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**Money, Deficits, Debts and Inflation in
Emerging Countries: Evidence from
Turkey**

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Abstract:

This paper focuses on internal and external factors, which influence the inflation rate in Turkey. The monetary model of inflation rate which was developed by Kia (2006) was extended and tested on Turkish data. It was found that government debt and deficits along with other factors are important determinants of inflation in Turkey. Furthermore, most sources of inflation in this country are domestic factors.

Keywords: Outstanding debt, deficit, inflation, fiscal and monetary policies, external and internal factors

JEL Codes: E31, E41, E50 and E62

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I. Introduction

The determinants of inflation rate in emerging countries are extremely important for policy makers because when the causes of inflation are correctly specified the appropriate policy change can be easily determined and effectively implemented. As described by Kia (2006a), inflation in a small-open economy can be influenced by both internal and external factors. Internal factors include, among others, government deficits, debt management, monetary policy, institutional economics (shirking, opportunism, economic freedom, risk, etc.) and structural regime changes (revolution, political regime changes, policy constraints, etc.). The impact of government deficits and debt financing on the inflation rate can be thought of through different channels. These channels include the crowding-out effect of deficits, the monetization of the deficit/debt, the wealth effect of deficits/debt financing and institutional economics. External factors include terms of trade and foreign interest rate as well as the attitude of the rest of the world (sanctions, risk generating activities, wars, etc.) toward the country. Emerging countries, for which the economy depends heavily on the import of capital, are subject to higher prices through the supply effect (cost-push inflation) as the price of imported capital goods goes up, see Kia for a full explanation and the relevant literature.

The objective of this paper is to investigate empirically the monetary and fiscal as well as other determinants of inflation rate in Turkey. To the best knowledge of the author, except for Kia's work which is on a non-traditional economy, no such study for emerging or developed countries exists. For example, Dornbush *et al.* (1990) and Drazen and Helpman (1990) find that an uncertainty on the time when the deficits are financed creates fluctuation in the inflation rate. Bahmani-Oskooee (1995) finds the world price has a positive impact over the long run on the consumer price in Iran. Özatay (1997) finds that when the fiscal process is not sustainable, monetary policy cannot be independent and, therefore, because of an unsustainable fiscal policy, price stability in Turkey is very difficult to achieve.

Tekin-Koru and Ozmen (2003) find no support for the linkage between the budget deficit and inflation through the wealth effect in Turkey. Instead, they found that deficit financing leads to a higher growth of interest-bearing broad money, but not currency seigniorage. Arize *et al.* (2004) find inflation in 82 countries responds positively to the volatility of real and nominal exchange rates. Berument and Kilinc (2004) find shocks in the industrial production of Germany, the United States and the rest of the world will affect positively the inflation rate in Turkey. Ashra *et al.* (2004), using a monetary approach to inflation, investigate a causality relationship between deficit, money supply and inflation in India. They found no relationship between the central bank credit to the government and the government deficit, but found that M3 causes the inflation rate.

Boschi and Girardi (2007) attempt to find short-run and long-run determinants of the inflation rate in the Euro Area. They found that both demand and supply-side factors, through mark-up process and output gap, affect inflation. Tawadros (2007) uses a monetarist model of inflation to test the neutrality of money in Egypt, Jordan and Morocco and finds that money affects inflation in these countries and not real income, suggesting that to curb inflation in these countries, the monetarist approach should be followed. Finally, Williams and Adedeji (2007), using a monetary approach to inflation, find that inflation rate in the Dominican Republic is affected by money supply, real income, foreign inflation as well as the exchange rate. However, all of the above-mentioned studies completely ignored the direct impact of deficits, the outstanding debt and the composition of debt on inflation rate.

Furthermore, excluding Kia (2006a), no study in this literature in estimating the cointegration relationship allows the short-run dynamics of the system to be influenced by policy regime changes as well as other exogenous shocks. As evidenced by Kia (2006b), constant models can have time-varying coefficients if a deeper set of constant parameters characterizes the data generation process. Specifically, the existence of constancy may depend on whether raw coefficients or underlying parameters are evaluated. Kia also shows that the estimated long-run relationship can be biased when the appropriate policy regime changes and/or other exogenous shocks are not incorporated in the short-run dynamics of the system. To fill the gap in this literature, Kia's (2006a) modified model is tested on the Turkish data and the estimation results proved the

validity of the model as it is unique in this literature. It should be noted that the model used in this study is completely different than Kia's model. Specifically, our tested model, contrary to Kia's tested model, includes the domestic interest rate as well as the real rather than the nominal exchange rate and imposes the restrictions implied by the theoretical model.

Turkey, which relies mostly on agricultural products, experienced severe inflation, up to 106.6% in 1994, when the outstanding debt was 44% of GDP. The outstanding debt reached 99.87% of GDP in 2001 when the inflation rate was 54.4%. The model used in this study is an augmented version of the monetarist model which, unlike the model used in the existing literature, is designed in such a way to incorporate both external and internal factors, which cause inflation in the country. Furthermore, since the model also incorporates government deficits and debt, we could test Sargent and Wallace's (1986) views that (i) the tighter is the current monetary policy, the higher inflation rate will eventually be, and (ii) that government deficits and debt will eventually be monetized in the long run.

It was found that the model is successful in capturing the impact of fiscal instruments, i.e., deficits, debt and debt management, and of monetary instruments on the inflation rate in Turkey. Furthermore, a policy toward a stronger currency is inflationary and most sources of inflation in Turkey are domestic factors. Finally, Sargent and Wallace's view on a tight monetary policy leading to higher inflation over the long run is valid. As for fiscal variables in Turkey, it was found that a higher government debt per GDP results in a riskier environment and, therefore, in a higher rate of inflation. However, the reverse is true for the externally government debt financing over the long run. Moreover, there is no imported inflation in Turkey over the long run.

The following section deals with the development of the theoretical model. Section III describes the data and the long-run empirical methodology and results. Section IV is devoted to the short-run dynamic models, which is followed by a section on analyzing the impact of unanticipated shocks on the inflation rate. The final section provides some concluding remarks.

II. The Model

Kia (2006a) considers an economy with a single consumer, representing a large number of identical consumers. The consumer maximizes the utility function (1) subject to budget constraint (2), where

$$U(c_t, c_t^*, g_t, k_t m_t, m_t^*) = (1 - \alpha)^{-1} (c_t^{\alpha 1} c_t^{*\alpha 2} g_t^{\alpha 3})^{1-\alpha} + \xi (1 - \eta)^{-1} [(m_t/k_t)^{\eta 1} m_t^{*\eta 2}]^{1-\eta}, \quad (1)$$

$$\tau_t + y_t + (1 + \pi_t)^{-1} m_{t-1} + q_t (1 + \pi_t^*)^{-1} m_{t-1}^* + (1 + \pi_t)^{-1} (1 + R_{t-1}) d_{t-1} + q_t (1 + \pi_t^*)^{-1} (1 + R_{t-1}^*) d_{t-1}^* = c_t + q_t c_t^* + m_t + q_t m_t^* + d_t + q_t d_t^*, \quad (2)$$

where τ_t is the real value of any lump-sum transfers/taxes received/paid by consumers, q_t is the real exchange rate, defined as $E_t p_t^*/p_t$, E_t is the nominal market exchange rate (domestic price of foreign currency), p_t^* and p_t are the foreign and domestic price levels of foreign and domestic goods, respectively, y_t is the current real endowment (income) received by the individual, m_{t-1}^* is the foreign real money holdings at the start of the period, d_t is the one-period real domestically financed government debt which pays R rate of return and d_t^* is the real foreign issued one-period bond which pays a risk-free interest rate R_t^* , where d_t and d_t^* are the only two storable financial assets.

Kia (2006a) assumes variable k_t , which summarizes risk associated to holding domestic money, has the following long-run relationship:

$$\log(k_t) = k_0 \text{defgdp}_t + k_1 \text{debtgdp}_t + k_2 \text{fdgdp}_t. \quad (3)$$

Variables defgdp , debtgdp and fdgdp are real government deficits per GDP, the government debt outstanding per GDP and the government foreign-financed debt per GDP, respectively, where it is assumed government debt pays the same interest rate as deposits at the bank (i.e., R).

