Exogenous characteristics of short-term capital flows: can they be under control? evidence from Turkey

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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 adlandırılabilecek 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 main domestic macroeconomic indicators called 'pull' factors such as real effective exchange rate, trade balance, 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*

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1. INTRODUCTION

Effects of capital flows in search of high return on real or financial assets have been of a 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 the 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 course of direct investment from abroad as well as to the volatile capital flows accrued 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 contraint 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 the developed and developing 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 the 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).[1] Insel and Sungur (2003) touch

[1] Supporting the positive impacts of capital flows on the growth performance, Mody and Murshid (2002) report evidence of a strong –almost one-to-one– relationship between the long term capital flows and the domestic investment in a sample of 60

on similar subjects for the case of the 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 to contribute the economic instability.

Besides, market failures make sense for policy makers 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 (Guitián, 1998). Following López-Mejia (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.[2]

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 the capital flows, which are diversified between the domestic and external factors, and gives some literature review. Section 3 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. And the final section concludes.

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 the

developing countries using fixed-effect panel regressions over a period from 1977 to 1998. Besides, Kamisky et al. (2004) document that the 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 the periods of capital inflows are associated with expansionary macroeconomic policies and the periods of capital outflows with contractionary macroeconomic policies. See also Karabulut (2002) on this issue.

[2] Chen and Khan (1997) develop a model of capital flows to developing countries based on asymmetric information problems arised from the 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.

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 reasons 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 to that private portfolio flows to a large set of developing countries would rise 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 the pull factors are in general dominant over the push factors in determining the capital flows into Turkey.[3]

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

On the other side, Chuhan et al. (1993) emphasize the importance of both push and pull factors in determining the 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 the 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 the developing countries, and represent significant long-run determinants of the portfolio flows.

Thus no consensus has just been settled by empirical findings in economics literature upon whether the push or pull factors affect the 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 the pull factors can affect capital flows, and in turn, whether the latter can affect the former for the case of the 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 the pull factors for the period of 1992:01-2006:06 of monthly observations. We use a variety of econometric procedures 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 the 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, trade balance, real income growth and the 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.

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

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 the 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 the consumer price index with the base year 1987: 100.

Following Bahmani-Oskooee (1991) and Bahmani-Oskooee (2001), a measure of trade balance (EXIM) is employed 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 definiton 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 the monthly domestic inflation rate (INF2) based on the 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 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 to the low frequency data actually observed. For comparison purposes, we give in Figure 1 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 for empirical purposes in this paper.

Besides, two impulse-dummy variables which take on values of unity from 1994M01 till 1994M12 and from 2001M01 till 2001M012 concerning the financial crises occured in 1994 and 2001 and eleven seasonal dummies are considered as exogeneous variables. The time series representation of the variables used in this paper can be seen in Figure 2 below.

