

ECONOMIC
RESEARCH
FORUM



منتدى
البحوث
الاقتصادية

2007

working paper series

A COMPARATIVE ANALYSIS OF EXCHANGE RATE
FLUCTUATIONS AND ECONOMIC ACTIVITY:
THE CASES OF EGYPT AND TURKEY

Magda Kandil and Nazire Nergiz Dincer

Working Paper No. 0722

**A COMPARATIVE ANALYSIS OF EXCHANGE RATE
FLUCTUATIONS AND ECONOMIC ACTIVITY:
THE CASES OF EGYPT AND TURKEY**

Magda Kandil and Nazire Nergiz Dincer

Working Paper 0722

December 2007

The views expressed in this paper are those of the authors and should not be attributed to the International Monetary Fund, its Executive Board, or its management. The views presented are those of the author and do not necessarily reflect the views of the SPO.

Magda Kandil , International Monetary Fund, USA
Email: mkandil@imf.org
Nazire Nergiz Dincer , State Planning Organization, Turkey
Email: nergiz.dincer@gmail.com

Abstract

The paper examines the effects of exchange rate fluctuations on real output, the price level, and the real value of components of aggregate demand in Egypt and Turkey. The theoretical model decomposes movements in the exchange rate into anticipated and unanticipated components. Unanticipated currency fluctuations determine aggregate demand through exports, imports, and the demand for domestic currency, and aggregate supply through the cost of imported intermediate goods and producers' forecasts of relative competitiveness. In Turkey, anticipated exchange rate appreciation has significant adverse effects, contracting the growth of real output and the demand for investment and exports, while raising price inflation. Further, unanticipated exchange rate fluctuations have asymmetric effects that highlight the importance of unanticipated depreciation in shrinking output growth and the growth of private consumption and investment, despite an increase in export growth. In Egypt, anticipated exchange rate appreciation decreases export growth. Given asymmetry, the net effect of unanticipated exchange rate fluctuations decreases real output and consumption growth and increases export growth, on average over time.

ملخص

تبحث الورقة آثار تقلبات سعر الصرف على الإنتاج الحقيقي ومستوى الأسعار والقيمة الحقيقية لمكونات الطلب الكلي في مصر وتركيا. وسنجد أن النموذج النظري يقسم التغيرات في سعر الصرف إلى تحركات متوقعة وأخرى غير متوقعة. تحدد تقلبات العملة غير المتوقعة الطلب الكلي من خلال الصادرات والواردات والطلب على العملة المحلية وإجمالي العرض من خلال تكلفة السلع الوسيطة المستوردة وتوقعات المنتجين بشأن المنافسة النسبية. ففي تركيا، نجد أن تقلبات سعر الصرف المتوقعة لها آثار عكسية ذات بال حيث تقلص من نمو الإنتاج الحقيقي والطلب على الاستثمار والصادرات، بينما تزيد من التضخم في الأسعار. أضف إلى ذلك، أن التقلبات غير المتوقعة في سعر الصرف لها أثر يفتقر إلى التساوق يبين أهمية الاستهلاك غير المتوقع في تقليص نمو الإنتاج ونمو الاستهلاك الخاص والاستثمار على الرغم من الزيادة في نمو الصادرات. وفي مصر نجد أن الارتفاع المتوقع في سعر الصرف يقلل من نمو الصادرات. وفي ضوء هذا الافتقار إلى التساوق نجد أن الأثر الصافي للتقلبات غير المتوقعة في سعر الصرف تقلل نمو الإنتاج الحقيقي والاستهلاك، بينما تزيد من نمو الصادرات في المتوسط بمضي الوقت.

Introduction

There has been an ongoing debate on the appropriate exchange rate policy in developing countries. The debate focuses on the degree of fluctuations in the exchange rate in the face of internal and external shocks. Exchange rate fluctuations are likely, in turn, to determine economic performance. In judging the desirability of exchange rate fluctuations, it becomes, therefore, necessary to evaluate their effects on output growth and price inflation. Demand and supply channels determine these effects.

A depreciation (or devaluation) of the domestic currency may stimulate economic activity through the initial increase in the price of foreign goods relative to home goods. By increasing the international competitiveness of domestic industries, exchange rate depreciation diverts spending from foreign goods to domestic goods. As illustrated in Guitian (1976) and Dornbusch (1988), the success of currency depreciation in promoting trade balance largely depends on switching demand in the proper direction and amount, as well as on the capacity of the home economy to meet the additional demand by supplying more goods¹.

While the traditional view indicates that currency depreciation is expansionary, the new structuralism school stresses some contractionary effects. Meade (1951) discusses this theoretical possibility. If the Marshall-Lerner condition is not satisfied, currency depreciation could produce contraction.² Hirschman (1949) points out that currency depreciation from an initial trade deficit reduces real national income and may lead to a fall in aggregate demand. Currency depreciation gives with one hand, by lowering export prices, while taking away with the other hand, by raising import prices. If trade is in balance and the terms of trade are not changed, these price changes offset each other. But if imports exceed exports, the net result is a reduction in real income within the country. Cooper (1971) confirms this point in a general equilibrium model.

Diaz-Alejandro (1963) introduced another argument for contraction following devaluation. Depreciation may raise the windfall profits in export and import-competing industries. If money wages lag the price increase and if the marginal propensity to save from profits is higher than propensity to save from wages, national savings will go up and real output will decrease. Krugman and Taylor (1978) and Barbone and Rivera-Batiz (1987) have formalized the same views.

Supply-side channels further complicate the effects of currency depreciation on economic performance. Bruno (1979) and van Wijnbergen (1989) postulate that in a typical semi-industrialized country where inputs for manufacturing are largely imported and cannot be easily produced domestically, firms' input costs will increase following a devaluation. As a result, the negative impact from the higher cost of imported inputs may dominate the production stimulus from lower relative prices for domestically traded goods. Gylfason and Schmid (1983) provide evidence that the final effect depends on the magnitude by which demand and supply curves shift because of devaluation.³

1 Empirical support of this proposition for Group 7 countries over the 1960-89 period is provided in Mendoza (1992).

2 The Marshall-Lerner condition states that devaluation will improve the trade balance if the devaluing nation's demand elasticity for imports plus the foreign demand elasticity for the nation's exports exceed 1.