Equation (3) is also assumed to be held subject to a short-run dynamic system, which is a function of a set of predetermined short-run (stationary) variables known to individuals. These variables include the growth of money supply, changes in fiscal variables per GDP, the growth in exchange rate, domestic and foreign inflation as well as changes in interest rates. Furthermore, it is assumed that the short-run dynamics of the risk variable $[\log(k)]$ includes a set of interventional dummies which account for wars, sanctions, political changes, innovations as well as policy regime changes which influence services of money. Maximizing the utility function (1) subject to equations (2)

and (3) and imposing some stability conditions Kia (2006a) finds the following demand for money relationship:

$$\begin{aligned} \log(m_t) = & m_0 + m_1 i_t + m_2 \log(y_t) + m_3 \log(g_t) + m_4 \log(k_t) + m_5 \log(q_t) \\ & + m_6 i_t^* \end{aligned} \quad (4)$$

where, $i_t^* = \log(R_t^*/1 + R_t^*)$, $i_t = \log(R_t/1 + R_t)$ and, $m_0 > 0$, $m_1 < 0$, $m_2 > 0$, $m_3 < 0$, $m_4 < 0$, $m_5 = ?$, $m_6 < 0$. From the equilibrium condition in the money market Kia (2006a) finds the following price relationship:

$$\begin{aligned} \log p_t = & \beta_0 + (\beta_1=1) \log M_s_t + \beta_2 i_t + \beta_3 \log y_t + \beta_4 \log q_t + \beta_5 i_t^* + \beta_6 \log g_t + \beta_7 \log fgdpt \\ & + \beta_8 \log debtgdp_t + \beta_9 \log fdgdp_t + \beta_{10} \text{trend} + u_t \end{aligned} \quad (5)$$

where an \log before a variable means the logarithm of that variable and u is a disturbance term assumed to be white noise with zero mean. β s are the parameters to be estimated, where $\beta_1 = 1$, $\beta_2 > 0$, $\beta_3 < 0$, $\beta_4 = ?$, $\beta_5 > 0$, $\beta_6 > 0$, $\beta_7 > 0$, $\beta_8 > 0$, $\beta_9 > 0$ and $\beta_{10} > 0$. However, Kia modified Equation (5) by assuming i_t is zero so as to be able to estimate the equation on Iranian data. Furthermore, Kia solved for real exchange rate and, therefore, his tested model is a function of the nominal exchange rate as well as the foreign price rather than the real exchange rate.

Consequently, he needed to impose two important restrictions on the coefficients of his model: (i) making the coefficient of nominal exchange rate and the level of foreign price equal and (ii) the summation of the coefficient of money supply and nominal exchange rate (or foreign price) equal to one. Since these two restrictions make an estimate of the long-run price level unrealistic, he estimated the long-run model without any restriction. However, in our model we only need to impose $\beta_1=1$. Furthermore, foreign price in terms of the domestic price (real exchange rate) is a more appropriate determinant of the price level over the long run than its absolute value. Therefore, Equation (5) is a more valid equation for a country like Turkey, where the economy has been operating under a traditional economic system. The next section of this paper is devoted to such an estimation.

As Kia (2006a, p. 886) mentions, according to the model, “a higher money supply and a higher interest rate (tight monetary policy) increase the price level over the long run. This confirms the theoretical model of Sargent and Wallace’s (1986, p. 160) view that ‘[...] given the time path of fiscal policy and given that government interest-bearing

debt can be sold only at a real interest rate exceeding the growth rate n , the tighter is current monetary policy, the higher must the inflation rate be eventually.' A higher real income results in a higher real demand for money and a lower price level. We cannot determine theoretically the impact of the exchange rate and the foreign price level on the domestic price level. According to our model, the impact of deficit, government spending, outstanding government debt and debt financed externally, for a given output level, on the price level is positive. Consequently, these fiscal variables, according to our theoretical model, are inflationary. Note that since real government expenditure is considered a "good" - in fact, a public good - its level influences the price, while deficits and debt are measures for future taxes and inflation, and so their proportions to GDP may influence the price level." However, Kia (2006a), using Iranian data, did not estimate Equation (5), but a modified version of this equation where β_2 is zero, a model for price which is a valid model for Iranian data. In the next section, I estimate the model on Turkish data, which is generated by traditional economics.

III. Data, Long-Run Empirical Methodology and Results

(A) Data

The model is tested for Turkey (1970Q1-2003Q3). All observations are quarterly and the sample period is chosen according to the availability of the data. The sources of the data, unless specified, are the *International Financial Statistics* (IFS) online. Some missing data were taken from the *World Development Indicator* (WDI) and some from the State Institute of Statistics of Turkey (SIS) or *IMF – Economic and Financial Data for Turkey*. When some observations within a series were missing they were interpolated. Data series on GDP, government deficits and expenditures as well as debt financed externally and outstanding government debt are only available yearly. Quarterly observations were, consequently, interpolated using the statistical process developed by RATS. This procedure keeps the final value fixed within each full period.

Information on institutional and policy changes in Turkey were taken from *The Middle East and North Africa* (2004). $\ln p$ is the logarithm of Consumer Price Index (CPI), $\ln M_1$ is the logarithm of nominal M1, i is the logarithm of $(R/1+R)$, where R is the discount rate at the annual rate, in decimal points. Note that the only reason, as a measure for the domestic interest rate, the discount rate was chosen is because of its data

availability in the sample period. Quarterly data on other more relevant interest rates is only available for a very short part of the sample period. For instance, Treasury Bills rates are available only from 1985Q4.

Variable y is the real GDP, which is the nominal GDP divided by CPI. Variable g is the real (nominal deflated by CPI) government expenditures on goods and services, $q = E p^* / p$ is the real exchange rate, where E is the nominal market exchange rate, which is equal to the domestic currency in terms of \$US. Variable p^* is the foreign price level where, following Kia (2006a) among others, the industrial countries unit value export price index was used as a measure for p^* . Foreign rate i^* is the logarithm of $(R^*/1+R^*)$, where, following Kia (2006a), R^* is the LIBOR (3-month London interbank) rate at the annual rate, in decimal points. Variables $defgdp$, $debtgdp$ and $fdgdp$ are deficits, outstanding debt and foreign debt per GDP, respectively.

(B) Stationarity Tests

To investigate the stationarity property of the variables I used Augmented Dickey-Fuller (ADF) and non-parametric Phillips-Perron's (PP) tests. Furthermore, to allow for a possibility of break in intercept and slope I also used Perron's (1997) as well as Zivot and Andrews' (1992) unit root tests. Moreover, the LM unit root test developed by Schmidt and Phillips (1992), (SP hereafter), was used. This test, in contrast to the Dickey-Fuller test, allows for trend under both the null and the alternative, without introducing any parameters that are irrelevant under either.

I found the exchange rate, the deficits per GDP, the debt per GDP and the foreign-financed debt per GDP are homogeneous of degree one according to all tests. Money supply and the discount rate are homogeneous of degree one according to all test results except Zivot and Andrews' (1992) test result which indicates these variables are homogeneous of degree zero and Perron's (1997) test result which indicates these variables are homogeneous of degree two. However, a graphical demonstration clearly confirms the ADF, PP and SP test results. I, consequently, assume these variables have a unit root. Real GDP is homogeneous of degree one according to all tests except Perron's (1997) test result which indicates the variable has two unit roots. However, again a graphical demonstration clearly confirms the results of all other tests.

LIBOR offer rate and the index of industrial countries exports unit values are homogeneous of degree one according to all tests except Zivot and Andrews' (1992) test result which indicates these variables have a two-unit root. However, again a graphical demonstration clearly confirms the results of all other tests. The Consumer Price Index was found to be homogeneous of degree one according to ADF, PP and SP tests results. However, according to both Perron's (1997) (the break point is at 1980Q1 and 1995Q1 for the level and first differences of this variable, respectively), and Zivot and Andrews' (1992) (the break point is at 1992Q4 and 1998Q1 for the level and first differences of this variable, respectively) test results, this variable is homogeneous of degree two. A graphical demonstration of this series does not clarify which result should be considered accurate.¹ To follow the model, I accept the result of the first three tests and assume the price equation is homogeneous of degree one. Finally, the government expenditure on goods and services was found to be stationary based on all test results. For the sake of brevity, these results are not reported, but are available upon request.

(C) Long-Run Methodology

Following Kia (2006a) we analyze a p -dimensional vector autoregressive model with Gaussian errors of the form

$$X_t = A_1 X_{t-1} + \dots + A_k X_{t-k} + \mu + \phi DUM_t + u_t, u_t \sim \text{iid}(0, \Sigma), \quad (6)$$

where $X_t = [lp_t, lms_t, i_t, ly_t, lq_t, lg_t, defgdp_t, debtgdp_t, fdgdp_t]$, μ is $p \times 1$ constant vector representing a linear trend in the system. The p -dimensional Gaussian X_t is modeled conditionally on long-run exogenous variable i^*_t and the short-run set of $DUM_t = (Q1_t, \dots, Q4_t)$, intervention dummies and other regressors that we can consider fixed and non-stochastic), where Q 's are centered quarterly seasonal dummy variables. Parameters A_1, \dots, A_k , ϕ , and Σ are assumed to vary without restriction. The error correction form of the model is

$$\Delta X_t = \Gamma_1 \Delta X_{t-1} + \dots + \Gamma_{k-1} \Delta X_{t-k+1} + \Pi X_{t-k} + \mu + \phi DUM_t + u_t, \quad (7)$$

where Δ is the first difference notation, the first k data points X_{t-1}, \dots, X_0 are considered fixed and the likelihood function is calculated for given values of these data points.