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

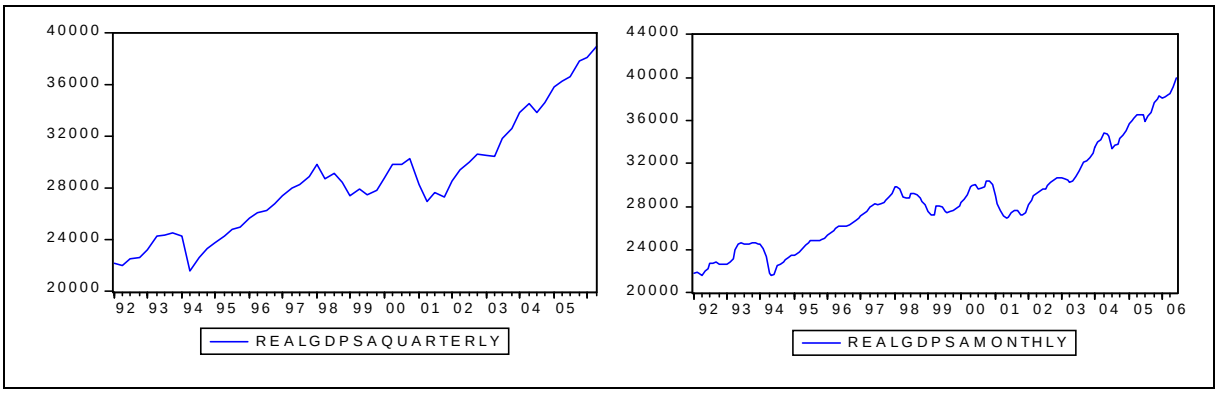
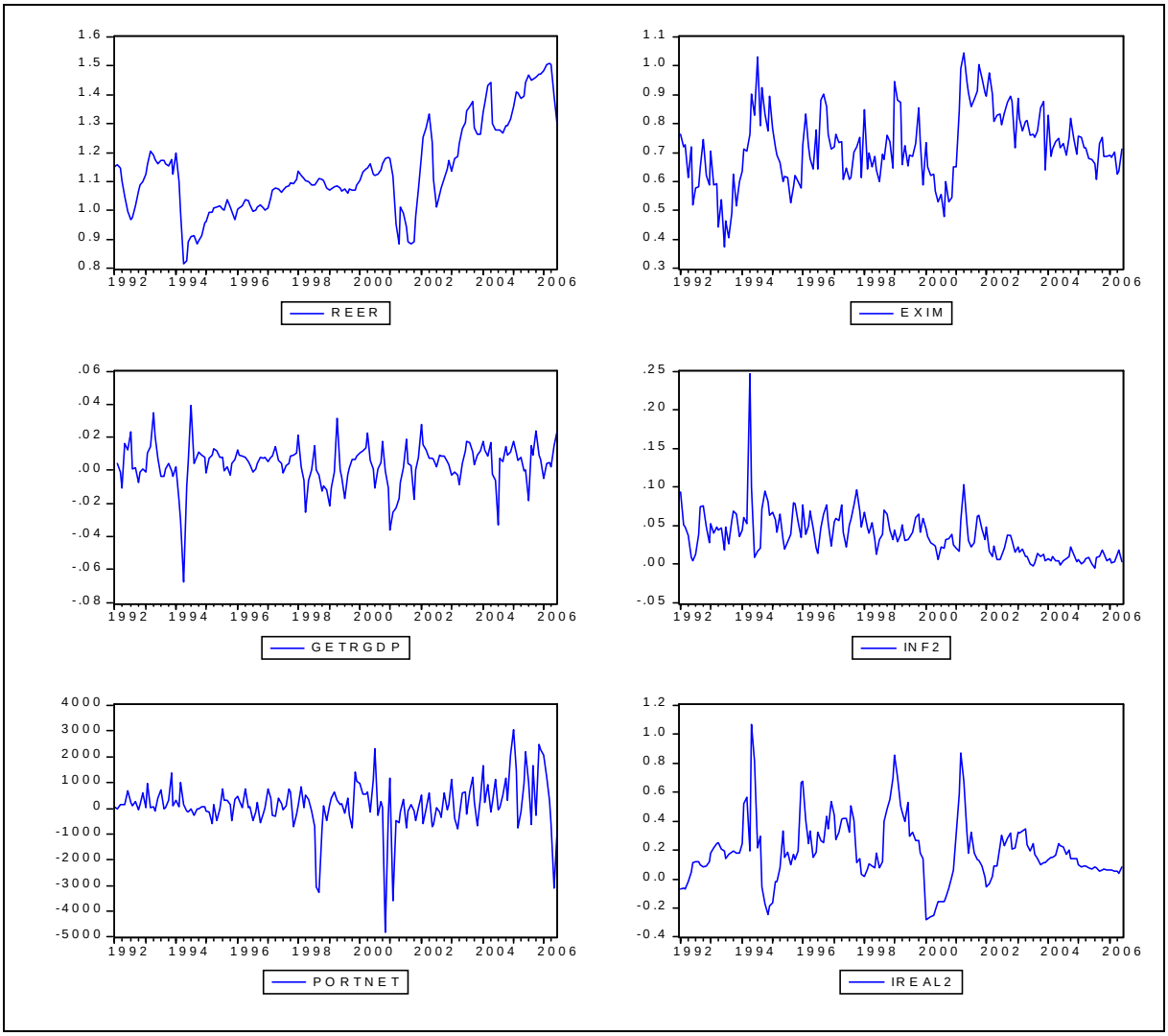


Figure 2: Time Series Used in the Paper



All the variables in Figure 2 seem to be stationary, but some doubts can be arised 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.[4]

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

	ADF test	PP test
	(in levels)	
Variable		
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, the reduction of system to eleven lags is accepted with an

[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.

