows such as interest rates, inflation and stock market prices (Montiel and Reinhart, 2000; Dasgupta and Ratha, 2000; Çulha, 2006).

Considering briefly some main papers emphasizing the importance of push factors affecting capital flows, the seminal paper by Calvo et al. (1993) estimate that renewal of capital flows to Latin America results from external shocks and can be considered an external shock common to the region. They argue that falling interest rates, a continuing recession, and balance of payments developments in the United States have encouraged investors to shift resources to Latin America to take advantage of renewed investment opportunities and the region's increased solvency, and that economic developments outside the region help to explain the universality of these flows. Fernandez-Arias (1994) supports the findings of Calvo et al. (1993) in the sense that the surge of capital inflows for a set of developing countries appears to be largely driven by low returns in industrial countries rather than by the domestic factors, and concludes that if global interest rates return to higher levels, capital inflows would be unsustainable. Kim (2000) employing structural decomposition analysis for four developing countries, i.e. Mexico, Chile, Korea, and Malaysia, finds that resurgence in capital movements is largely due to external factors such as decreases in the world interest rate or recession in industrial countries, while domestic factors such as country-specific productivity shocks and demand shocks are relatively less important. Ying and Kim (2001) reveal that the US business cycle and shocks to foreign interest rates account for more than 50% of capital inflows to Korea and Mexico.

Dealing with the pull factors, estimation results in Dasgupta and Ratha (2000) give evidence that private portfolio flows to a large set of developing countries would increase in response to an increase in the current account deficit, a rise in foreign direct investment flows, higher per capita income and growth performance. Hernández et al. (2001) indicate that the main determinants of private capital flows are the developing countries' own characteristics, and

external or push factors have no significance in explaining the inflows. A recent paper by Çulha (2006) upon the Turkish economy suggests that pull factors are in general dominant over push factors in determining capital flows into Turkey.<sup>3</sup>

On the other side, Chuhan et al. (1993) emphasize the importance of both push and pull factors in determining capital flows for developing countries, and find that although the global factors such as the drop in US interest rates and the slowdown in US industrial production are important in explaining capital flows, domestic factors in developing countries are at least as important in determining these flows. Considering the Latin American countries, they estimate that about half of the explained increase in flows to the Latin American countries can be attributed to the drop in US interest rates and to the the slowdown in the US economy. But for the Asian countries, country-specific factors are estimated to be three to four times more important than global factors in motivating the flows. Likewise, Taylor and Sarno (1997) find that both domestic and global factors explain bond and equity flows to developing countries, and represent significant long-run determinants of portfolio flows.

Thus no consensus has just been achieved by empirical findings in economics literature upon whether push or pull factors affect capital flows much more than other. Having specified the distinction between the determinants of capital flows, from now on we will try to explore whether pull factors can affect capital flows, and in turn, whether the latter can affect the former for the case of Turkish economy, and leave modelling possible external determinants of capital flows to the future papers.

### 3. DATA AND MODEL SPECIFICATION

We now construct an empirical model for the Turkish economy so as to examine the dynamic interactions between the short-term

capital flows and various domestic macroeconomic aggregates representing pull factors for the period of 1992:01-2006:06 of monthly observations. We use a variety of econometric methods available in the program EViews 5.1. All the data we use are taken from the electronic data delivery system of the Central Bank of Republic of Turkey (CBRT) and indicate seasonally unadjusted values in their linear form. Since the availability of monthly capital flows data is possible as of the beginning of 1992 through using this source, our estimation sample begins as of the beginning of 1992 as well. In order to consider the possible sources and consequences of pull factors we define a six variable unrestricted vector autoregression (VAR) model, which is consisted of capital flows variable, real effective exchange rate, real interest rate, balance of trade, real income growth and domestic inflation. If we briefly define such aggregates used in this paper, for the short-term or volatile capital flows (PORTNET) experienced in the Turkish economy we use the sum of portfolio investments net of assets and liabilities as equity securities and debt securities in millions of US\$.s.

Following the definitions used by the CBRT, the real effective exchange rate data (REER) are computed as the weighted geometric average of the price of the domestic country relative to the prices of its trade partners, which can be indicated in equation (1) using wholesale price index (WPI) based price indices with the base year 1995: 100 below,

$$REER = \Pi [(P_i R_i) / (P_j R_j)]^{W_{ij}}, \quad j \neq i, \quad (1)$$

where  $P_i$  is the Turkey's price index,  $R_i$  is the nominal exchange rate of Turkish Lira in US dollars,  $P_j$  is the price index of country  $j$ ,  $R_j$  is the nominal exchange rate of country  $j$ 's currency in US dollars,  $W_{ij}$  is the country  $j$ 's weight for Turkey. A critical point which should be considered here is that an increase in the real

effective exchange rate index would denote a real appreciation of the Turkish Lira, whereas a decrease would denote a real depreciation.