¹ It should be noted that I could not find any policy regime change or other exogenous shock which could explain these breaks in the price level.

Parameters $\Gamma_1, \dots, \Gamma_{k-1}$ and Π are also assumed to vary without restriction. However, the hypotheses of interest are formulated as restriction on Π .

Note that the set of dummy variables that constitutes the set of DUM affects only the short-run dynamics of the system. They account for institutional and policy regime changes, which could affect the inflation rate, the real exchange rate and other variables in Turkey. For these dummy variables I consider five major policy regime changes that have characterized Turkey (see *The Middle East and North Africa*, 2004):

- (i) In 1984Q4 the government introduced a value-added tax to replace the previous unwieldy system of production taxes.
- (ii) Two U.S. credit rating agencies downgraded Turkey's credit rating, which resulted in a run of foreign currencies. The value of the lira was officially devalued by 12% against the US dollar; however, the currency continued to plummet. Interest rates rose to 150% - 200% as the government and the Central Bank desperately tried to bring the financial markets under control. In April 1994, the government announced a program of austerity measures to reduce the budget deficit, lower inflation and restore domestic and international confidence in the economy. The program included a freezing of wages, price increases of up to 100% on state monopoly goods, as well as longer-term restructuring measures such as the closure of loss-making state enterprises and an accelerated privatization process.
- (iii) In July 1995, the new government approved a raise in the minimum wage and salary increases of 50% for state workers and pensioners. The government stated that the main aspects of its economic program were: a commitment to a free-market economy, lower inflation and a steady growth rate, lower taxation for producers, greater efforts to attract foreign investment, an acceleration in the privatization program and an emphasis on investment in infrastructure projects.
- (iv) In January 2000, as part of the anti-inflation program, a new exchange rate substitution policy took effect under which the managed peg used since 1994 was abandoned in favor of a peg set according to a pre-determined devaluation rate (20% in 2000), itself set against a basket of the US dollar and the euro.
- (v) In February 2001, following a public clash between the President and the Prime Minister, the financial system went into near-meltdown in Turkey's worst

economic crisis in recent years. A massive flight of capital forced the government to float the lira and accept an immediate devaluation of the currency. Consequential consumer price increases sparked widespread protest demonstrations, amidst rumors that another military takeover was imminent. The interest rate rose to the equivalent of 4,000% annually. On February 22, 2001, the government ended the crawling peg with the US dollar and allowed the lira to float freely, with the result that its value fell by 36% over two days. Accordingly, I use the following dummy variables to represent these potential policy regime shifts and exogenous shocks: $v_{tax} = 1$ from 1984Q4 and $= 0$, otherwise, $f_{crisis} = 1$ for 1994Q2 and $= 0$, otherwise, $p_{wd} = 1$ for 1995Q2-1995Q3 and $= 0$, otherwise, $MEX = 1$ for 1994Q4-1999Q4 and $= 0$, otherwise, $PEX = 1$ for 2000Q1-2000Q4 and $= 0$, otherwise, $flex = 1$ since 2001Q1 and $= 0$, otherwise.

In determining the lag length one should verify if the lag length is sufficient to get white noise residuals. As it was recommended by Hansen and Juselius (1995, p. 26), set $p=r$ (the unrestricted model) in Equation (6) and test for autocorrelation. In this case the residuals are the OLS-estimates from Model (6). LM tests will be employed to confirm the choice of lag length. The order of cointegration (r) will be determined by using the Trace test developed in Johansen and Juselius (1991). Following Cheung and Lai (1993), the Trace test will be adjusted in order to correct a potential bias possibly generated by a small sample error. Table 1 reports the result of the Trace test as well as the long-run relationships in space.

According to diagnostic tests reported in the table, the lag length 5 was sufficient to ensure that errors are not autocorrelated. According to normality test results, the error is not normally distributed. However, as it was mentioned by Johansen (1995), a departure from normality is not very serious in cointegration tests. Since we allow the short-run dynamics of the system to be affected by the dummy variables included in vector DUM we need to simulate the critical values as well as their associated p -values for the rank test. CATS in RATS computer package [Version 2, see Dennis (2006)] was used to simulate the critical values. The number of replications is 2500 and the length of random walks is 400.

According to the Trace test result reported in Table 1 we can reject $r=0$ at 5% level, while we cannot reject $r \leq 1$, implying that $r=1$. Figure 1 plots the calculated values

of the recursive test statistics for the long-run relationship. Note that these statistics are recursive likelihood-ratios normalized by the 5% critical value. Thus, calculated statistics that exceed unity imply the rejection of the null hypothesis and suggest unstable cointegrating vectors. The broken line curve (BETA_Z) plots the actual disequilibrium as a function of all short-run dynamics including seasonal dummy variables, while the solid line curve (BETA_R) plots the “clean” disequilibrium that corrects for short-run effects. We hold up the first fifteen years for the initial estimation. As the figure shows, the relationship appears stable over the long run when the models are corrected for short-run effects.

Figure 1 about here

For the sake of robustness, the dynamic OLS (DOLS) test of Stock and Watson (1993) was also used to estimate the above long-run equation. For the sake of brevity, the bottom panel of Table 1 reports only the estimated result for the price equation. See the footnote of the table indicated by *** for the formula. The DOLS Wald test result, reported in the table, also indicates the existence of a long-run cointegrated relationship in the space. Comparing the estimated result with the long-run estimated relationship, using MLS procedure we can see that the estimated coefficients of the real income and foreign interest rate are now statistically significant, but with a different sign. Moreover, the estimated coefficient of the real government expenditure is now statistically insignificant, but again has a different sign. All other coefficients have the same sign, but the coefficient of the real exchange rate is statistically insignificant under DOLS while the estimated coefficient of deficit per GDP is statistically significant under DOLS estimation method.

The estimated coefficients of other variables in DOLS, which only affect the short-run dynamics of the system, for the sake of brevity, are not reported, but are available upon request. The differences between these two long-run estimated results, as mentioned in Kia (2006a), are due to the fact that the DOLS result is less efficient and less reliable than the estimated result of the MLS procedure. Having established that a long-run and stable relationship exists, we will analyze these long-run equations.

It is also interesting to investigate which parameter in the conditional and marginal distributions is variation free. In other words which variable in the system is

weakly exogenous for the long-run parameters. If a variable in Equation (5) is weakly exogenous for β , then the loading parameters associated with the variable will be zero. This implies that the first differences of the variable do not contain information about the long-run parameters in β . If, for example, the loading parameter (α) associated with x_t , a variable in Equation (6), is zero, then Δx_t is weakly exogenous for α and β in the sense that the conditional distribution of ΔX_t given Δx_t as well as the lagged values of X_t contains the parameters α and β , whereas the distribution of Δx_t given the lagged X_t does not contain the parameters α and β . This also implies that the parameters in the conditional and marginal distributions are variation free (Johansen and Juselius (1991)). Namely, these parameters are constant over time when there is no intervention. The last row of the bottom panel of Table 1 also reports the test for the weak exogeneity of the variables. According to the result, variables lp , lms , lg , $defgdp$ and $debtgdp$ are weakly exogenous for β in Equation (5). This implies that the marginal model of these variables does not react to equilibrium errors.

(D) Long-Run Relationship

(i) *Monetary policy*: According to our theoretical model [Equation (5)], we would expect interest rate to have a positive influence on the price level. Based on our estimation result, the interest rate has a positive and a statistically significant impact on the price level. This means that a tight monetary policy when debt and deficits exist leads to a higher inflation over the long run in Turkey, i.e., Sargent and Wallace's (1986) view that "[...] the tighter is current monetary policy, the higher must the inflation rate be eventually" cannot be rejected at least for Turkey. This result confirms Baydur and Süslü's (2004) finding. However, their analysis is mostly a short-term study, while our finding is a long-run conclusion.

Considering the exchange rate as a monetary instrument, a depreciation of the domestic currency (appreciation of exchange rate) in Turkey leads to a fall in the price level, as the coefficient of the real exchange rate indicates in the price equation. Note that a higher E in variable q means a depreciation of domestic currency. So far, we found the domestic monetary policy, including the exchange rate policy, could be a major tool to fight inflation over the long run in Turkey. For example, an easy monetary policy which

results in a lower interest rate leads to a lower inflation rate over the long run when debt and deficit exist; Sargent and Wallace's (1986) view is again satisfied in Turkey. Furthermore, a depreciation of the domestic currency leads to a higher demand for money (a lower demand for goods and services) resulting in a downward pressure of the price level over the long run.