LR statistic of 19.62952, but the 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 Johnston and Dinardo (1997), Greene (2000) and QMS (2004), and assume first an AR(p) process,

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

We now consider a column vector of k different variables,

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

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

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

The A_i are kxk matrices of coefficients, m is a kx1 vector of constants and ε_t is a vector of white noice 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 Ω is the covariance matrix. Thus ε'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,

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

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 endogenous variables will depend on the properties of the A matrix. For simplicity, we ignore the deterministic time trends and other exogeneous variables in our demonstration.

In the system of Equations in (6), a perturbation in ε_{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, leading to a chain reaction for all the endogenous variables over time in the underlying VAR model. We can attribute these chain reactions to the impulse-response estimates. Briefly to say, 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.

If the innovations ε_t are contemporaneously uncorrelated, this means that the i-th innovation $\varepsilon_{i,t}$ is a shock to the i-th endogenous variable $y_{i,t}$. Innovations, however, are usually correlated, and exert 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 probability values are presented in parantheses, and so we test whether an endogenous variable in the system can be treated as exogenous under the null hypothesis. For each equation in the VAR in Table 2, we consider χ^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 χ^2 statistic for the joint significance of all other lagged endogenous variables in the equation.

We estimate that all the variables except the 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 trade balance

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

is mainly affected by the real interest structure dominated in the economy possibly through the dampening effect on the 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 a way not supporting the validity of any theorem in favor of the *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 the 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.[5] 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 occured 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 has 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 the pull factors expressed in the former section, at least for the present, have no prior information content on the capital flows variable.

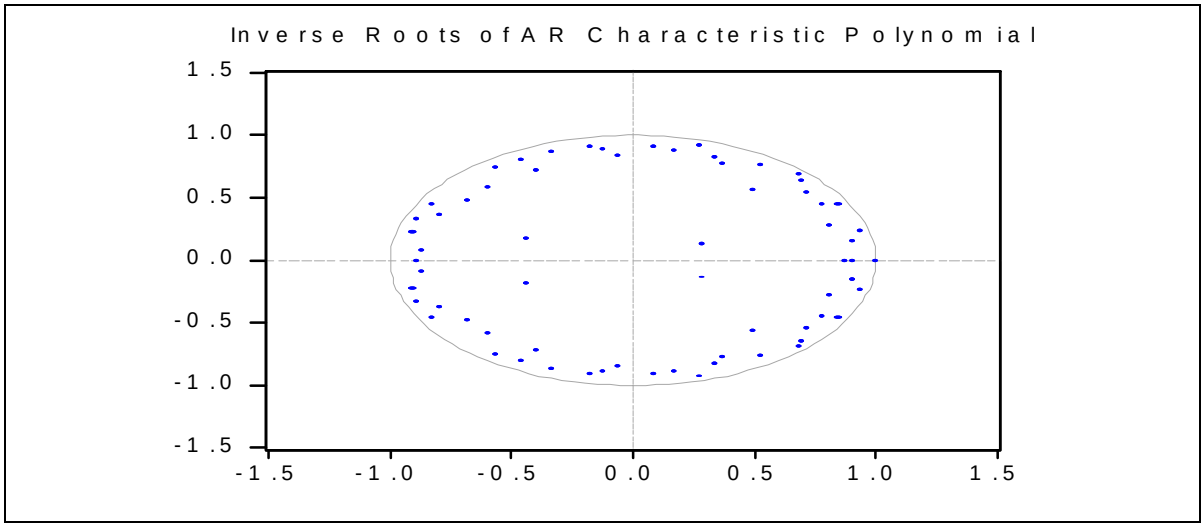
As can be seen in Figure 3 below, we report the inverse roots of the characteristic AR polynomial such that the estimated VAR would be stable (stationary) if all the roots have modulus less than 1 and lie inside the unit circle. If the VAR is not stable, certain results such as impulse response standard 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^{st} or 12^{th} 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.