3 Hanson (1983) provides theoretical evidence that the effect of currency depreciation on output depends on the assumptions regarding the labor market. Solimano (1986) studies the effect of devaluation by focusing on the structure of the trade sector. Agenor (1991) introduces a theoretical model for a small open economy and distinguishes between anticipated and unanticipated movement in the exchange rate. Examples of empirical

To summarize, currency depreciation increases net exports and increases the cost of production. Similarly, currency appreciation decreases net exports and the cost of production. The combined effects of demand and supply channels determine the net results of exchange rate fluctuations on real output and price.⁴

This paper focuses on a comparative analysis of the relationship between exchange rate fluctuations and economic activity in Egypt and Turkey. The contribution of the theory is in treating the process of forming rational forecasts of the exchange rate. Recent experiences of currency crises have brought to the forefront the importance of anchoring agents' forecasts in the design of an appropriate exchange rate policy. Hence, the theory aims to separate the effects of anticipated shifts in the exchange rate from unanticipated deviations around agents' forecasts. The theoretical investigation introduces a model that decomposes movements in the exchange rate into anticipated and unanticipated components using rational expectations. Anticipated movement in the exchange rate is assumed to vary with agents' observations of macro-economic fundamentals, which determine changes in the exchange rate over time. Deviation in the realized exchange rate from its anticipated value captures the unanticipated component of the exchange rate.

In this context, the output supplied varies with unanticipated price movements and the cost of the output produced. Anticipated exchange rate movements determine the cost of the output produced and producers' forecasts of relative competitiveness. In contrast, unanticipated exchange rate movements determine economic conditions in three directions: net exports, money demand, and the output supplied.

The solution of the model demonstrates the effects of demand and supply channels on the output and price responses to unanticipated changes in the exchange rate. Based on theory's solutions, empirical models are formulated for output, price, and the real value of components of aggregate demand in Egypt and Turkey: consumption, investment, exports, and imports. The models incorporate demand and supply shifts as well as exchange rate shifts. Exchange rate fluctuations are assumed to be randomly distributed around a steady-state stochastic trend over time. This trend varies over time with agents' observations of macro-economic fundamentals. Positive shocks to the real effective exchange rate indicate an unanticipated increase in the real foreign-currency price of domestic currency—that is, unanticipated currency appreciation. Similarly, negative shocks indicate unanticipated depreciation of the exchange rate.

The data under investigation are for Egypt and Turkey over the sample period 1980-2004. The real effective exchange rate is constructed as a weighted average of the log value of the real price of the domestic currency in terms of the currencies of its major trading partners. The weights represent the relative share of each trading partner in the total trade (exports and imports) for each country. Hence, the real exchange rate accounts for the relative prices in the domestic economy relative to the weighted average of foreign price in major trading partners. The relative price channel is important to the analysis of exchange rate fluctuations given the high inflationary experience in Egypt and Turkey. Accordingly, the empirical investigation will combine the nominal exchange rate policy with movements in domestic price inflation relative to that of major trading partners to determine the implications of fluctuations in the real exchange rate on economic performance in Egypt and Turkey.

The results clearly illustrate the different effects of anticipated and unanticipated shifts of the exchange rate on the macroeconomy in Egypt and Turkey. In Turkey, anticipated exchange

investigations include Edwards (1986), Gylfason and Radetzki (1991), Roger and Wang (1995), Hoffmaister and Vegh (1996), Bahmani (1998), Kamin and Rogers (2000), and Kandil and Mirzaie (2002 and 2003).

⁴ For an analytical overview, see Lizondo and Montiel (1989).

rate appreciation have significant adverse effects, contracting the growth of real output and the demand for investment and exports, while raising price inflation. As producers anticipate loss of competitiveness, they shrink the output supply. This evidence emphasizes the role of rational forecasts in guiding production plans in Turkey. In contrast, unanticipated deviation of the realized exchange rate from agents' forecasts induce random fluctuations, with varying effects, on output growth, price inflation, and the growth of aggregate demand. Asymmetry highlights a more significant effect of unanticipated depreciation, which shrinks real output growth and the growth of real private demand on consumption and investment, despite higher exports.

In Egypt, anticipated exchange rate appreciation decreases export growth. This evidence highlights the competitiveness channel in guiding rational forecasts and export plans in Egypt. The significant channels of exchange rate shocks are mostly on export growth. Exchange rate depreciation stimulates export growth. In contrast, exports increase despite exchange rate appreciation. Hence, higher variability of the real effective exchange rate has a net positive effect on export growth in Egypt. Unanticipated exchange rate depreciation, by increasing the cost of imports, decreases consumption growth. This channel blocks the inflationary effects of currency depreciation. Hence, price inflation appears to be declining despite currency depreciation in the current period.

The remainder of the paper is organized as follows. Section II presents the theoretical model. Section III discusses developments in Egypt and Turkey. Section IV outlines the empirical models and presents empirical results. The summary and conclusion are presented in Section V.

Theoretical Background

In the real world, stochastic uncertainty may arise on the demand or supply sides of the economy. Economic agents are assumed to be rational. Accordingly, rational expectations of demand and supply shifts enter the theoretical model. Economic fluctuations are then determined by unexpected demand and supply shocks impinging on the economic system.

The paper introduces a macro-economic model that incorporates exchange rate fluctuations of the domestic currency. Fluctuations are assumed to be realized around a steady-state trend that is consistent with variation in macro-economic fundamentals over time. Uncertainty enters the model in the form of disturbances to both aggregate demand and aggregate supply. Within this framework, aggregate demand is affected by currency depreciation through exports, imports, and the demand for domestic currency, and aggregate supply is affected through the cost of imported intermediate goods and producers' forecast of competitiveness. The model demonstrates theoretically that unanticipated currency depreciation may decrease real output growth, via the effect on the supply side. However, the relationship between unanticipated currency depreciation and aggregate demand makes the final outcome inconclusive.