(ii) *Fiscal policy*: The long-run estimated coefficient of the log of real government expenditures is negative and statistically significant. This result implies that over the long-run a higher government expenditure results in a higher demand for money and, therefore, has a depressing impact on the price level. To the best knowledge of the author, no study has dealt with the impact of the government expenditures on the price level for Turkey and so comparison is not possible. However, Kia (2006a) finds a higher government expenditure in Iran leads to a higher price level over the long run, as the model predicts.

The long-run estimated coefficient of deficits per GDP is positive, but is statistically insignificant. This result confirms our theoretical model. The result is consistent with the finding of Tekin-Koru and Ozmen (2003). The estimated coefficient of the government debt per GDP is positive and statistically significant, confirming the theoretical model. This implies that a higher government debt in Turkey is associated with a riskier environment and higher inflation. The estimated coefficient of the externally financed government debt per GDP is negative and statistically significant. This result implies that a rise in a foreign financing of debt reduces the risk in holding domestic money and so leads to lower inflation. However, as we will see later in this paper the situation is different over the short run.

(iii) *External factors*: The foreign interest rate has a positive, but statistically insignificant impact on the price. The estimated long-run coefficient of the real exchange rate is negative and statistically significant. Noting that we could not determine theoretically the sign of the real exchange rate in the price equation, the negative impact of the real exchange rate on price, for a given nominal exchange rate, means a negative impact of the foreign price on the domestic inflation rate. This means contrary to the case of Iran [see Bahmani-Oskooee (1995) and Kia (2006a)] and the Dominican Republic [see Williams and Adedeji (2007)] there is no imported inflation over the long-run in Turkey.

Finally, the estimated coefficient of the real GDP, contrary to the model and Neyapti's (2004) finding, is positive, but statistically insignificant.

IV. Short-Run Dynamic Models of Inflation Rate

Having established in the previous section that a long-run and stable relationship exists, we need to specify the ECM (error correction model) that is implied by our cointegrating vector. Following Granger (1986), we should note that if small equilibrium errors can be ignored, while reacting substantially to large ones, the error correcting equation is non linear. All possible kinds of non linear specifications, i.e., squared, cubed and fourth powered of the equilibrium errors (with statistically significant coefficients) as well as the products of those significant equilibrium errors were included.

In estimating ECMs, several concerns are important. First, the error-correction term is a generated variable and its t -statistic should be interpreted with caution [Pagan (1984)]. To cope with this problem, I implemented, following Pagan (1984), the instrumental variable estimation technique, where the instruments were first and second lagged values of the error term. Second, to avoid biased results, I allowed for a lag profile of four quarters. Third, having too many coefficients can also lead to inefficient estimates. To guard against this problem and ensure parsimonious estimations, I selected the final ECMs on the basis of Hendry's General-to-Specific approach. Since there are eight endogenous variables in the system we may have eight error-correction models. However, for the sake of brevity, I only report the parsimonious reduced form and the structural form of ECM for the inflation rate. Other results are available upon request. The full interpretation of the estimation results of all these models will be done by using the impulse response functions of the estimated ECMs.

Some of these variables were found to have only a marginal model instead of ECM. Specifically, the error-correction term was found to be statistically insignificant in the model for the deficit per GDP (defgdp), the outstanding debt per GDP (debtgdp) and the foreign-financed debt per GDP (fdgdp). In fact, the deficit and the foreign-financed debt per GDP were found to be strongly exogenous. It should be mentioned that for any cointegrating relationship there should be at least one ECM and in the above model we have five ECMs. Tables 2 and 3 assemble the parsimonious results from the estimating structural and reduced forms of ECM. Other models are available upon request. The

structural equation is estimated by the two-stage least squares method by allowing the fitted value of each contemporaneous variable from a parsimonious marginal model [for the definition of marginal model, see Engle, Hendry and Richard (1983), Engle and Hendry (1993) and Kia (2003a and 2003b)] based on four lag values of all variables in the system to serve as its own instruments. To construct overidentified equations, following Johansen and Juselius (1994), I first estimated the correlation coefficients between endogenous variables. Then by imposing a zero restriction on the coefficient of variables in any equation with a correlation coefficient of less than 0.20, in the absolute value term, with the dependent variable, the overidentified structural equations were constructed. The estimated coefficients of the structural equations may not be asymptotically efficient and other estimation methods, e.g., three-stage least squares or full information maximum likelihood estimators are more appropriate, but because of the lack of enough observations I was unable to use these estimators.

In these tables, White is White's (1980) general test for heteroskedasticity, ARCH is five-order Engle's (1982) test, Godfrey is five-order Godfrey's (1978) test, REST is Ramsey's (1969) misspecification test, Normality is Jarque-Bera's (1987) normality statistic, L_i is Hansen's (1992) stability test for the null hypothesis that the estimated i th coefficient or variance of the error term is constant and L_c is Hansen's (1992) stability test for the null hypothesis that the estimated coefficients as well as the error variance are jointly constant. None of these diagnostic checks is significant. According to Hansen's stability test result, all of the coefficients, individually or jointly, are stable. Both level and interactive combinations of the dummy variables included in the set DUM were tried for the impact of these potential shift events in the models. As it was mentioned in the previous section, DUM also appeared in the short-run dynamics of the system in our cointegration regression.

Tables 2 and 3 about here

According to our estimation results reported in tables 2 and 3, the error-correction term is significant and non-linear, implying that individuals in Turkey may ignore a small deviation from equilibrium, but react drastically to a large deviation. According to the result in Table 2, the growth of the real GDP has an instantaneous impact on the inflation rate. The estimated coefficient of the growth of the real GDP is negative as the theoretical

model predicts, but after a quarter, as the estimated coefficient of the lag value indicates, is positive implying that after a quarter a higher income leads to a higher demand for goods and services and causes a higher inflation rate. The latter result can also be seen from the reduced form of the ECM reported in Table 3. As the estimated coefficient of lagged values of the growth of the real government expenditure (Table 3) indicates, the growth of the real government expenditures leads to a higher inflation rate in the country up to two quarters. This positive relationship confirms the theoretical model [Equation (5)].

The estimated coefficient of the change in interest rate is negative after three quarters (tables 2 and 3), but over the long run, as we saw (Table 1), a higher interest rate is associated with a higher price level. Namely, a higher interest rate (a tight monetary policy) reduces the inflation rate after three quarters, but will cause it to go up over the long run (Table 1). This result confirms Sargent and Wallace's (1986) view that the tighter is the current monetary policy, the higher must the inflation rate be eventually. Specifically, the view is accepted for Turkey. This result confirms Baydur and Süslü's (2004) finding.

According to the estimated coefficient of the growth of the government expenditure, an increase in the size of the government results in a higher inflation rate in Turkey. As for policy regime or institutional change, according to the estimated coefficient of the dummy variable *fcrisis*, the financial crisis of 1994 had a positive shock on the inflation rate in Turkey while the anti-inflation program of January 2000 which resulted in banning managed peg exchange rate and allowing the lira to float freely on February 22, 2001 resulted in a lower inflation rate in Turkey, see the estimated coefficient of dummy variables *peg* and *flex*, respectively.

As for external factors, according to the estimated coefficient of the foreign rate of interest, in both structural and reduced forms of ECM, after two lags this rate has a positive impact on the inflation rate. Specifically, it seems the inflation in emerging countries is partly due to a higher foreign interest rate as Kia (2006a) also finds a similar result for Iran. Dummy variables *Nor1980Q1Q2* and *Nor1988Q1*, which account for outliers in the data, have positive estimated coefficients. To the best knowledge of the

author, no event reflects these outliers. The overall conclusion is that the sources of inflation in Turkey are both internal and external factors.

V. Unanticipated Shocks

To analyze the impact of unanticipated shocks in domestic factors on the inflation rate, we use the estimated coefficients of all ECMs by considering the associated impulse responses. Following Kia (2006a), the Choleski factor is used to normalize the system so that the transformed innovation covariance matrix is diagonal. This allows us to consider experiments in which any variable is independently shocked. The conclusions are potentially sensitive to the ordering (or normalization) of the variables. As one would expect, part of a shock in the government expenditures is contemporaneously correlated to a shock in deficits, debt financing and the outstanding debt which by themselves are correlated to a shock in the money supply, the interest rate, the real exchange rate, GDP and the price level. Consequently, let us follow Kia (2006a) and propose the ordering of lg , $defgdp$, $debtgdp$, $fdgdp$, IMs , i , lq , ly and lp . However, contrary to Kia (2006a), I also include the domestic interest rate and order it after the money supply and before the real income. Furthermore, contrary to Kia, I analyze the real, rather than nominal exchange rate and it is ordered before the real GDP. By ordering the price level last, the identifying restriction is that the other variables do not respond contemporaneously to a shock to the price level. As it was mentioned by Kia (2006a), this ordering is not critical in the analysis as no particular theory or empirical evidence conflicts with the logic of the proposed ordering.