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 the effects of innovations to capital flows on other endogenous variables, and the 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.[6] In Figure 4, we find that a one standard

[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.

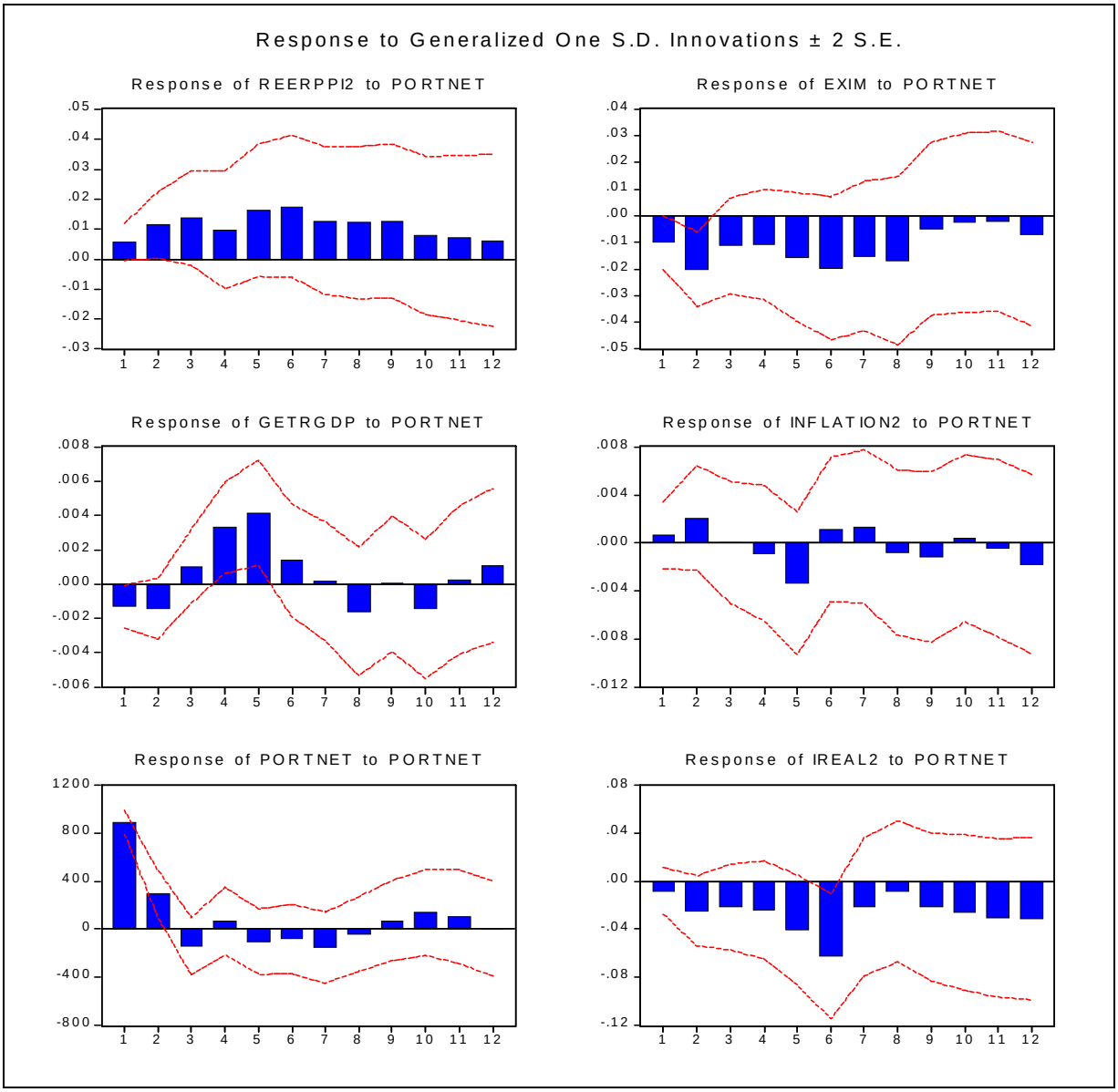
Figure 3: Inverse Roots of AR Characteristic Polynomial