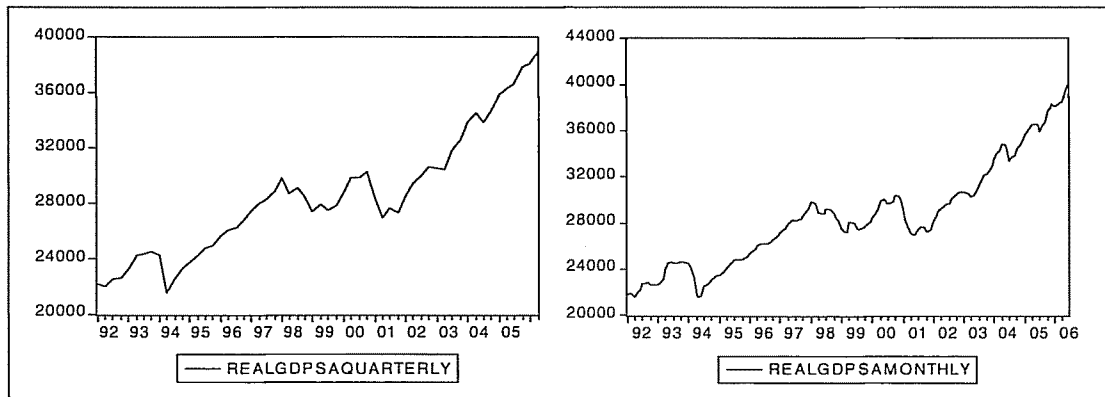
The real interest variable (IREAL2) represents the difference between nominal interest rate, which is the maximum rate of interest on the Treasury bills whose maturity are at most twelve months or less, and the annualized monthly domestic inflation rate based on consumer price index with the base year 1987: 100.

Following Bahmani-Oskooee (1991) and Bahmani-Oskooee (2001), a measure of balance of trade (EXIM) is needed in our paper, which is insensitive to units of measurement, i.e., the ratio of exports over imports in millions of US\$. Bahmani-Oskooee emphasizes that such a variable definition for trade balance is not sensitive to units of measurement, and can be interpreted as nominal or real trade balance.

The domestic inflation variable is represented by monthly domestic inflation rate (INF2) based on consumer price index, while

monthly percent change of the seasonally adjusted real gross domestic product data (GETRGDP) is used for the real income variable, which is interpolated from the quarterly time series following QMS (2004: 108-111) by applying to low frequency to high frequency quadratic match average conversion option. Such conversion fits a local quadratic polynomial for each observation of the low frequency series, then uses this polynomial to fill in all observations of the high frequency series associated with the period. The quadratic polynomial function is formed by taking sets of three adjacent points from the source series and fitting a quadratic so that either the average or the sum of the high frequency points match the low frequency data actually observed. For comparison purposes, in Figure 1 we give below the course of seasonally adjusted quarterly real gross domestic product data (REALGDPSAQUARTERLY) taken from the electronic data delivery system of the CBRT and the course of real income series (REALGDPSAMONTHLY) used in this paper,

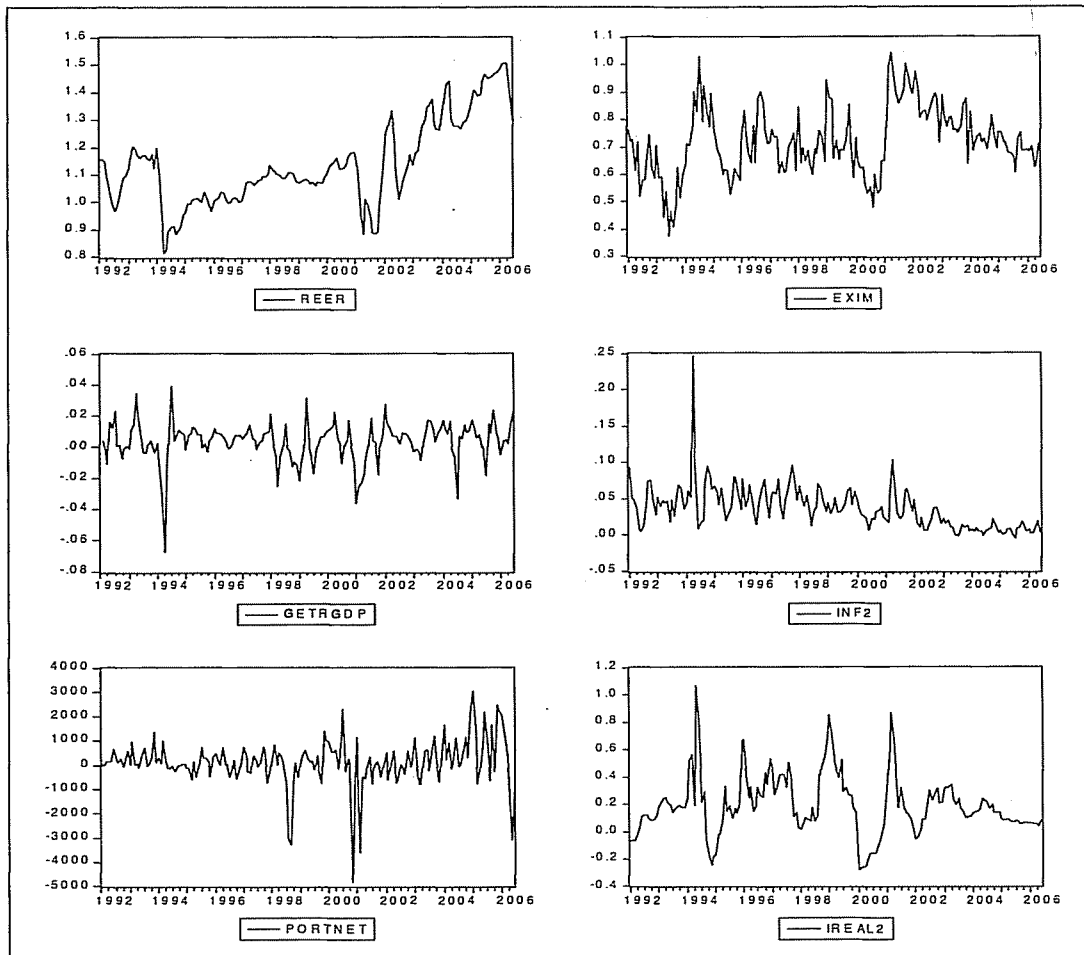
Figure 1: Comparison of Quarterly and Interpolated Monthly Real GDP Series