The VAR was run in the error-correction form with five lags (the lag length of the cointegration equations, see Table 1). The impulse response functions reflect the implied response of the levels. The foreign interest rate is included as an exogenous variable. Other deterministic variables include dummy variables which account for policy regime changes or other exogenous shocks. Let us follow Lütkepohl and Reimers (1992) and assume a one-time impulse on a variable is transitory if the variable returns to its previous equilibrium value after some periods. If it settles at a different equilibrium value, the effect is called permanent. Figure 2 plots the impulse responses of the price level to a shock in lg , $defgdp$, $debtgdp$, $fdgdp$, IMs , i , lq , ly and lp . For the sake of brevity, we only concentrate on the impulse responses of lp to a shock in other variables.

Furthermore, all responses are within the confidence band, but for the sake of better exposition the confidence bands were dropped in all of the plots of Figure 2.

Figure 2 about here

Note that all plots in Figure 2 show the normalized responses of a shock. The normalization has been done by dividing the response by its innovation variance. This allows all the responses to a shock to be plotted on a single scale. According to Plot (A), a one standard deviation shock to real government expenditures (equal to 0.24 units) induces a contemporaneous fall of about 0.005 units in the price level. The fall in price continues two years before reaching zero at the 9th quarter. Therefore, the impulse is transitory. The impact of this shock on government expenditure itself is also transitory since it falls to -0.18 units at the 7th quarter and then rises to 0.10 units at the 13th quarter and then falls again to about -0.006 units at the 20th quarter and then rises gradually to 0.12 units at the 24th quarter. According to Plot (B), a one standard deviation shock to deficits per GDP (equal to 0.0044 units) induces a contemporaneous increase of 0.001 units in the price level. The price level, then, will fall gradually to -0.06 units at the 24th quarter; therefore, the impulse response is permanent. The response of deficit per GDP to its own shock results in a rise to a maximum of about 0.007 units at the 15th quarter and then in a fall to its initial shock. Consequently, unanticipated fiscal deficits may have a deflationary effect in developing countries, or at least in Turkey.

According to Plot (C), a one standard deviation shock to the outstanding debt per GDP (equal to 0.015 units) induces a contemporaneous increase of 0.008 units in the price level. The rise in price continues to 0.014 units at the 24th quarter; therefore, the impulse is permanent. The impact of this shock on the debt per GDP itself is also permanent, since it increases to about 0.03 units at the 10th quarter and then falls slightly to about 0.029 units and fluctuates around this number up to the 24th quarter. This means the unexpected shock to the debt per GDP results in a permanent impulse in Turkey. According to Plot (D), one standard deviation shock to foreign financing per GDP (equal to 0.0016 units) induces a contemporaneous decline of 0.005 units in the price level. The price, however, will increase permanently to 0.015 units at the 24th quarter. The impact of the shock on itself is transitory as the foreign-financed debt returns to its almost initial shock, 0.0015 units at the 24th quarter. Overall, the impulse responses of the price level to

a shock on fiscal variables are mixed. Specifically, while a shock to deficits per GDP results in a negative impulse of the price, a shock to outstanding debt and foreign-financed debt results in a continuous increase in the price level in Turkey.

According to Plot (E), a one standard deviation shock to money supply (equal to 0.06 units) induces a contemporaneous increase of 0.003 units in the price level. The price will increase constantly to a level of 0.04 units at the 24th quarter. Consequently, an unanticipated positive shock to the money supply creates a permanent increase in the price level. However, the impulse impact of the money supply on itself is temporary at 0.05 units at the 24th quarter.

According to Plot (F), a one standard deviation shock to the domestic interest rate (equal to 0.048 units) induces a contemporaneous increase of 0.004 units in the price level. The price then will fall permanently to -0.019 units at the 24th quarter. The impulse impact of the interest rate on itself falls up to the 14th quarter and then settles down at about 0.020 units thereafter. From the above analysis we can see that the monetary policy is an effective tool to fight inflation in Turkey.

According to Plot (G), a one standard deviation shock to the real exchange rate (equal to 0.045 units) induces a contemporaneous fall of 0.002 units in the price level. The price will fluctuate around zero units up to the 6th quarter before starting to increase by about 0.01 units at the 21st quarter. It will fall thereafter. The impulse impact, therefore, is permanent. The impulse impact of the real exchange rate on itself is transitory as it falls at the 2nd quarter and fluctuates around 0.03 units up to the 24th quarter. Consequently, an unanticipated exchange rate policy which leads to the depreciation of the exchange rate is, therefore, inflationary. In other words, an anticipated shock in the foreign price relative to the domestic price has a permanent inflationary effect in Turkey.

As Plot (H) shows, a one standard deviation shock to the real GDP (equal to 0.045 units) induces a contemporaneous fall of 0.01 units in the price level. The price will continue to fall permanently to 0.018 units at the 24th quarter. The impulse response of the real GDP on itself is transitory at about 0.04 units. Finally, as Plot (I) shows, a one standard deviation shock to the price level (equal to 0.031 units) induces permanent increases in itself. In sum, the most inflationary induced shocks in Turkey are the

outstanding debt and the foreign financing of the debt as well as the positive monetary policy shocks, i.e., a shock to the money supply or the exchange rate.

To gauge whether fiscal, monetary and other shocks have played much of a role in accounting for movements in the price level, we analyze variance decompositions for various time horizons. Table 4 reports variance decompositions for various time horizons. Each row shows the fraction of the t-step ahead of forecast error variance for the price level that is attributed to shocks to the column variables. According to these results, the real government expenditures, the debt per GDP, the foreign financing per GDP, the domestic interest rate, the real exchange rate and the real GDP shocks account for an insignificant percentage of the price forecast error variance at all horizons. The deficits per GDP and the money supply shocks account for an increasing percentage of the price forecast error variance as the time horizon increases. This result is very similar for Iran which operates under an Islamic system, see Kia (2006a).

Table 4 about here

For example, after four quarters, the deficits per GDP shocks account for 7.60% of the price forecast error variance. This rises to 31.24% after three years and to 37.14% after six years. The money supply shocks account for 13.05% after a year, but rises to 15.75% after six years. These results, similar to what was found by Kia, imply that deficits and money supply shocks play a relatively important role in price fluctuations. However, the major impact of these shocks only occurs with quite a long lag. Interestingly, opposite to what was found by Kia (2006a) for Iran, more than half of the price forecast error variance is due to innovations in itself up to two years, but as the error variance of the deficits and the money supply goes up the price forecast error variance will fall to about 35%. For example, the price forecast error variance is 63.23% at one quarter ahead and falls to 50.71% after two years (not reported in the table). It continues to fall to 35.08% after six years.

VI. Conclusions

This paper focuses on internal and external factors, which influence the inflation rate in Turkey. I extended and tested the monetary model of inflation rate developed by Kia (2006a) on Turkish data. Turkey relies heavily on agricultural products and has experienced a period of both high inflation and public debt. It was found that the

monetary policy, including the foreign exchange policy, is an effective tool to fight inflation in Turkey over the long run. Specifically, while a tight monetary policy (a higher interest rate) results in a higher price level over the long run, a weaker currency can help to lower inflation in Turkey. The former effect also confirms Sargent and Wallace's view that a current tight monetary policy leads to a higher inflation rate over the long run.

It is also found that the fiscal policy is very effective to fight inflation in Turkey as the increase in the real government expenditures causes the inflation to fall, but the accumulation of debt will raise the inflation rate over the long run. As for the foreign financing of the government debt, it was found that as debt is financed externally, the demand for the domestic currency increases and so the price level falls over the long run. In general, it was found the major factors affecting inflation in Turkey over the long run are internal rather than external factors. For example, the foreign interest rate does not have any inflationary impact on the price level, but a higher foreign price results in a lower inflation rate over the long run.

An increase in the interest rate, while over the long run leads to a higher price level, will reduce the inflation rate over the short run implying a tight monetary policy is effective only over the short run in Turkey. However, it was found that an unanticipated shock to the interest rate has a permanent deflationary effect. Interestingly, while the increase in the size of the government, measured by the government expenditures, creates an inflationary environment over the short run, it leads to a deflationary environment over the long run. This is possible when a significant part of the government expenditures is used on infrastructural investment. Furthermore, it was found that an unanticipated shock to the government expenditures has only a short-run effect in this country. However, an unanticipated shock to the deficit and the debt per GDP has a permanent effect.