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 the 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% possibly through appreciating real effective exchange rate in response to the capital inflows.[7] 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, the shocks to the capital flows would have 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 the real interest rates for the sixth period. As expressed above, such an effect can be attributed to the course of nominal interest rates occured 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 occured indirectly

[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.

Figure 4: Generalized Impulse Responses of the Innovations on the Capital Flows



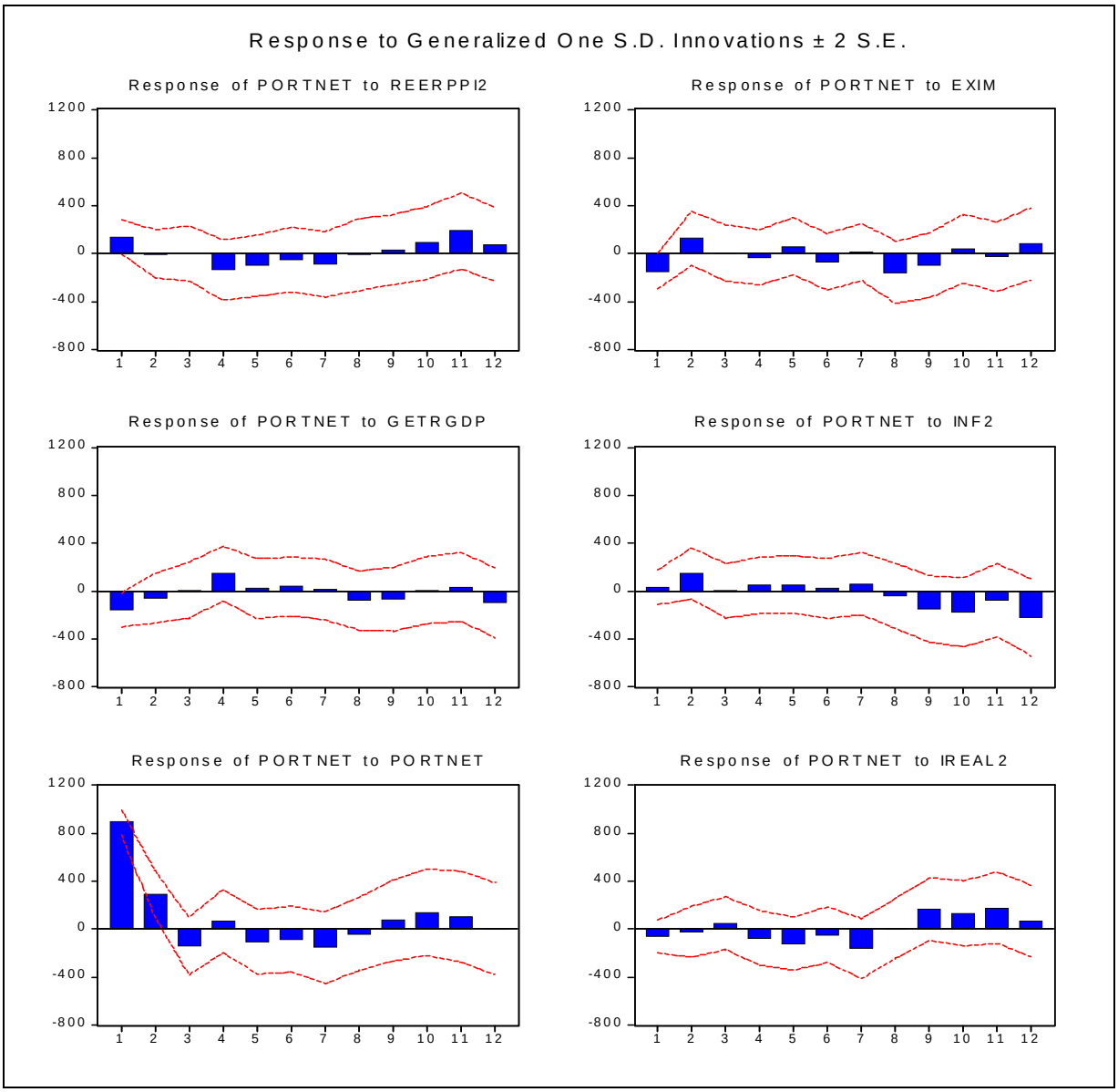
through the changes in real effective exchange rate.[8] Finally, a one st. dev. positive shock on capital flows itself, would lead to $895 million additional inflows for the next period.