A. Aggregate Demand

The demand side of the economy is specified using standard IS-LM equations with a modification for an open economy. The specifications below describe equilibrium conditions in the Goods and Money markets. All coefficients are positive and throughout the paper, lower case denotes the logarithm of the corresponding level variable. The subscript t denotes the current value of the variable.

$$c_t = c_o + c_1 y_{dt}, \quad 0 < c_1 < 1 \quad (1)$$

$$y_{dt} = y_t - t_t \quad (2)$$

$$t_t = t_0 + t_1 y_t, \quad t_1 > 0 \quad (3)$$

$$i_t = i_0 - i_1 r_t, \quad i_1 > 0 \quad (4)$$

$$RE_t = \frac{S_t P_t}{P_t^*} \quad (5)$$

$$x_t = x_0 - x_1 \log(RE_t), \quad x_1 > 0 \quad (6)$$

$$im_t = m_0 + m_1 y_t + m_2 \log(RE_t), \quad m_1, m_2 > 0 \quad (7)$$

$$y_t = c_t + i_t + g_t + x_t - im_t \quad (8)$$

$$m_t - p_t = -\lambda [r_t + (E_t p_{t+1} - p_t)] + \phi y_t + \theta (E_t s_{t+1} - s_t), \quad \lambda, \phi, \theta > 0 \quad (9)$$

Equations (1) through (8) describe equilibrium conditions in the Goods market. In equation (1), real consumption expenditure, c , varies positively with real disposable income, y_d . In equation (2), disposable income is defined to be the net of real income, y , minus taxes, t . In equation (3), real taxes are specified as a linear function of real income. In equation (4), real investment expenditure, i , varies negatively with the real interest rate, r . In equation (5), let the domestic price level be represented by P and the foreign price level in foreign currency by P^* . S denotes the spot price of domestic currency. It measures the number of foreign currency units per units of domestic currency. RE is the price of domestically produced goods and services relative to the prices of foreign produced goods and services, i.e., the real exchange rate of the domestic currency. When RE increases, the domestic currency appreciates in real terms. The value of RE measures the degree of competitiveness of foreign produced goods and services relative to those produced domestically.⁵ In equation (6), real exports are related to an autonomous element, x_0 , which rises when the income level abroad rises, and to relative prices. The inverse relationship between RE and x , in (6), refers to the fact that when the domestic price is higher relative to foreign goods, exports will decrease. In equation (7), real imports, im , are assumed to rise with the level of real income and the real exchange rate of the domestic currency. Equation (8) describes the equilibrium condition in the goods market. Real government spending, g , is assumed to be exogenous. The total expenditure by domestic residents in real terms (y) is the sum of real consumption expenditure (c), real investment (i), real government spending (g), and net exports (the real value of exports, x , minus the real value of imports, im).

Substituting all equations into the equilibrium condition for the goods market results in the expression for real income. It is a function of the exchange rate, the domestic price level, the foreign price level, and the domestic interest rate. This expression is the IS equation which describes the negative relationship between real income and the real interest rate.

In equation (9), equilibrium in the money market is obtained by equating the demand and supply of real money balances. The real money supply is determined by nominal balances, m , deflated by price, p . The demand for real money balances is positively related to real income and inversely related to the nominal interest rate. The nominal interest rate is defined as the sum of the real interest rate and inflation expectation at time t . $E_t s_{t+1}$ is the expected future value of the foreign currency at time t . It is assumed that citizens in each country must hold domestic money for transactions purposes but they may speculate by holding foreign money.⁶

⁵ For a similar definition, see (Shone 1989).

⁶ For a similar discussion, see (Buiter 1990).

An unexpected temporary appreciation of the domestic currency in period t would lead to speculation of depreciation in period $t+1$ to restore the steady-state normal trend of the exchange rate, i.e., $(E_t s_{t+1} - s_t) < 0$.⁷ Consequently, agents decrease the speculative demand for domestic currency, establishing a positive relationship between the demand for real money balances and agents' expectation of the exchange rate relative to the current value of the currency.

The LM equation is determined by the equilibrium condition in the money market. It establishes a positive relationship between real income and the real interest rate. Solving for the interest rate, r , from the LM equation and substituting the result into the IS equation results in the equation for aggregate demand.

B. Aggregate Supply

On the supply side, output is produced using a production function that combines labor, capital, energy and imported intermediate goods. When the currency depreciates (or is devalued), it is more expensive to buy intermediate goods from abroad. Nonetheless, the outlook of a better competitiveness may provide incentives to increase supply.

To illustrate, the level of gross domestic output, Q , is produced using a production function that combines imported intermediate goods, U , labor, L , and the capital stock, K . The production function is Cobb-Douglas in U and L , assuming fixed capital stock.⁸ In addition, the production function is dependent on competitiveness, Z . Accordingly, the supply-side of this economy can be summarized in equations (10) through (14) as follows:

$$Q_t = L_t^\delta U_t^{1-\delta} e^{Z_t} \quad (10)$$

$$Y_t = Q_t - RE_t U_t \quad (11)$$

$$l_t^d = u_t - \eta \{w_t - p_t - z_t - \log \delta\}, \quad \eta = \frac{1}{1-\delta} > 0 \quad (12)$$

$$u_t = l_t + \frac{1}{\delta} \{ \log(1-\delta) + z_t + \log(RE_t) \} \quad (13)$$

$$l_t^s = \eta \log \delta + \omega \{w_t - E_{t-1} p_t\}, \quad \omega > 0 \quad (14)$$

Equation (10) specifies the level of gross domestic output produced, assuming complementary relation between the labor input and imported intermediate goods. Equation (11) defines domestic value added (output supplied) or the difference between gross domestic output and the amount of real intermediate imports.⁹

⁷ Agents are encouraged to dispose of domestic currency following unexpected appreciation. Alternatively, speculative attacks may start if agents perceive the exchange rate to be overvalued (e.g., in the event of a peg that cannot be sustained). Hence, the demand for domestic currency decreases.

⁸ Fixing the capital stock excludes the possibility that depreciation may increase labor productivity by stimulating capital accumulation.

⁹ This definition follows Agenor (1991) where he introduces a model and assumes intermediate goods are necessary for the production process and cannot be produced domestically. Assuming currency appreciation, the cost of imported goods decreases, increasing demand for imports. The output supply, in equation (10), increases. In equation (11), the effect of currency fluctuations on domestic value added will depend on the elasticity of imports with respect to price change. If this elasticity is large, the increase in quantity dominates the price reduction, resulting in an increase in the domestic value of imports. Regardless, output supply will certainly increase. Whether the domestic value added increases or decreases depends on the elasticity of imports with respect to a price change. The effect of the exchange rate on domestic value added is not the focus of the paper's analysis.