Besides, two impulse-dummy variables which take on values of unity from 1994M01 till 1994M12 and from 2001M01 till 2001M12 concerning the financial crises occurred in 1994

Figure 2: Time Series Used in The Paper

and 2001 and eleven seasonal dummies are considered as exogenous variables. The time series representation of the variables used in this paper can be seen in Figure 2 below,



All the variables in Figure 2 seem to be stationary, but some doubts can arise whether there exists any trend effect in the variables REER and EXIM. For this purpose, we also apply to the

augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) unit root tests in Table 1 below to confirm what we see in Figure 2,<sup>4</sup>

Table 1: Unit Root Tests (Assuming Constant & Trend)

Variable	ADF test (in levels)	PP test
REER	-4.210936 (1)*	-3.258498 (5)***
EXIM	-3.597137 (1)**	-5.614098 (6)*
GETRGDP	-3.743894 (6)**	-6.722162 (11)*
INF2	-8.312387 (1)*	-8.635918 (16)*
PORTNET	-9.358448 (0)*	-9.286683 (2)*
IREAL2	-4.542821 (0)*	-4.774459 (4)*
Test Critical Values ADF and PP		
%1 level		-4.012296
%5 level		-3.436163
%10 level		-3.142175

When we examine the results of the unit root tests, we see that the null hypothesis that there is a unit root is strongly rejected for all the variables using constant&trend terms in the test equation in the level form supporting our cursory examination of Figure 2 above. From now on, therefore, we will carry on our empirical research by using the stationary form data.

We now determine the lag length of our unrestricted VAR model for which the maximum lag number selected is 12 due to using monthly frequency data considering sequential modified LR statistics employing Sims' (1980) small sample modification, which compare the modified LR statistics to the %5 critical values starting from the maximum lag, and decreasing the lag one at a time until first getting a rejection (QMS, 2004). In our case, reduction of system to eleven lags is accepted with an LR statistic of 19.62952, but reduction to ten lags is rejected with an LR statistic of 52.94453. Thus we consider the lag length 11 to estimate our unrestricted VAR model.

We now apply to some contemporaneous vector autoregression estimation techniques (VARs) such as impulse response analysis for empirical purposes. Let us follow Iohnston and Dinardo (1997), Greene (2000) and QMS (2004), and assume first an AR(p) process,

$$y_t = m + \alpha_1 y_{t-1} + \alpha_2 y_{t-2} + \dots + \alpha_p y_{t-p} + \varepsilon_t \quad (2)$$

We now consider a column vector of *k* different variables,

$$y_t = [y_{1t} \ y_{2t} \ \dots \ y_{kt}]' \quad (3)$$

and model this in terms of the past values of the vector as a VAR. The VAR(p) process would thus be,

$$y_t = m + A_1 y_{t-1} + A_2 y_{t-2} + \dots + A_p y_{t-p} + \varepsilon_t \quad (4)$$