Thus, we see above that highly significant effects seem to be brought out on the pull factors through capital flows, and this should lead the 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

[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.

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 the Pull Factors



We estimate that the responses of capital flows to shocks on the pull factors do not cross or lie outside the plus / minus two standard error bands in a way supporting the VAR pairwise Granger causality / block exogeneity Wald test results above. Such a finding would indicate that the 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.[9]

All these estimation results, if can also be supported by future researchs, might be indicated within the investigation period considered 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, the weakly exogenous characteristic of capital flows can easily increase the volatility content of the domestic real and financial indicators and thus play an important role to contribute 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 foreing investors are to be failed, no matter how successful are the domestic policies.

4. CONCLUDING REMARKS

We can state the main policy conclusion in our paper as follows. Provided that the expectations of foreign investors tend to be positive, the capital inflows increase, and the domestic real income grows, real effective exchange rate appreciates, domestic inflation and real interest rates decrease, 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 the 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.

[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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REFERENCES

Agénor, Pierre-Richard, McDermott, C. John and Üçer, E. Murat (1997), "Fiscal Imbalances, Capital Inflows, and the Real Exchange Rate: The Case of Turkey", *IMF Working Paper*, 987/1.

Bahmani-Oskooee, Mohsen (1991), "Is There a Long-Run Relation Between the Trade Balance and the Real Effective Exchange Rate of LDCs?", *Economic Letters*, 36, 403-407.

Bahmani-Oskooee, Mohsen (2001), "Nominal and Real Effective Exchange Rates of Middle Eastern Countries and Their Trade Performance", *Applied Economics*, 33, 103-111.

Berument, Hakan and Paşaoğulları, Mehmet (2003), "Effects of the Real Exchange Rate on Output and Inflation: Evidence from Turkey", *The Developing Economies*, 41/4, 401-435.

Berument, Hakan and Dinçer, Nergiz (2004), "Do Capital Flows Improve Macroeconomic Performance in Emerging Markets? The Turkish Experience", *Emerging Markets Finance and Trade*, 40/4, 20-32.

Biçer, Gül and Yeldan, A. Erinç (2002), "Patterns of Financial Capital Flows and Accumulation in the Post-1990 Turkish Economy", *Canadian Journal of Development Studies*, 24/2, June, 250-265.

Calvo, Guillermo A., Leiderman, Leonardo and Reinhart, Carmen M. (1993), "Capital Flows and Real Exchange Rate Appreciation in Latin America: The Role of External Factors", *IMF Staff Papers*, 40/1, March, 108-151.

Celasun, Oya, Denizer, Cevdet, and He, Dong (1999), "Capital Inflows, Macroeconomic Management, and the Financial System: The Turkish Case, 1989-97", *World Bank Working Paper*, No. 2141.

Chen, Zhaohui and Khan, Mohsin S. (1997), "Patterns of Capital Flows to Emerging Markets: A Theoretical Perspective", *IMF Working Paper*, WP/97/13, January.

Chuhan, Punam, Claessens, Stijn, and Mamingi, Nlandu (1993), "Equity and Bond Flows to Asia and Latin America: The Role of Global and Country Factors", *World Bank Policy Research Working Paper*, WPS 1160, July.