To derive the demand for inputs, the marginal product of L and U is calculated and the results are equated with the real cost of labor (the real wage) and the real price in domestic currency of imported intermediate goods (the real exchange rate). Taking log transformation of the first-order conditions and rearranging produces equations (12) and (13). The demand for labor varies negatively with the real wage and positively with imported intermediate goods. Similarly, the demand for imported intermediate goods increases with the labor input. The appreciation of currency decreases the real price of imported intermediate goods and, hence, increases the demand for these goods. Nonetheless, an appreciation of the currency decreases competitiveness and the demand for labor and imported intermediate goods.

Equation (14) hypothesizes a positive log-linear relationship between labor supply and expected real wage. The supply of labor increases with an increase in the nominal wage relative to workers' expected price at time $t-1$.

The nominal wage solution is obtained by equating labor demand and labor supply. Substituting the nominal wage into labor demand results in the solutions for employment and imported intermediate goods. Substituting for l and u into the log transformation of equation (10), results in an equation for gross domestic output supplied. Substituting the result into the log transformation of equation (11) results in an equation for the aggregate supply of domestic value added. For details of the model solution, see Kandil and Mirzaie (2003).

Aggregate supply has a direct positive relationship with output price surprises. Workers decide on labor supply based on their expectation of the aggregate price level. An increase in aggregate price relative to workers' expectations increases the demand for labor and, hence, the nominal wage. A rise in expected real wage increases employment and, hence, the output supplied. In addition, the aggregate supply may move positively with the foreign currency price of domestic currency. Currency appreciation decreases the cost of imported goods and increases the output supplied. Nonetheless, the output supplied may vary negatively with the foreign currency price of domestic currency. Currency appreciation decreases competitiveness and the output supplied. The net effect of fluctuations in the foreign currency price of domestic currency on the output supplied will be dependent on which channel dominates.

C. Market Equilibrium

Internal balance requires that aggregate demand for domestic output be equal to aggregate supply of domestic output at full employment. It is assumed that demand and supply shifts in the model are constructed of two components: anticipated (steady-state) component and an unanticipated (random) component. The solution of the model results in reduced form equations for real output, price, and components of aggregate demand (see Kandil and Mirzaie (2003) for details).

In theory, the combination of demand and supply channels indicates that real output depends on unanticipated movements in the exchange rate, the money supply, and government spending.¹⁰ In addition, supply-side channels establish that output varies with anticipated changes in the exchange rate.

Given demand-side channels, aggregate demand increases with an increase in government spending or the money supply, increasing output and price in the short-run.

The complexity of demand and supply channels may determine the results of exchange rate fluctuations as follows:

10 Shocks are assumed to fluctuate in response to domestic economic conditions or in response to external vulnerability, e.g., capital mobility or fluctuations in foreign reserves.

1. In the goods market, a positive shock to the exchange rate of the domestic currency (an unexpected appreciation) will make exports more expensive and imports less expensive. As a result, the competition from foreign markets will decrease the demand for domestic products, decreasing domestic output and price.¹¹
2. In the money market, a positive shock to the domestic currency (an unexpected temporary appreciation) relative to anticipated value, prompts agents to hold less domestic currency and decreases the interest rate. This channel moderates the contraction of aggregate demand and, therefore, the reduction in output and price in the face of a positive exchange rate shock.
3. On the supply side, a positive shock to the exchange rate (an unanticipated appreciation) decreases the cost of imported intermediate goods, increasing domestic output and decreasing the cost of production and, hence, the aggregate price level.
4. On the supply side, a positive shock to the exchange rate (an unanticipated appreciation) decreases competitiveness and, therefore, producers' outlook of external demand. Output supply decreases as a result.
5. The net effect of currency appreciation on output growth and price inflation is determined by the dominant effect of demand or supply channels.

ECONOMIC DEVELOPMENTS IN TURKEY AND EGYPT

To provide a background for investigation, this section outlines developments over the sample period that shaped economic developments in Turkey and Egypt.

A. Economic Developments in Turkey

In the 1980-83 period, Turkey was governed by a military regime. In that period, the deteriorated public balances were relieved by the tight fiscal policy and suppressed wages; price controls were gradually removed and interest rates were gradually liberalized. On the other hand, the government followed an exchange rate policy that aimed at preventing the real exchange rate from appreciating, thereby supporting the export-led growth strategy. The import regime was gradually liberalized¹². Thereby, the 1980's were the years of integration with the world economy for Turkey.

In 1984, a new government came to power and followed similar policies to that of the military government till 1988, except that public expenditures increased, causing public deficits. Moreover, tax policy was changed in 1985, resulting in a further deterioration in the public balances for which domestic lending became an effective tool for financing the public deficit. Higher public deficit necessitated the launching of the stabilization program in 1988. Stabilization policies were successful in decreasing the deficit but it could not prevent inflation from increasing. Finally, 1989 was a year of a crisis; elections were held; wages increased by 42 percent, the inflation rate, which was around 40 percent in the 1980-88 period, rose to near 80 percent; and a new phase for the Turkish economy started.

Overall, between 1980 and 1989, exchange rate policy supported real depreciations and, thereby, export-led-growth strategy. Moreover, imports were liberalized by removing quotas and decreasing the tariffs, thereby increasing the share of imports to GDP. Till 1989, the economy grew well and high export growth proved to be the engine of growth. Owing to tight fiscal policy and suppressed wages, consumption growth slowed to below overall

11 Similarly, a depreciation of the exchange rate stimulates demand for exports, which triggers capital accumulation to produce tradable goods. The elasticity of supply to cope with the increased demand determines the allocation of the exchange rate shock between output growth and price inflation.

12 Quotas were removed and tariffs were reduced.

economic growth, resulting in an increase in the growth of domestic savings. Higher savings were necessary to finance the growth in investment and boost export-led growth.