As for the external determinates of inflation in Turkey, it was found that only over the short run the change in the world interest rate leads to higher inflation. However, an unanticipated change in the foreign price relative to the domestic price (the real exchange rate) results in a permanent inflationary effect. The policy regime changes over the managed exchange rate, similar to the current flexible exchange rate period (since 2001), had a downward pressure on the short-run dynamics of inflation in Turkey. Another

domestic shock to inflation was found to be the financial crisis of 1994 which resulted in a higher inflation rate. The overall conclusion is that the sources of inflation in Turkey are mainly internal factors. They arise mostly from the monetary policy.

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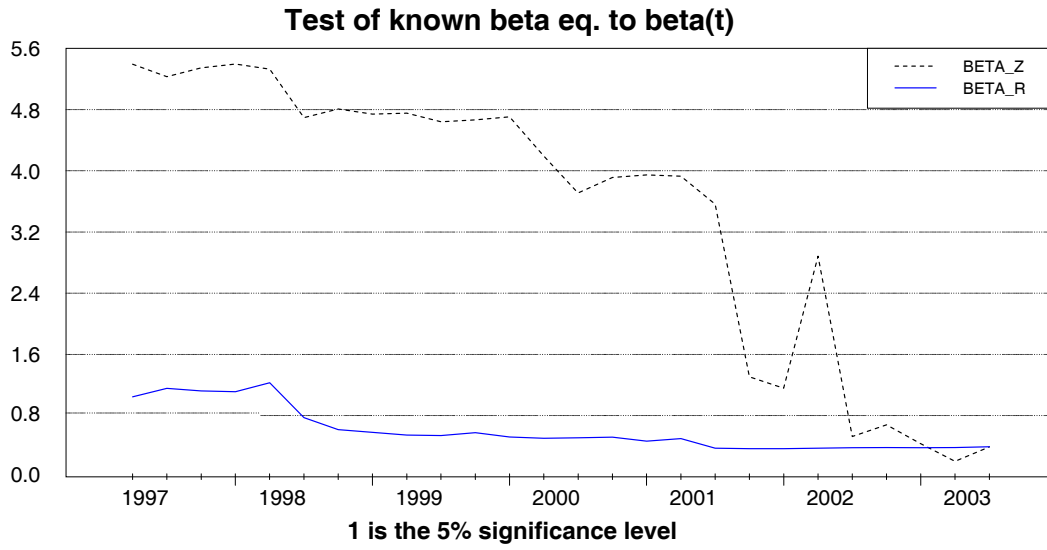
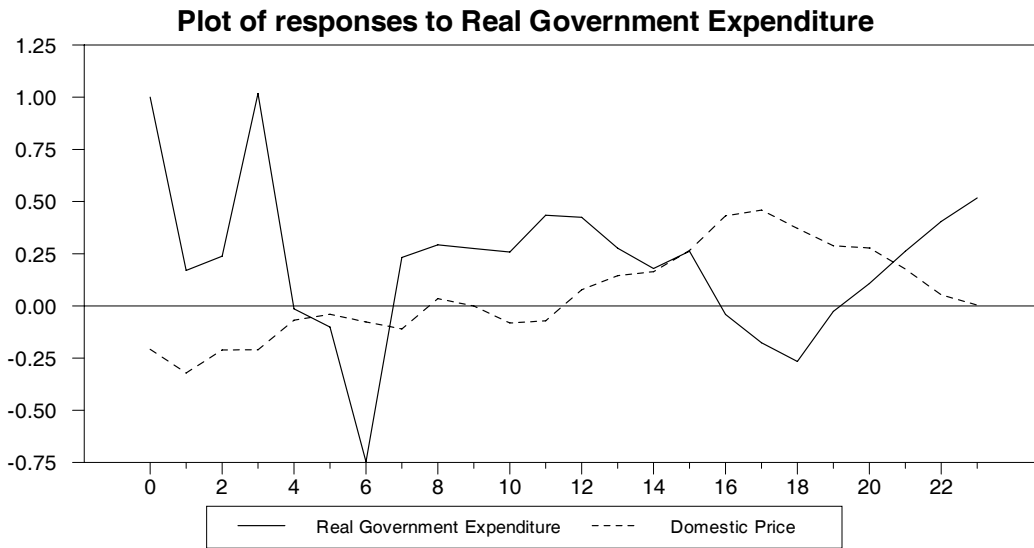
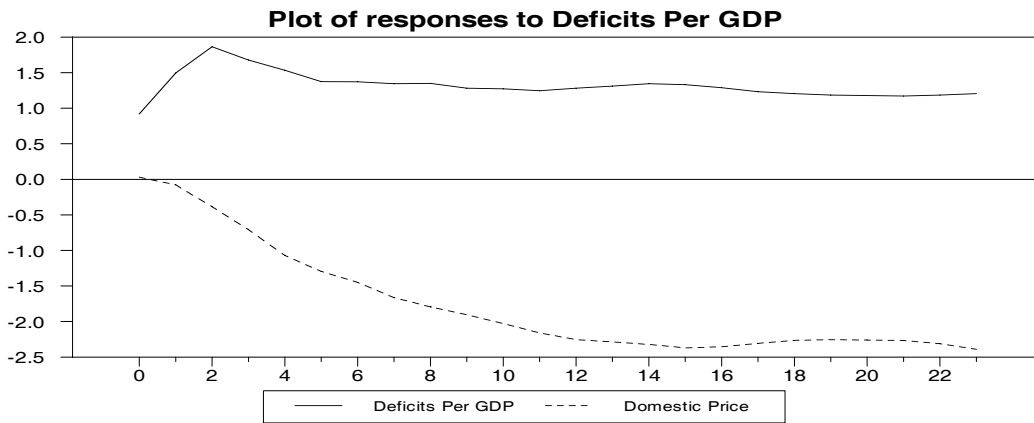
Figure 1: Recursive Likelihood Ratio Tests

Figure 2: Impulse Responses
Plot A



Plot B



Plot C

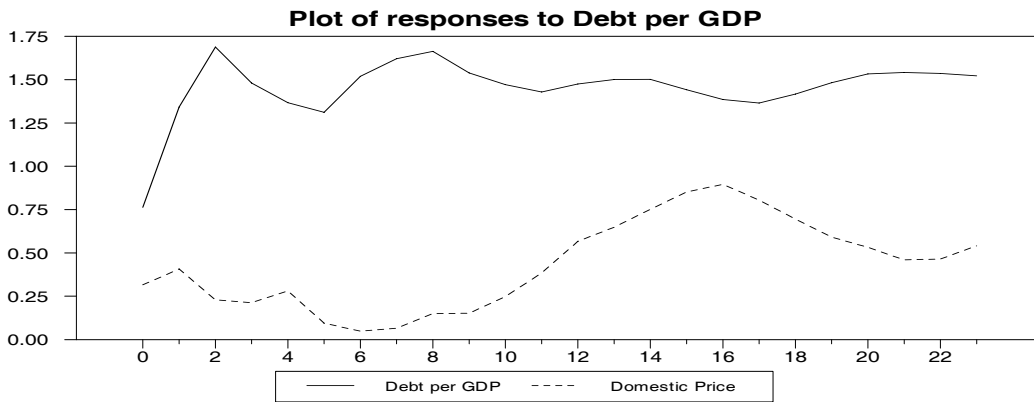
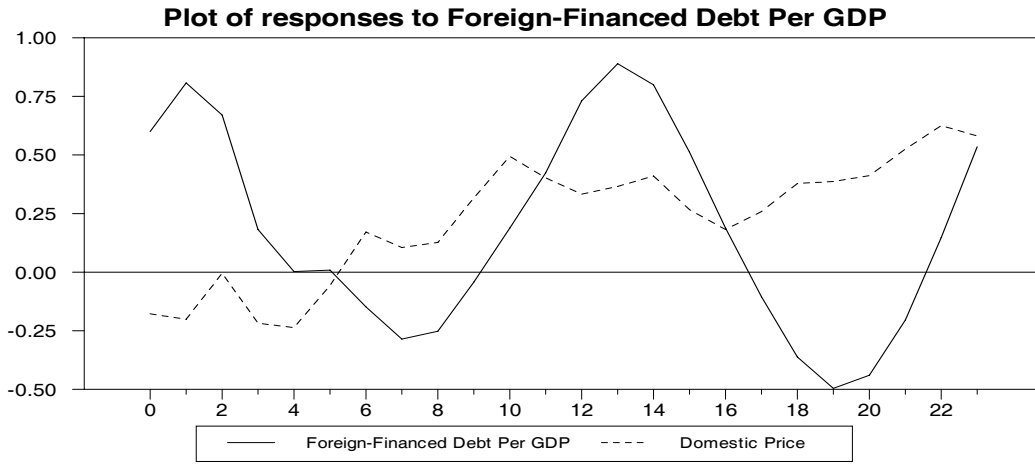
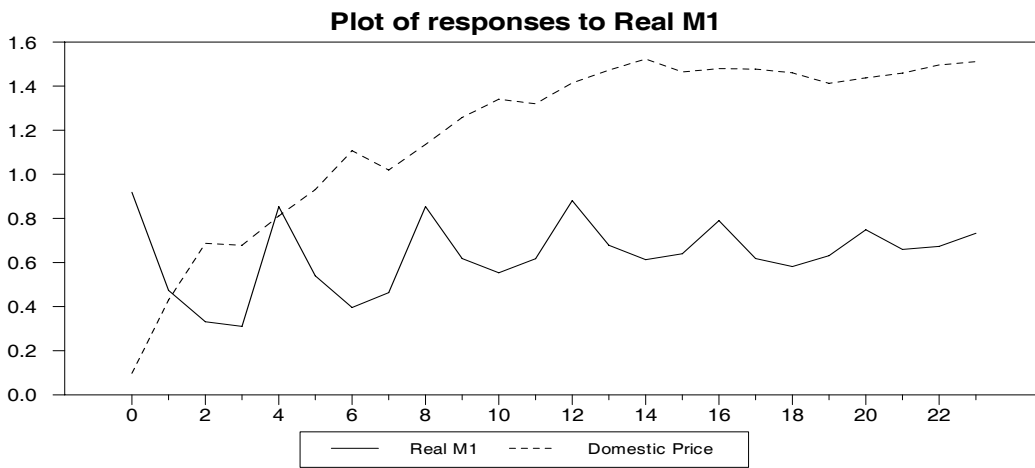