The  $A_i$  are  $k \times k$  matrices of coefficients,  $m$  is a  $k \times 1$  vector of constants and  $\varepsilon_t$  is a vector of white noise process, with the properties,

$$E(\varepsilon_t) = 0 \text{ for all } t \quad E(\varepsilon_t, \varepsilon_s') = \begin{cases} (\Omega, & s=t \\ 0, & s \neq t \end{cases} \quad (5)$$

where the  $\Omega$  is the covariance matrix. Thus  $\varepsilon_t$ 's are serially uncorrelated but may be contemporaneously correlated. Let us now explain some of the basic features of VARs by

considering the simple case where  $k=2$  and  $p=1$ . This would give,

$$y_t = \begin{bmatrix} y_{1t} \\ y_{2t} \end{bmatrix} = \begin{bmatrix} m_1 \\ m_2 \end{bmatrix} + \begin{bmatrix} a_{11} & a_{12} \\ a_{21} & a_{22} \end{bmatrix} \begin{bmatrix} y_{1,t-1} \\ y_{2,t-1} \end{bmatrix} + \begin{bmatrix} \varepsilon_{1t} \\ \varepsilon_{2t} \end{bmatrix} \quad (6)$$

Thus, as in all VARs, each variable is expressed as a linear combination of the lagged values of itself and lagged values of all other variables in the system. In such a system of VARs, the behavior of the  $y$ 's will depend on the properties of the  $A$  matrix. For simplicity, we ignore the deterministic time trends and other exogeneous variables in our demonstration.

Let us carry on following Johnston and Dinardo (1997), Greene (2000) and QMS (2004), and try to examine the construction of short run dynamic interactions among the variables used. Consider again a two variable VAR system such as equation (6) but explicitly in this case,

$$y_{1t} = m_1 + a_{11}y_{1,t-1} + a_{12}y_{2,t-1} + \varepsilon_{1t} \quad (7)$$

$$y_{2t} = m_2 + a_{21}y_{1,t-1} + a_{22}y_{2,t-1} + \varepsilon_{2t} \quad (8)$$

A perturbation in  $\varepsilon_{1t}$  has an immediate and one-for-one effect on  $y_{1t}$ , but no effect on  $y_{2t}$ . In period  $t+1$ , that perturbation in  $y_{1t}$  affects  $y_{1,t+1}$  through the first equation and also affects  $y_{2,t+1}$  through the second equation. These effects work through to period  $t+2$ , and so on. Thus a perturbation in one innovation in the VAR sets up a chain reaction over time in all variables in the VAR. Impulse response functions calculate these chain reactions. The path whereby the variables return to the equilibrium is called the impulse response of the VAR (Greene, 2000), if so, also supporting their stationary characteristics.

A shock to the  $i$ -th variable not only directly affects the  $i$ -th variable but is also transmitted to all of the other endogenous variables through the dynamic lag structure of the VAR. An impulse response function traces the effect of a one time shock to one of the innovations on current and future values of the endogenous variables. If the innovations  $\varepsilon_t$  are contemporaneously uncorrelated, interpretation of the impulse response is straightforward. The  $i$ -th innovation  $\varepsilon_{i,t}$  is simply a shock to the  $i$ -th endogenous variable  $y_{i,t}$ . Innovations, however, are usually correlated, and may be viewed as having a common component which cannot be associated with a specific variable. In order to interpret the impulses, it is common to apply a transformation to the innovations so that they become uncorrelated. In our paper, we apply to the generalized impulses as described by Pesaran and Shin (1998) which construct an orthogonal set of innovations that does not depend on the VAR ordering. The generalized impulse responses from an innovation to the  $j$ -th variable are derived by applying a variable specific Cholesky factor computed with the  $j$ -th variable at the top of the Cholesky ordering (QMS, 2004).

Following these methodological issues in our estimation process, we now apply to the pairwise Granger causality/block exogeneity Wald tests below using lag length 11 of sequential modified LR statistics, in which each equation are represented by columns and probs. are in parantheses, and so we test whether an endogenous variable can be treated as exogenous under the null hypothesis. For each equation in the VAR, we consider  $\chi^2$  (Wald) statistics for the joint significance of each of the other lagged endogenous variables in that equation. The statistic in the last row (All) is the  $\chi^2$  statistic for the joint significance of all other lagged endogenous variables in the equation.

Table 2: VAR Pairwise Granger Causality/Block Exogeneity WALD Test



(lag length = 11 and probs. in parantheses)  
 Sample: 1992M01 2006M06  
 Included observations: 162

	REER	EXIM	GETRGDP	INF2	PORTNET	IREAL2
REER	9.37 (0.59)	18.15 (0.08)	20.08 (0.04)	9.70 (0.56)	8.98 (0.62)	
EXIM	10.26 (0.51)	17.72 (0.09)	9.67 (0.56)	9.10 (0.61)	15.34 (0.17)	
GETRGDP	17.93 (0.08)	12.86 (0.30)	6.65 (0.83)	15.27 (0.17)	15.85 (0.15)	
INF2	13.57 (0.26)	15.74 (0.15)	18.63 (0.07)	23.66 (0.01)	20.62 (0.04)	
PORTNET	10.52 (0.48)	16.95 (0.11)	18.65 (0.07)	9.77 (0.55)	21.43 (0.03)	
IREAL2	5.04 (0.93)	22.54 (0.02)	14.99 (0.18)	15.37 (0.17)	11.73 (0.38)	
All	73.07 (0.05)	107.02 (0.00)	102.66 (0.00)	75.94 (0.03)	55.29 (0.46)	109.47 (0.00)