In 1989, the capital account was liberalized and in 1990 Turkey adopted a convertibility policy for the Turkish lira, and a new era started in the Turkish economy. High capital inflows that were realized in the 1988-90 period led to an appreciation of the Turkish lira. Furthermore, the policy of the government (higher spending and high interest rates to finance the deficit) prevented the exchange rate from depreciating. By 1990, the Central Bank of Turkey (CBRT) increased interest rates to attract more capital inflows. During this period, a primary deficit was observed and the public sector borrowing requirement was financed with short-term domestic borrowing. With the increase in interest rates, the domestic debt stock grew to such a level that a debt-rollover problem arose. The expectations for a devaluation increased at the end of 1993. In January 1994, the CBRT abandoned the exchange rate policy and devalued the nominal exchange rate by 14%. The devaluation of the currency continued until April 1994 and the total devaluation for this period reached 173% in nominal terms. Output declined by 6.2% in the same year. In April 1994, a new economic program with the IMF was brought into effect to overcome the financial crises.

On the growth side, 1990 was the year of the recovery. The liberalization of the capital account, coupled with higher government spending, contributed to economic growth. As a result of wage increases and real appreciation of the Turkish lira, consumption increased by 13 per cent. Overall, growth was around 9 percent in 1990. The same trend did not continue in 1991. During the Gulf crisis surrounding Iraq's invasion of Kuwait, the Turkish economy was adversely affected by regional conditions, which slowed down economic growth. To stimulate economic growth, a depreciation of the exchange rate was necessary, which boosted export-led growth in 1992. In 1993, the continued inflow of capital resulted in currency appreciation and supported economic growth, particularly the growth of domestic spending on consumption and investment. Nonetheless, the continued accumulation of public debt reached a level that became unsustainable, resulting in a financial crisis in 1994. Uncertainty surrounding the crisis led to a contraction of real output by six percent in 1994.

As Turkey engaged in the economic program with the IMF in 1994, a series of reforms and stabilization policies were in place and economic recovery was underway. Following integration into the Customs Union in 1996, trade liberalization was accelerated, resulting in an increase in both exports and imports. The continued increase in capital inflows in 1996-1997 provided external resources to finance the current account deficit. Concurrently, foreign reserve accumulation contributed to a loose monetary policy, which supported the growth of investment and the economy. Unfortunately, inflation increased as well.

Starting with the economic program in 1994, the exchange rate policy was designed to stabilize the real exchange rate. The CBRT depreciated the nominal exchange rate parallel to inflation expectations.

In 1998, the Russian crisis hit the Turkish economy and private investment and consumption, as well as capital inflows, decreased sharply. Nonetheless, Turkey experienced a positive growth rate, boosted by export growth and the increase in public spending on consumption and investment.

In 1999, the economy underwent through another recession due to the earthquake and the deterioration in public finance. In December 1999, Turkey adopted another disinflation program with the support of the IMF. The aim of the program was to decrease inflation to a single digit at the end of 2002. The exchange rate regime of the program was announced as the crawling peg regime. The CBRT declared an exchange rate basket path consisting of 1

US\$+0.77 Euro, and announced a daily depreciation rate, which added up to a cumulative of 20 percent by the end of 2000.

The implementation of the 1999 program gave positive signals. The nominal Treasury bond auction interest rates fell from 96.4% in November 1999¹³ to 34.1% in January 2000. Consistently, inflation expectations decreased. The economy realized high capital inflows, which supported a high growth rate that reached 4.8% in the first half of 2000. However, higher growth resulted in an increase in consumption and investment spending, which stimulated an increase in import growth. Subsequently, the current account deficit deteriorated and the external balance became fragile. Despite crawling depreciation, capital inflow and high domestic spending led to a real exchange rate appreciation, which adversely affected export growth. Subsequently, the banking sector increased its foreign currency denominated debt to a level that became risky for the system. With the sudden capital outflow in November 2000, the banking sector crises broke out, which led to a significant loss of foreign reserves of the CBRT.

In February 2001, political instability further contributed to a deterioration of economic conditions. As the economic crisis deepened, the crawling exchange rate regime was abandoned. The nominal exchange rate depreciated 94% (the annual increase of the second quarter of 2001) and the output response was detrimental, declining by 9.4%.

In May 2001, a new program based on a floating exchange rate regime, tight fiscal policy and structural reforms was implemented. Signs of recovery were observed in 2002; output grew by 7.8%. The source of growth was exports and public expenditures¹⁴. For the 2002-2004 period it can be said that Turkey has managed to diversify exports, which resulted in a significant increase in export growth, despite real appreciation of the Turkish lira. In support of economic reform, fiscal policy was tight, which contributed to a reduction in the inflation rate and interest rates. Hence, the primary engines of growth between 2002 and 2004 were export growth and the growth of domestic private absorption (private investment and consumption).

B. Economic Developments in Egypt

The 1980's was a period of rising inflation, foreign exchange shortages, balance-of-payment deficits, declining growth and a massive foreign debt for Egypt. The 1985 was the year of high foreign debt with liquidity shortages. The only choice for Egypt was rescheduling. In 1987, the stand-by arrangement with the IMF resulted in progress in economic reform. Two months later, the Paris Club agreed to reschedule. After a promising start, the political will was not supportive enough to carry on the structural reform programme. The result was a comprehensive Economic Reform and Structural Adjustment Programme (ERSAP) in 1991, based on a fixed exchange rate regime. The program aimed to increase competitiveness of the economy through executing a sequence of structural adjustment measures, and to ensure that fiscal and current account deficits are brought under control. Achieving exchange rate stability and fiscal discipline were at the heart of the stabilization program.

On one hand, the program succeeded in bringing the inflation rate down to 2-4 percent, achieving a growth rate of about 5 percent during the mid-1990s, and reducing fiscal and current account deficits. During the period 1998–2000, the local currency came under notable pressure. In an attempt to defend the overvalued exchange rate, policymakers heavily relied on international reserves. Therefore, international reserves dropped by almost 25 percent.

¹³ There was no Treasury auction in December, 1999.

¹⁴ Although tight fiscal policy was targeted in 2002, public expenditures could not be prevented due to elections held at the end of 2002.

Consequently, a large amount of liquidity has been pulled out of the market. The situation was aggravated by the unfavorable external shocks in the late 1990s (Asian crisis in June 1997; Luxor incident in November 1997 and oil prices deterioration starting from late 1997).