Figure 2 Continues
Plot D



Plot E



Plot F

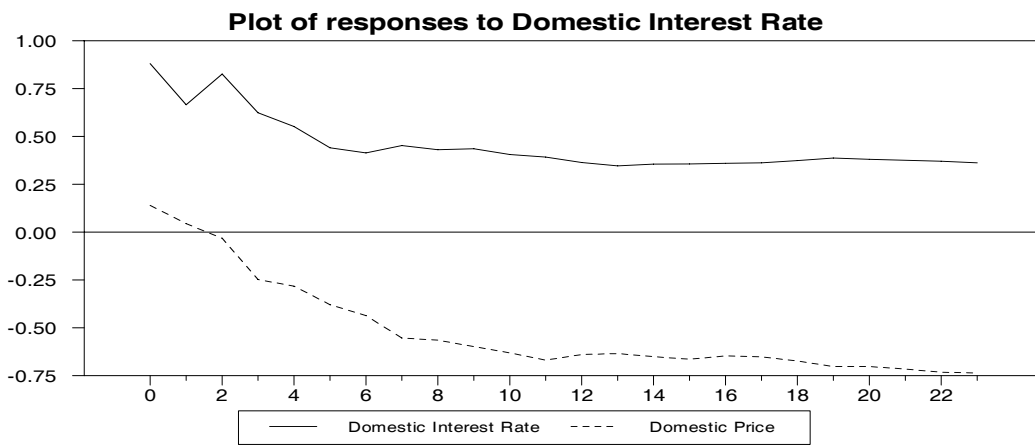
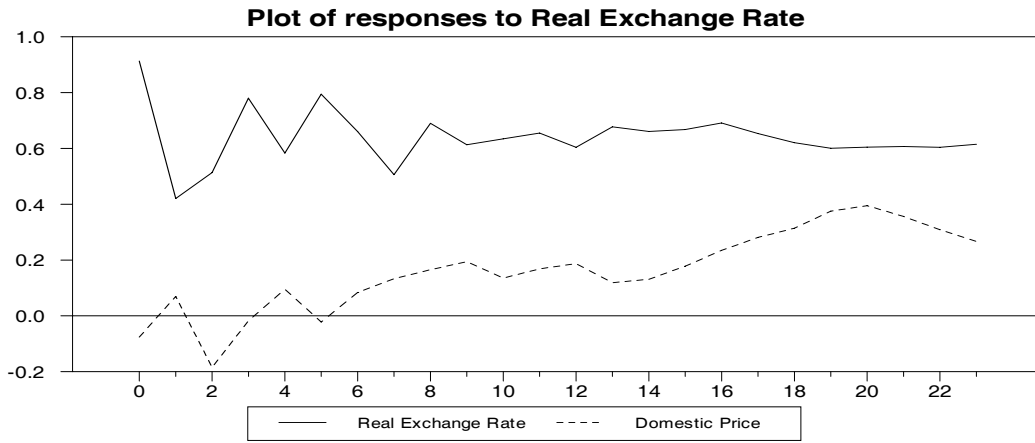
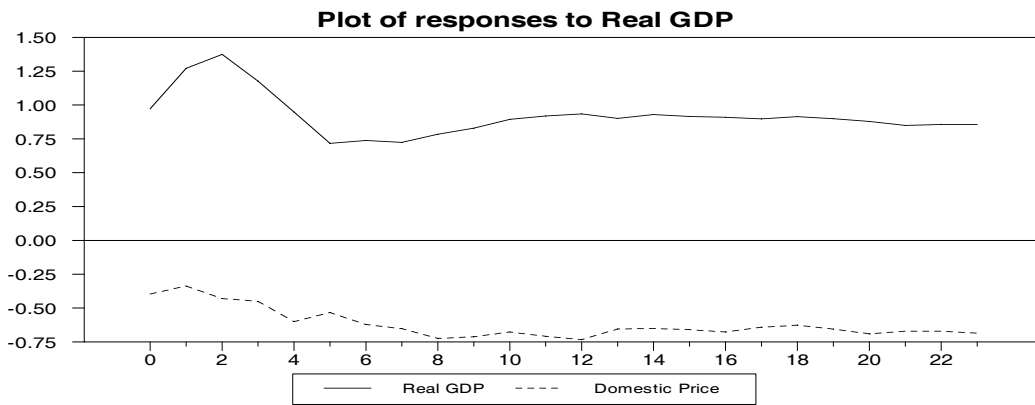


Figure 2 Continues
Plot G



Plot H



Plot I

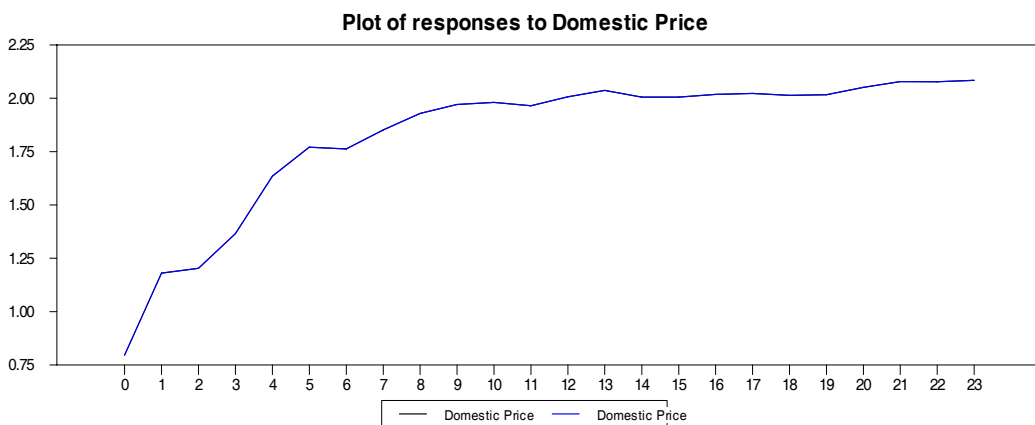


Table 1*: Long-Run Test Results

Tests of the Cointegration Rank											
$H_0 = r$	0	1	2	3	4	5	6	7	8	Diagnostic tests** <i>p</i> -value	
Trace⁽¹⁾	272.70	191.24 ^a	135.88	85.29	60.54	48.24	22.93	11.40	3.08	Test for Autocorrelation: LM(5)** 0.41	
Trace 95⁽²⁾	257.48	214.59	176.30	141.06	109.89	81.44	57.01	35.47	19.19	Test for ARCH: LM(1)** 0.10 LM(2)** 0.01 Test for Normality: $\chi^2 = 178$ 0.00 Lag length = 5	
Test for the Restricted Long-Run Relationship. Restrictions are accepted: $\chi^2(1) = 4.95$, <i>p</i>-value = 0.03											
Normalized	lp	IMs	i	ly	lq	i*	lg	defgdp	debtgdp	fdgdp	constant
lp (<i>t</i>-statistic)	-	Rest. = 1.00	1.19 (6.89)	0.33 (1.37)	-3.32 (-7.76)	0.04 (0.37)	-1.55 (-8.25)	0.13 (0.09)	1.44 (2.83)	-66.00 (-9.55)	47.14 (7.81)
Stock and Watson's (1993) Dynamic OLS Results*** Wald statistic = 108.38 (<i>p</i>-value=0.00)											
lp (<i>t</i>-statistic)	-	Rest. = 1.00	0.44 (5.07)	-0.79 (-4.76)	-0.23 (-0.88)	-0.22 (-4.46)	0.14 (1.05)	2.48 (3.01)	1.09 (4.03)	-7.38 (-1.99)	3.54 (0.96)
Weak Exogeneity test Null: Variable is weakly exogenous (<i>p</i>-value)	0.12 (0.73)	0.79 (0.37)	9.75 (0.00)	5.32 (0.02)	7.54 (0.01)	-	1.99 (0.16)	0.36 (0.55)	0.49 (0.49)	8.88 (0.00)	-

a = accept the null of $r=1$.