We estimate above that all the variables except capital flows variable have an endogenous characteristic to our dynamic simultaneous equation system specification. We should specify here that following QMS (2004), the statement “x Granger causes y” does not imply that y is the effect or the result of x. Granger causality measures precedence and information content but does not by itself indicate causality in the more common use of the term, but provides some additional information at the extent to which variables precede each other. In Table 2, we find that the main determinant of real effective exchange rate is the course of real income growth rate, and also the latter mutually precedes the former. The representative balance of trade is mainly affected by real interest structure dominated in the economy possibly through dampening effect on domestic expenditures which leads to an improvement in the trade balance. But such a conclusion, of course, requires a more detailed investigation. Besides, there exists no dynamic causality/precedence relationship between the trade balance and the real effective exchange rate in such a way not supporting the validity of any theorem in favor of *so-called* J-curve phenomenon of international economics

theory. The real income growth process is found the most endogenous variable to our unrestricted dynamic VAR framework. Considering %10 probability levels for the statistical significance, both real effective exchange rate, trade balance, domestic inflation, and portfolio flows can provide us with knowledge of the real income growth path. As can be expected for the Turkish economy, the main determinant of domestic inflationary process in our system specification is the real effective exchange rate through possibly giving rise to a relieving effect on the cost pressure settled in the domestic economy, resulted from real appreciations.<sup>5</sup> As for the real interest structure, domestic inflation and portfolio flows are able to give prior information. Especially dealing with the capital flows of our main interest in this paper, we can assume here a relieving effect on the real interest rates through positive innovation on capital flows. Such an effect, if so, can be attributed to the course of nominal interest rates occurred downwards because of the relevant effect on domestic borrowing possibilities resulted from capital inflows, by increasing the price of domestic borrowing assets thus pulling down the nominal interest rates given the price inertia dominated in the economy in the short run. We

will see below that our generalized impulse response results will confirm such a policy conclusion. Representative capital flows variable have a different characteristic than other variables in our system specification in the sense that the variable PORTINV has a weakly exogenous characteristic in our dynamic system specification. Our Granger causality/block exogeneity Wald test results reveal that pull factors expressed in the former section, at least for the present, have no prior information content on the capital flows variable.

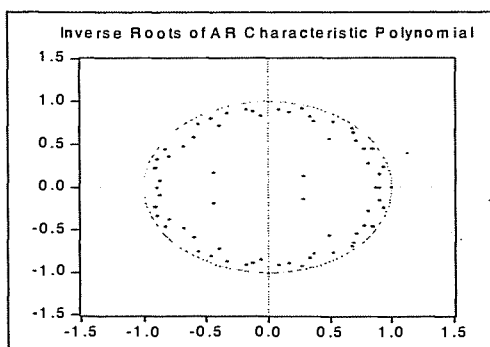
As can be seen in Figure 3 and Table 3 below, we report the inverse roots of the characteristic AR polynomial such that the estimated VAR would be stable (stationary) if all the roots have modulus less than 1 and lie inside the unit circle. If the VAR is not stable, certain results such as impulse response standard errors are not valid (QMS, 2004). The estimated results point out that the VAR stability condition check suggests that the model satisfies the stability condition due to the fact that no characteristic roots lie outside the unit circle enabling us to implement impulse response analysis of the contemporaneous VAR methodology. We should specify that no serial correlation problem of the 1<sup>st</sup> or 12<sup>th</sup> degree of the monthly data has been found in our unrestricted VAR model considering %5 significance level with LM statistics of LM(36)=27.75273 (0.8359) and LM(36)=48.39864 (0.0812) respectively, of which probs. is given in paranthesis under the null of no serial correlation,

Figure 3: Inverse Roots of AR Characteristic Polynomial

Table 3: Roots of Charesterictic Polynomial

Root	Modulus
0.995884	0.995884
0.678303 – 0.687377i0.965703	
0.678303 + 0.687377i0.965703	

We now focus on the generalized impulse response functions dealing with capital flows in our dynamic VAR model. For this purpose, we will consider both effects of innovations to capital flows on other endogenous variables, and effects of shocks to the latter variables on the capital flows employing 1000 Monte Carlo repetitions of plus/minus two standard deviations. Below is given the dynamic impulse response estimation results.<sup>6</sup> In Figure 4, we find that a one standard deviation (st. dev.) positive shock to the capital flows, i.e., capital inflow, would lead to %1.1 appreciation of the real effective exchange rate, and this effect carries on its statistical significance two periods. There exists a negative dynamic relationship between portfolio investments and trade balance. Having statistical significance two periods, a one st. dev. positive shock to the capital flows would deteriorate the trade balance % 2.0