On the other hand, the authorities' attempt to defend the exchange rate peg resulted in an excessively overvalued real exchange rate. There was a justified fear of floating since it was not announced that the fixed exchange rate regime was a temporary arrangement and that it would be abandoned according to a careful exit strategy once inflationary pressures were contained. The overvaluation of the Egyptian pound led to a current account deficit, albeit the rise in that deficit in the last three years of the 1990s was mainly due to an increase in investment rather than consumption. Moreover, although the current account deficit as a ratio of GDP was not considered too high by international standards, the fact that Egypt was unable to attract significant private capital flows made it difficult to finance a growing deficit.

Excessive intervention to defend the exchange rate peg, coupled with external shocks, led to a severe credit crunch in late 1990s, forcing a severe slowdown in the domestic economy, starting from the fiscal year 1999/2000. To make things worse, the accumulation of non-performing loans in the banking system further shrank domestic liquidity and necessitated a massive bailout by the government.

In an attempt to stimulate the economy, the government has allowed the budget deficit to increase to about 5-7 percent of GDP since the late 1990s. As the depletion of domestic liquidity continued to pose the risk of a prolonged recession, it became necessary to abandon the exchange rate peg. The Central Bank of Egypt slowly and gradually moved toward a more flexible exchange rate regime since July 2000. While this was the right path to pursue, the adoption of the policy change came too late, resulting in a massive depletion of foreign reserves and a prolonged recession.

Toward the end of 2002, the situation was characterized by an overvalued real exchange rate; a budget deficit of about 6 percent of GDP; a vulnerable current account situation (the current account still shows a volatile deficit once net exports of oil and private remittances are excluded); a critical level of international reserves; a fragile financial system, segmented consumption markets, and finally a protracted economic slowdown. As the system continued to deteriorate, the Prime Minister of Egypt announced the flotation of the pound on January 28, 2003.

Following a period of overshooting, under a flexible exchange rate system, the value of the Egyptian pound stabilized, having lost more than fifty percent of its value relative to the dollar. Growth picked up momentarily, rising to an estimated 2.7% in fiscal year 2004. Economic growth was led by an increase in exports of goods and services, following the sharp decline of the pound that raised Egypt's export competitiveness. In fiscal year 2005, growth rose to an estimated 4% as the pound stabilized and business and consumer confidence strengthened following the appointment of the government of Mr Nazif. An increase in each of tourism income, remittances, and exports improved the current account position, resulting in an increase in foreign reserves. As confidence was restored in the stability of the Egyptian pound, the focus of the new government has been on structural reform that would enhance private sector activity and stabilize an export-led growth of the Egyptian economy.

EMPIRICAL INVESTIGATION

Developments in Egypt and Turkey over time clearly illustrate that changes in the exchange rate policy have played a major role in shaping up economic conditions. Our investigation will aim at providing a thorough analysis of the interaction between exchange rate

fluctuations and the macroeconomy in Egypt and Turkey. The empirical investigation analyzes annual time-series data of real output, the price level and specific demand components in Egypt and Turkey for the period 1980-2004. The data and sources are given in Appendix B.

The results of the unit root test suggest that all of the variables, except for prices, include a unit-root but their first differences are stationary, whereas the second difference of prices is stationary for Turkey¹⁵. Similarly, for Egypt, all the variables except prices and output are first difference stationary. Prices and output are second difference stationary.

The empirical investigation follows the solution of the theoretical model in Kandil and Mirzaie (2002). Accordingly, dependent variables (real output, the price level, and specific demand components) fluctuate in response to major domestic determinants of macroeconomic fundamentals and the real exchange rate. Assuming rational expectation, aggregate demand shifts and exchange rate shifts are decomposed into anticipated and unanticipated components. Anticipated shifts vary with agents' observations of macroeconomic fundamentals. Unanticipated shifts are random transitory shocks that have symmetric distribution over time. Positive shocks to the exchange rate approximate unanticipated currency appreciation, while negative shocks approximate unanticipated currency depreciation. Shocks are defined as the difference between the realizations and the anticipated portion of the exchange rate.

A. Empirical Models

To identify the anticipated and unanticipated components of the exchange rate, we construct a model for the real exchange rate. To decide on the explanatory variables in the equation, we follow a formal causality test in Granger sense for the theoretically related variables¹⁶. Using annual data, the change of the exchange rate is regressed on its lags and lags of all variables that may be relevant to movements in the exchange rate in theory. Lag structure is determined by Akaike Information Criteria. The final exchange rate equation accounts for statistically significant lags and is presented in Table 1 for Egypt and Turkey¹⁷.

(+) Here, Dr_t is the first-difference of the real exchange rate. The change in the trade balance to nominal GDP is denoted by Dtb_t . The change in the ratio of the sum of exports and imports to GDP, which is an indicator for openness, is denoted by $Dopen_t$. For Turkey, $d1$ and $d2$ are the dummy variables that take 1 in 1989 and 1997, respectively and 0 elsewhere, whereas, for Egypt, $d1$ and $d2$ are the dummy variables that take 1 in 1985 and 2003, respectively and 0 elsewhere.

The residual of the above equation is the unanticipated component of the exchange rate, i.e., the exchange rate shock. The residual satisfies conditions for rationality, i.e., it is serially uncorrelated and orthogonal to all variables that determine agents' forecasts of the exchange rate, as they appear in the empirical model. Coefficients on the right-hand side indicate determinants of movements in the exchange rate in Egypt and Turkey.

The real exchange rate is not characterized by a high degree of persistence in Turkey. In contrast, the lagged exchange rate is significant in Egypt, providing evidence of a higher degree of persistence. The signs, using the evidence for both countries, indicate that an improvement in the trade balance leads to an appreciation of the exchange rate. This relationship is statistically significant in Egypt.

15 The results are available upon request.

16 The results are available upon request.

17 The necessary diagnostic tests are performed for the exchange rate model and the following models. Results are available upon request.

The real exchange rate depreciates in a more open economy. This relationship is statistically significant in Turkey. In 2004, the share of imports to GDP reached 35 percent in Turkey, while the share of exports to GDP reached 28 percent. Given the relatively higher share of imports, compared to exports, the increased openness depreciates the exchange rate significantly. Causality test results do not support the relevance of openness to movements in the exchange rate in Egypt.