Çulha, Ali (2006), "A Structural VAR Analysis of the Determinants of Capital Flows into Turkey", *CBRT Research and Monetary Policy Department Working Paper*, No. 06/05.

Dasgupta, Dipak and Ratha, Dilip (2000), "What Factors Appear to Drive Private Capital Flows to Developing Countries? And How Does Official Lending Respond?", *World Bank Policy Research Working Paper*, No. 2392.

Fernandez-Arias, Eduardo (1994), "The New Wave of Private Capital Inflows: Push or Pull?", *World Bank Policy Research Working Paper*, June, No. 1312.

Greene, William H. (2000), *Econometric Analysis*, Prentice-Hall , Inc.

Guitián, Manuel (1998), "The Challenge of Managing Global Capital Flows", *IMF Finance and Development,* 35/2.

Hernández, Leonardo, Melladoi Pamela, and Valdés, Rodrigo (2001), "Determinants of Private Capital Flows in the 1970s and 1990s: Is There Evidence of Contagion?", *IMF Working Paper*, 01/64, May.

International Monetary Fund (2006), *World Economic Outlook*, September.

Insel, Aysu and Sungur, Nesrin (2003), "Semaye Akımlarının Temel Makroekonomik Göstergeler Üzerindeki Etkileri: Türkiye Örneği: 1989:III-1999:IV", *Turkish Economic Association Discussion Paper*, 2003/8.

Johnston, Jack and Dinardo, John (1997), *Econometric Methods*, The McGraw-Hill Companies, Inc.

Kaminsky, Graciela L., Reinhart, Carmen M., and Végh, Carlos A. (2004), "When It Rains, It Pours: Procyclical Capital Flows and Policies", in M. Gertler and K. S. Rogoff (eds.), *NBER Macroeconomics Annual*, Cambridge, Mass: MIT Press, 11-53.

Karabulut, Gökhan (2002), *Gelişmekte Olan Ülkelerde Finansal Krizlerin Nedenleri*, Der Yayınları: 328.

Kim, Yoonbai (2000), "Causes of Capital Flows in Developing Countries", *Journal of International Money and Finance*, 19, 235-253.

Kirmanoğlu, Hasan and Özçiçek, Ömer (1999), "The Effect of Short-Term Capital Inflow on the Turkish Economy", *Yapı Kredi Economic Review*, 10/1, 27-34.

López-Mejia, Alejandro (1999), "Large Capital Flows: A Survey of the Causes, Consequences, and Policy Responses", *IMF Working Paper*, WP/99/17, February.

Mishra, Deepak, Mody, Ashoka, and Murshid, Antu Panini (2001), "Private Capital Flows and Growth", *IMF Finance and Development*, 38/2.

Mody, Ashoka and Murshid, Antu Panini (2002), "Growing up with Capital Flows", *IMF Working Paper*, WP/02/75, April.

Montiel, Peter and Reinhart, Carmen M. (2000), "The Dynamics of Capital Movements to Emerging Economies During the 1990s", in S. Griffith-Jones and M. Montes (eds.), *Short-term Capital Movement and Balance of Payments Crises*, Oxford: Oxford University Press, 3-28.

Pesaran, M. Hashem and Shin, Yongcheol (1998), "Impulse Response Analysis in Linear Multivariate Models", *Economics Letters*, 58, 17-29.

QMS (2004), *EViews 5 User's Guide*, April.

Saatçioğlu, Cem and Korap, Levent (2006), "Determinants of Turkish Inflation", *TEA Discussion Paper*, 2006/7.

Sims, Christopher A (1980), "Macroeconomics and Reality", *Econometrica*, 48/1, 1-48.

Taylor, Mark P. and Sarno, Lucio (1997), "Capital Flows to Developing Countries: Long- and Short-Term Determinants", *World Bank Economic Review*, 11/3, 451-470.

Ying, Yung-Hsiang and Kim, Yoonbai (2001), "An Empirical Analysis on Capital Flows: The Case of Korea and Mexico", *Southern Economic Journal*, 67/4, April, 954-968.