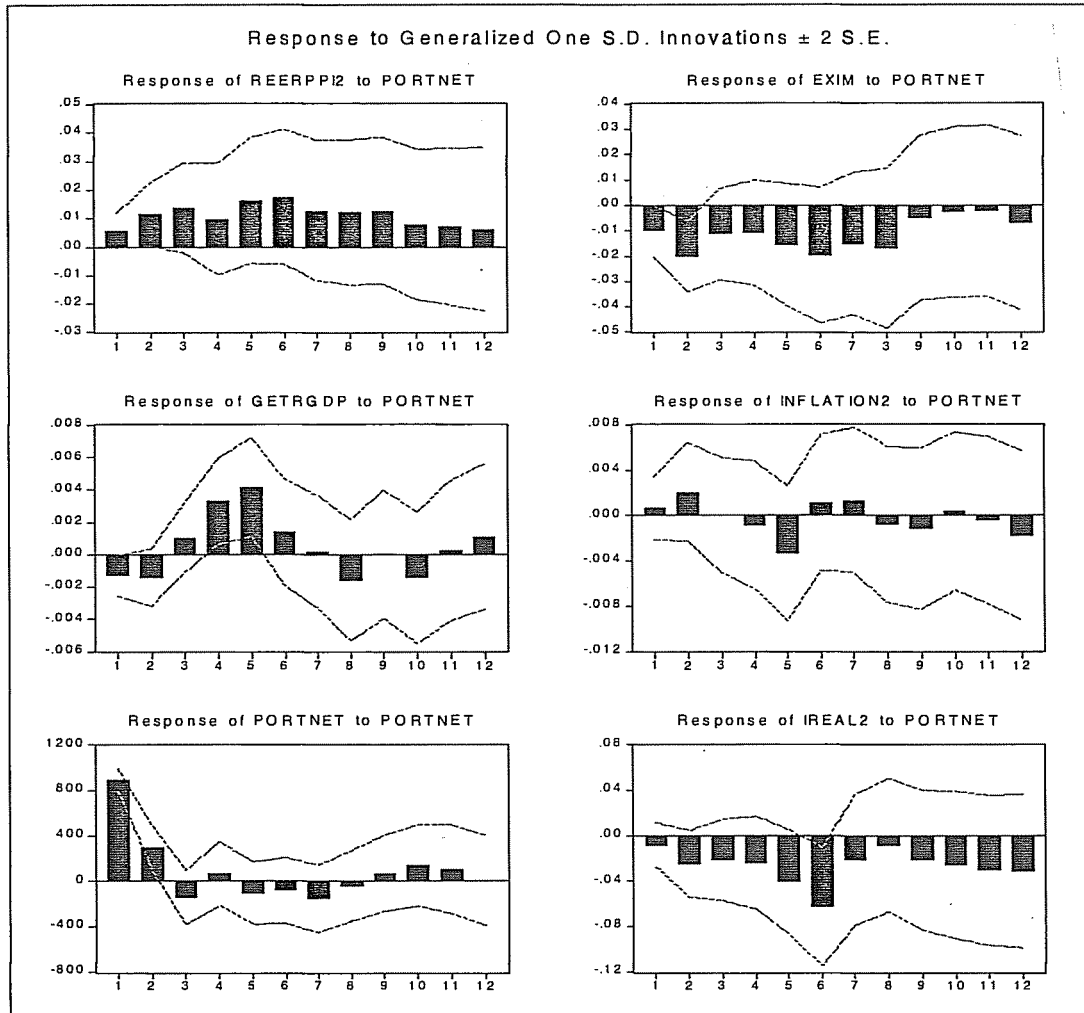


Figure 4: Generalized Impulse Responses of The Innovations On Capital Flows

possibly through appreciating real effective exchange rate in response to the capital inflows.<sup>7</sup> The domestic real income growth process would be affected positively by the shocks on capital flows. Statistically significant for the fourth and fifth periods following the shock, a one st. dev. positive shock on capital flows would increase real income growth approximately %0.3 and %0.4, respectively. Due to the symmetric nature of impulse responses, we can conclude here that the adverse developments in capital flows, i.e., capital outflows, would deteriorate the real income growth process. Effects of capital flows on domestic real interest structure reveal that the larger the capital inflows the lower would be the

real interest structure in a highly strong way. However all the responses are seem to be negative considering a twelve months horizon, shocks to the capital flows would have its significant effects on the real interest structure for the fifth and sixth periods following the shock. Thus for the fifth period, a one st. dev. positive shock on capital flows would decrease the real interest structure %4.1, while this effect occurs with a %6.1 decrease in real interest rates for the sixth period. As expressed above, such an effect can be attributed to the course of nominal interest rates occurred downwards because of the relevant effect on domestic borrowing possibilities pulling down the nominal interest rates, given the price inertia dominated in the economy in the short run. We

can assume here that the adverse developments in capital flows, i.e., capital outflows, would increase the real interest structure. No direct significant effect of capital flows on the domestic inflation rate can be found, but of course such an effect can be occurred indirectly through the changes in real effective exchange rate.<sup>8</sup> Finally, a one-st. dev. positive shock on capital flows itself, would lead to \$895 million additional inflows for the next period.