In the case of Egypt, causality test results indicate that the share of government expenditure to GDP is an important determinant of the real exchange rate. An increase in the share of government spending to GDP increases the budget deficit, the current account deficit, and depreciates the nominal exchange rate. Nonetheless, higher government spending is inflationary. The latter channel is more dominant, resulting in an appreciation of the real effective exchange rate with respect to an increase in the share of government spending to GDP. In another direction, government spending may force an increase in the interest rate, attracting capital inflows. The result is an appreciation of the exchange rate in response to an increase in government spending relative to GDP.

The structural break points, captured by the dummies on the right-hand side, indicate a significant change in the real effective exchange rate that could not be explained by the explanatory variables. In Turkey, the significance of the dummy variables in 1989 and 1997 support major structural breaks that resulted in a significant increase in the real effective exchange rate. Recall 1989 was a crisis year and the inflation rate rose by 80 percent. Inflation was also high in 1997 due to the significant capital inflow to finance the current account deficit. In Egypt, the dummy variables indicate significant reduction of the real effective exchange rate in 1985 and 2003. In 1985, Egypt suffered from high debt and shortage of foreign reserves, resulting in a depreciation of the exchange rate. In 2003, the Egyptian pound was formally floated, resulting in a significant depreciation following a prolonged period of a fixed exchange rate policy.

To analyze the asymmetric effects of exchange rate shocks on the relevant macroeconomic variables, we decompose the exchange rate shock to its positive and negative components, as defined for joint estimation, following the suggestions of Cover (1992) as follows:

$$\text{neg}_t = -0.5 \{ \text{abs}(\text{Drs}_t) - \text{Drs}_t \}$$

$$\text{pos}_t = 0.5 \{ \text{abs}(\text{Drs}_t) + \text{Drs}_t \}$$

where, Drs_t is the exchange rate shock and neg_t and pos_t are the negative and positive components of the shock or, to express it differently, unexpected depreciation and appreciation of the exchange rate.

Over time, it is assumed that real output growth, price inflation and components of aggregate demand fluctuate in response to changes in aggregate domestic demand, and exchange rate shocks. In addition, given the importance of fluctuations in the energy price to regional economic conditions, we account for changes in the energy price in the empirical model.

The model specification is based on the results of the test for non-stationarity of real output.¹⁸

$$Dy_t = A_0 + A_1 Do_t + A_2 Dm_t + A_3 Dg_t + A_4 E_{t-1} \text{Drs}_t + A_8 (\text{Drs}_t - E_{t-1} \text{Drs}_t) + v_t^y \quad (15)$$

The test results are consistent with non-stationary real output for Egypt and Turkey. Given these results, the empirical model of real output is specified in first difference form where

18 For details, see Kwiatkowski et. al. (1992). Non-stationarity indicates that, real output follows a random-walk process. Upon first-differencing, the resulting series is stationary, which is the domain of demand and supply shifts, as specified in theory.

$D(.)$ is the first-difference operator.¹⁹ Accordingly, all variables in the model enter in first-difference form. The unexplained residual of the model is denoted by v_t^y .

Let o_t be the log value of the energy price. In an oil-importing country, output growth is expected to vary negatively with changes in the energy price. Accordingly, $A_1 < 0$. Nonetheless, Egypt and Turkey are surrounded by oil-producing countries (Iran and Arab Gulf countries). It is possible that the countries would enjoy a positive spillover effect from a boom in neighboring countries in the wake of an increase in the energy price. Two sources of domestic policies, government spending and the money supply, approximate demand shifts, where g_t and m_t denote the log values of government spending and the money supply.

Finally, anticipated appreciation of the real exchange rate determines the cost of the output supplied. Let rs_t be the log value of the real exchange rate.²⁰ Accordingly, a rise in the exchange rate indicates real appreciation of the domestic currency. As producers anticipate a lower cost of imported intermediate goods, in the face of currency appreciation, they increase the output supplied. Nonetheless, it is possible that anticipated appreciation may trigger anticipation of a loss in competitiveness and, therefore, a decline in external demand, forcing a reduction in output supply. By construction, anticipated change in the exchange rate are function of lagged variables in the economic system. Accordingly, adjustments of real output growth to anticipated shifts capture intertemporal dynamics over time.

Unanticipated change in the exchange rate is likely, however, to determine both aggregate demand and supply²¹. Unanticipated currency appreciation, a shock to the exchange rate, decreases the cost of buying intermediate goods, increasing the output supplied. Concurrently, appreciation decreases net exports and the demand for domestic currency. The final effect remains indeterminate on aggregate demand, output, and price.

To demonstrate fluctuations in the output price, an empirical model is specified as follows:

$$Dp_t = B_0 + B_1 D o_t + B_2 D m_t + B_3 D g_t + B_4 E_{t-1} D r s_t + B_5 (D r s_t - E_{t-1} D r s_t) + v_t^p \quad (16)$$

Based on test results, output price is evident to be non-stationary. Accordingly, the empirical model is specified in first-difference form.

Energy price shifts increase the cost of the output produced and, hence, prices. Nonetheless, a positive spillover effect of an increase in the energy price on output growth may have a deflationary effect on price. Demand shifts increase price inflation. Accordingly, $B_2, B_3 > 0$.

Given that the effect of anticipated currency appreciation maybe positive or negative on the output supplied, price inflation may increase or decrease.²² An unanticipated appreciation of the domestic currency (a positive shock to the exchange rate) may increase (cheaper cost of imported inputs) or decrease (Loss of competitiveness) the output supplied and may decrease

19 Given the non-stationarity of the estimated dependent variables, the empirical models are estimated in first-difference form.

20 This measure captures shifts attributed to the nominal exchange rate, s , and the foreign price of imports, p^* , in theory.

21 Unanticipated currency appreciation may be the result of unanticipated shock that moves the exchange rate relative to its expected value. Alternatively, unanticipated appreciation may be consistent with an overvalued currency compared to agents' expectations that have adjusted downward in view of underlying macroeconomic fundamentals.

22 Anticipated shifts in the real exchange rate are function of lagged values of variables that enter the forecast equation, including its own lags. Hence, lagged values of domestic price are captured in anticipated currency shifts.

(net exports effect) or increase (money demand effect) aggregate demand. The reduction in demand coupled with an increase in supply are deflationary while the other channels increase price inflation.

In addition to the empirical models for real output growth and price inflation, we replicate the same models to explain cyclical fluctuations in components of aggregate demand, real growth of private consumption, Dc , real growth of private investment, Di , real growth of exports, Dx , and real growth of imports, Dim .