(1) The Trace test has been multiplied by the small sample correction factor $(N - kp)/N$, see Cheung and Lai (1993).

(2) CATS 2 in RATS computer package was used to simulate the critical values. The number of replications was 2500 with a length of random walks of 400.

* The sample period is 1970Q1-2003Q3. IMs is the log of nominal money supply, i and i^* are the $\log[R/(1+R)]$ and $\log[R^*/(1+R^*)]$, respectively, where R and R^* are domestic and foreign interest rates in decimal points, respectively, ly is the log of the real GDP, lq is the log of the real exchange rate, lp is the log of domestic CPI, lg is the log of the real government expenditures on goods and services, $defgdp$ and $debtgdp$ are deficits and outstanding debt per GDP, respectively, and $fdgdp$ is the amount of the foreign-financed debt per GDP.

** LM(i), for $i=1, 2$ and 5 , is i th-order Lagrangian Multiplier test for autocorrelation, respectively [Godfrey (1988)].

*** Stock and Watson's (1993) test (DOLS) is based on the following regression:

$$lp_t = \beta_0 + \beta_1 IMs_t + \beta_2 i_t + \beta_3 ly_t + \beta_4 lq_t + \beta_5 i^*_t + \beta_6 lg_t + \beta_7 defgdp_t + \beta_8 debtgdp_t + \beta_9 fdgdp_t + \delta_1(L) \Delta IMs_t + \delta_2(L) \Delta i_t + \delta_3(L) \Delta ly_t + \delta_4(L) \Delta lq_t + \delta_5(L) \Delta i^*_t + \delta_6(L) \Delta lg_t + \delta_7(L) \Delta defgdp_t + \delta_8(L) \Delta debtgdp_t + \delta_9(L) \Delta fdgdp_t + DUM_t' \alpha + u_t,$$

where $\delta_i(L)$, for $i=1$ and 2 , has two leads and lags.

**Table 2* : Error Correction Model for the Inflation Rate
Structural Form**

Dependent Variable	Δp		
	Coefficients	Standard Error	Hansen's (1992) Li stability test p -value
Constant	-0.16	0.05	0.42
Δy_t	-0.31	0.09	0.63
Δi_{t-3}	-0.02	0.01	0.25
Δi^*_{t-2}	0.06	0.03	0.12
Δy_{t-1}	0.22	0.05	0.64
$(ECP)^2_{t-2}$	0.06	0.03	0.11
$(ECP)^3_{t-2}$	-0.04	0.02	0.85
Δp_{-1}	0.21	0.08	0.83
Δp_{-2}	-0.14	0.06	0.43
fcrisis	0.17	0.03	0.14
flex	-0.07	0.02	0.97
pex	-0.07	0.02	1.00
Trend	0.001	0.0002	0.46
Nor1980Q1Q2	0.14	0.03	1.00
Nor 1988Q1	0.13	0.03	0.04
L_i test on variance	p -value = 0.35		
Joint L_c test***	p -value = 0.41		
$\bar{R}^2=0.70$, $\sigma=0.03$, $DW=1.66$, $Godfrey(5)=1.34$ (significance level=0.24), $White=0.99$ (significance level=0.99), $ARCH(5)=9.75$ (significance level=0.08), $RESET=0.21$ (significance level=0.89) and Normality, Jarque-Bera = 4.34 (significance level=0.11).			

* The estimation method is the Ordinary Least Squared. The sample period is 1970Q1-2003Q3. Δ means the first difference, Δp is the change in the log of CPI and Δy is the change in the log of the real GDP. Δi and Δi^* are, respectively, the change in the log[R/(1+R)] and log[R*/(1+R*)], where R and R* are, respectively, the nominal domestic and foreign interest rates in decimal points. ECP is the error-correction term. Dummy variable fcrisis is equal to 1 for 1994Q2 and to zero, otherwise. Dummy variable flex is equal to 1 since 2001Q1 and to zero, otherwise. Dummy variable pex is equal to 1 for the period of 2000Q1-2000Q4 and to zero, otherwise. Trend is a linear time trend. Nor1980Q1Q2 is equal to 1 during the first and second quarters of 1980, and to zero, otherwise, and Nor 1988Q1 is equal to 1 in the first quarter of 1988, and to zero, otherwise. These dummy variables were used to eliminate the outliers in the data.

**Table 3* : Error Correction Model for the Inflation Rate
Reduced Form**

Dependent Variable	Δp		
	Coefficients	Standard Error	Hansen 's (1992) Li stability test p -value
Constant	-0.20	0.05	0.64
Δi_{t-3}	-0.03	0.01	0.43
Δy_{t-1}	0.10	0.04	0.66
Δi^*_{t-2}	0.08	0.03	0.10
Δg_{t-1}	0.01	0.005	0.81
Δg_{t-2}	0.02	0.009	0.61
ECP_{t-2}	0.08	0.03	0.17
$(ECP)_{t-2}^2$	-0.20	0.05	0.76
$(ECP)_{t-2}^3$	-0.11	0.03	1.00
fcrisis	0.18	0.03	0.14
flex	-0.04	0.02	1.00
pex	-0.10	0.02	1.00
Trend	0.002	0.0002	0.71
Nor1980Q1Q2	0.17	0.02	1.00
Nor 1988Q1	0.13	0.03	0.04
L_i test on variance	p -value = 0.71		
Joint L_c test ***	p -value = 0.53		
$\bar{R}^2=0.68$, $\sigma=0.03$, $DW=1.76$, $Godfrey(5)=1.18$ (significance level=0.32), $White=96.43$ (significance level=0.99), $ARCH(5)=4.92$ (significance level=0.43), $RESET=0.01$ (significance level=0.99) and $Normality$, $Jarque-Bera = 3.26$ (significance level=0.20).			

* The estimation method is the Ordinary Least Squared. The sample period is 1970Q1-2003Q3. Δ means the first difference, Δp is the change in the log of CPI and Δy is the change in the log of the real GDP. Δi and Δi^* are, respectively, the change in the $\log[R/(1+R)]$ and $\log[R^*/(1+R^*)]$, where R and R^* are, respectively, the nominal domestic and foreign interest rates in decimal points. Δg is the change in the log of the real government expenditure on goods and services. ECP is the error-correction term. Dummy variable fcrisis is equal to 1 for 1994Q2 and to zero, otherwise. Dummy variable flex is equal to 1 since 2001Q1 and to zero, otherwise. Dummy variable pex is equal to 1 for the period of 2000Q1-2000Q4 and to zero, otherwise. Trend is a linear time trend. Nor1980Q1Q2 is equal to 1 during the first and second quarters of 1980, and to zero, otherwise, and Nor 1988Q1 is equal to 1 in the first quarter of 1988, and to zero, otherwise. These dummy variables were used to eliminate the outliers in the data.

Table 4* Price Level Variance Decompositions

	Shock to:								
Period (Quarters)	lg	defgdp	debtgdp	fdgdp	lMs	i	lq	ly	lp
1	4.33	0.10	9.96	3.17	0.95	1.97	0.58	15.72	63.23
4	2.73	7.60	4.21	1.39	13.05	0.98	0.52	7.63	61.89
12	0.36	31.24	0.93	0.97	14.76	3.03	0.25	5.35	43.12
20	0.56	36.43	2.76	0.89	15.62	3.18	0.36	4.18	36.02
24	0.48	37.14	2.56	1.18	15.75	3.34	0.47	4.01	35.08

* See footnote of Table 1 for the mnemonics.