Thus, we see above that highly significant effects seem to be brought out on the pull factors through capital flows, and this should lead Turkish policy makers to focus on, or at least, to consider how the short term volatile capital flows change when applying to the discretionary policy instruments. If we now examine whether or not the pull factors can affect the capital flows through generalized impulse responses in Figure 5 below,

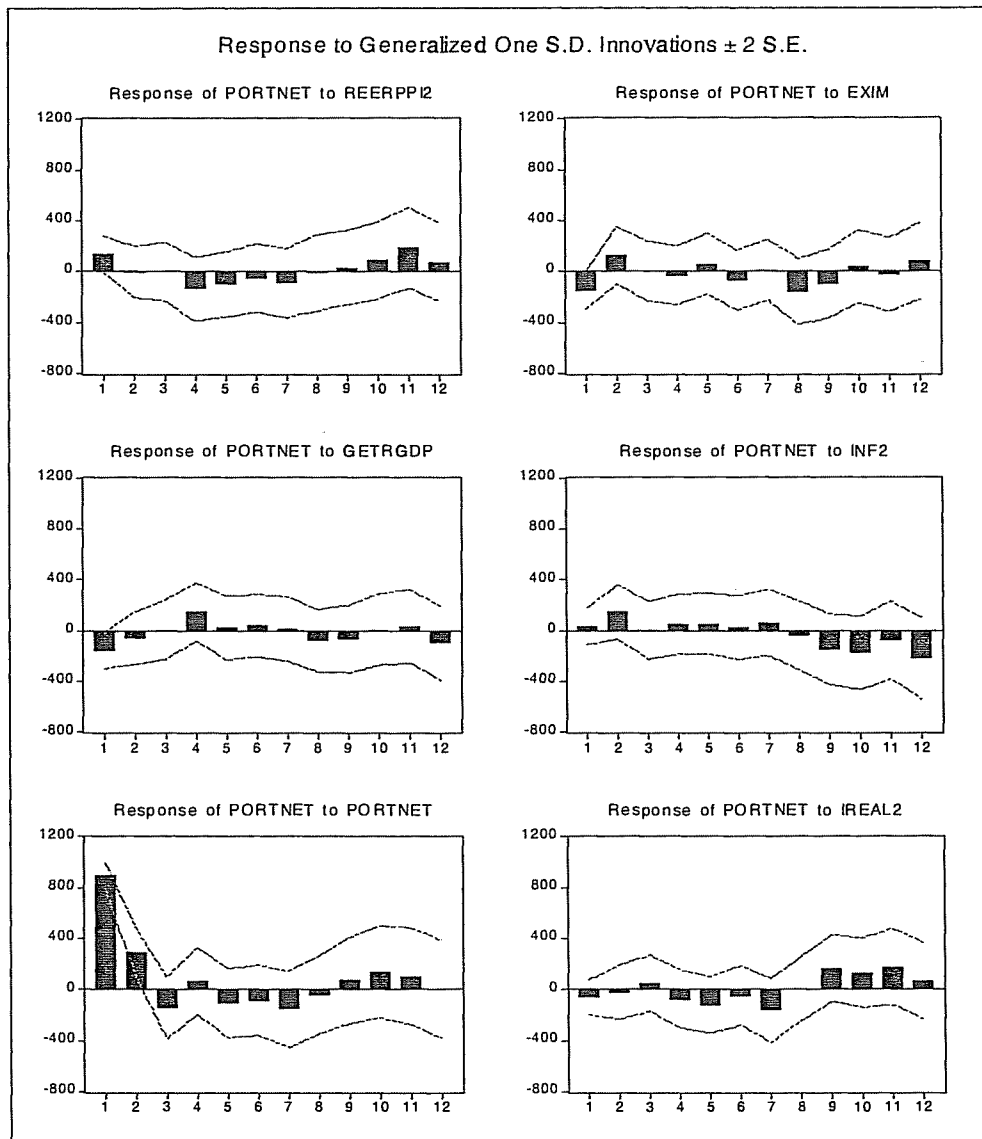


Figure 5: Generalized Impulse Responses of the Innovations on Pull Factors

We estimate that responses of capital flows to shocks on pull factors do not cross or lie outside

the plus/minus two standard error bands supporting the VAR pairwise Granger causality/block exogeneity Wald test results above. Such a finding would indicate that pull factors of our interest in this paper, which are not subject to any *a priori* structural identification in line with economics theory, do not affect the portfolio based capital flows, in other words; the latter have a weakly exogenous characteristic in our unrestricted VAR framework, and this result can lead to the inefficiency of the policies based on the domestic effects of short term capital flows if the capital reversals increase.<sup>9</sup>

All these estimation results, if can also be supported by future researchs, might be indicated the importance of management of expectations by policy makers in the eyes of economic agents so as to perpetuate the positive effects of capital flows on the economy. Otherwise, weakly exogenous characteristics of capital flows can easily increase the volatility content of the domestic real and financial indicators and thus play an important role in contributing to the economic instability as emphasized by Insel and Sungur (2003). In this line, the findings in Çulha (2006) giving the pull factors a dominant role in determining capital flows to Turkey by structural identification between pull and push factors and suggesting that sound fiscal and monetary policies ensuring sustainable budget and current account balances are required for perpetuating the positive effects of capital flows in the Turkish economy, is at least for the present questionable, if expectations management in the eyes of foreign investors are to be failed, no matter how successful are the domestic policies.

#### 4. CONCLUDING REMARKS

Main policy conclusion in our paper is that the capital inflows would increase, and the domestic real income would grow, real effective exchange rate would appreciate, and domestic inflation and real interest rates would decrease,

provided that the expectations of foreign investors tend to be positive, or no policy conclusion in line with our findings can be attained in favor of that when the sound fiscal and monetary policies are to be implemented successfully, the capital inflows would increase.

Complementary papers estimating the direction of the causality or the interaction between pull factors and capital flows should be constructed on structural vector autoregression models (SVARs) identifying shocks on both domestic and external factors as in Çulha (2006), and such future papers will help researchers confirm whether estimation results in this paper, that is, the direction of interaction between domestic macroeconomic aggregates and short-term capital flows is from the latter to the former, are in fact of the stylized facts for the Turkish economy.

#### NOTES

1. Supporting the positive impacts of capital flows on growth performance, Mody and Murshid (2002) report evidence of a strong –almost one-to-one– relationship between long term capital flows and domestic investment in a sample of 60 developing countries using fixed-effect panel regressions over a period from 1977 to 1998. Besides, Kamisky et al. (2004) document that net capital inflows are procyclical, i.e., external borrowing increases in good times and falls in bad times, in most OECD and developing countries, and that periods of capital inflows are associated with expansionary macroeconomic policies and periods of capital outflows with contractionary macroeconomic policies.

2. Chen and Khan (1997) develop a model of capital flows to developing countries based on asymmetric information problems arised from cost of financing aspects of capital flows, and show that the patterns of capital flows are influenced by the combined effects of financial market development, which is captured by the market's

ability to alleviate capital market inefficiencies, and the growth potential in the recipient countries.

3. For the Turkish case, Agénor, McDermott, and Üçer (1997) point out that positive shocks to the uncovered interest rate differential lead to a capital inflow such as Celasun et al. (1999), resulted in appreciation of the real exchange rate. Besides, estimation results in Biçer and Yeldan (2002) also allege that short-term foreign capital inflows have a significant negative correlation with the industrial production index and trade openness, and are positively correlated with real currency appreciation, while there exists a positive relationship between capital inflows and the stock market index.

4. For the case of stationarity we expect that these statistics are larger than the MacKinnon critical values in absolute value and that they have a minus sign. The numbers in parantheses are the lags used for the ADF stationary test and augmented up to a maximum of 12 lags due to using monthly observations, and we add a number of lags sufficient to remove serial correlation in the residuals, while the Newey-West bandwidths are used for the PP test. ‘\*’, ‘\*\*’ and ‘\*\*\*’ indicate the rejection of a unit root for the %1, %5 and %10 levels, respectively.

5. Saatçioğlu and Korap (2006) recently support such a policy conclusion empirically. Likewise, estimation results in Kirmanoğlu and Özçiçek (1999), Berument and Paşaoğulları (2003) and Berument and Dinçer (2004: 20-32) give somewhat supportive estimation results to such a conclusion.

6. For informative purposes, that all the impulse responses considering 12 months horizon die out to zero would indicate the stationary characteristics of the variables used.

7. Although not reported here, a one st. dev. positive innovation on real effective exchange rate leads to a %0.7 deterioration in the trade balance following the shock by one period in a statistically significant way.

8. A one st. dev. positive innovation on real effective exchange rate significantly decreases domestic inflation %1.5 in an accumulative response of first three periods following the shock on real effective exchange rate. These results not reported here are available upon request.

9. Celasun et al (1999) report that while capital inflows do significantly affect the real variables in the economy, they were unable to find significant effects of the dynamics of GDP growth on short term or total capital flows, and also estimate that the most important pull factor of capital flows is the short term interest rate differential rather than growth opportunities in the economy.

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