In all empirical models for Turkey, we test the significance of structural break using four dummy variables: a dummy variable for the economic crisis in 1988, a dummy variable for the Gulf crisis in 1992, a dummy variable for integration in the Customs Union in 1996, and a dummy variable for the earthquake in 1999.

Similarly, we test the significance of structural break in the empirical models for Egypt. The results support the statistical significance of the dummy variable for the Gulf crisis in 1991 and a dummy variable for the Asian crisis and Luxor incidence in 1997.

B. Empirical Results

To analyze the asymmetric effects of exchange rate shocks on output, the price level, and components of aggregate demand, we estimate empirical models that control for other policy variables. In this respect, the variables under consideration are modeled, as presented in Tables 2, 3, and 4. The explanatory variables in the models are the growth rate of each of government spending, the money supply, energy prices, the expected change in the exchange rate, unexpected exchange rate appreciation (positive shocks) and depreciation (negative shocks), and the necessary dummies to control for structural breaks.

B1. Fluctuations in Real Output Growth

Table 2 indicates fluctuations in real output growth with policy variables and fluctuations in the exchange rate in Turkey and Egypt. The growth of government spending is significant in stimulating real output growth in the current period in Turkey. The growth of the money supply appears to be counter-cyclical. That is, additional liquidity maybe targeting a slowdown in the economy. Real output growth appears to pick up in response to lagged growth of the money supply.

It is interesting to note that an increase in the oil price has a positive effect on output growth in Turkey. This evidence indicates a positive spillover effect from neighboring oil-producing countries (Iran and Arab Gulf countries) on output growth in Turkey.

Anticipated appreciation of the exchange rate, current and lagged, has a negative effect on output growth in Turkey. This indicates a dominant effect of the demand channel on output growth. As producers anticipate exchange rate appreciation and loss of competitiveness, they shrink the output supply. Apparently, anticipated appreciation is more important compared to unanticipated appreciation, as the latter is not significant in explaining real output growth. Lagged unanticipated depreciation (a negative exchange rate shock) has a positive effect on output growth. Unexpected depreciation increases the cost of imported inputs, forcing reduction in the output supply. The significant Wald test statistic indicates asymmetric effects of unanticipated currency appreciation and depreciation on output growth in Turkey.

Appendix A provides a graphical illustration of estimated dependent variables and exchange rate shocks over time. As illustrated in Figure 1A of Appendix A, unanticipated exchange rate depreciation in Turkey in 1994 and 2001 correlates with a reduction in real output growth.

In the case of Turkey, there are two significant dummies in the output equation, indicating a reduction in output growth in 1988 and in 1999. The first observation surrounds the beginning of the stabilization program that led to a significant reduction in government spending to contain the budget deficit. The second observation marks the 1999 earthquake.

Similar to Turkey, the growth of government spending increases real output growth significantly in Egypt. Further, monetary growth stimulates real output growth with a lag in Egypt. Moreover, an increase in the oil price does not determine real output growth significantly in Egypt.

In contrast to the evidence for Turkey, producers, in Egypt, react to lagged anticipated appreciation. Anticipated appreciation decreases the cost of imported inputs and increases the output supply. Hence, the cost channel dominates the competitiveness channel in determining the output supply in Egypt, although the effect is not statistically significant.

The negative response indicates reduction, although statistically insignificant, in real output growth with respect to unanticipated currency appreciation in Egypt. The positive response indicates reduction, although statistically insignificant, with respect to unanticipated currency depreciation in Egypt. The difference between the responses to positive and negative shocks is statistically significant according to Wald test results. Accordingly, exchange rate variability has a net negative effect on real output growth in Egypt over time. The structural break dummy indicates a significant reduction in real output growth in Egypt during the Gulf crisis in 1991.

Figure 1b of Appendix A illustrates a dominant negative effect, particularly for exchange rate depreciation, which correlates with an increase in output growth in Egypt over time.

B2. Fluctuations in Price Inflation

The evidence for Turkey indicates that the growth of government spending (lagged) has a significant positive effect on price inflation. While contemporaneous growth of government spending increases output growth, capacity limitation necessitates an increase in price inflation in the following period.

The inflationary effects of monetary growth are evident and significant, both in the current and lagged period. Liquidity stimulates additional demand and fuels price inflation. Consistent with capacity limitations, monetary growth fuels price inflation, without stimulating output growth in the current period. Having relaxed capacity constraints in the following period, monetary growth stimulates output growth, with additional increase in price inflation.

The effects of an increase in the energy price are interesting in explaining price inflation. The positive spillover effect on output growth correlates with a contemporaneous reduction in price inflation. In the following period, higher oil price increases cost and, therefore, price inflation.

Anticipated exchange rate appreciation raises price inflation in Turkey. This may reflect a high degree of persistence in price inflation. Expected change in the real effective exchange rate is a function of its lags, which are, in turn, dependent on lagged price inflation. The positive effect of anticipated appreciation on price inflation indicates close adjustment of price inflation to its lagged values.

Unanticipated appreciation of the exchange rate slows down price inflation in the next period. This is evident by the negative and statistically significant response of price inflation to lagged exchange rate appreciation, i.e., the lagged positive shock. Unanticipated appreciation slows down the demand for exports and decreases aggregate demand. Additionally, unanticipated appreciation decreases the cost of imported inputs and increases aggregate supply.²³ Wald test statistic indicates asymmetric effects of exchange rate shocks (positive and negative) on price inflation in Turkey.

The graph in Figure 2a of Appendix A for Turkey illustrates a few observations, where currency appreciation appears to have been followed by a reduction in price inflation (1985, 1995, 1998, 2000, 2004).

Structural break dummies for Turkey indicate a significant increase in price inflation in 1988 and in 1992 and a significant reduction in 1996. During the 1989 crisis, price inflation increased by 80 percent. During the 1991 Gulf crisis, the Turkish economy was adversely affected by regional conditions, which fueled price inflation. The integration into the Customs Union in 1996 resulted in removal of tariffs on imports, decreasing price inflation.

In contrast to the evidence for Turkey, an increase in government spending counters price inflation significantly in Egypt. Higher government spending increases subsidies to control price inflation for basic consumption items.²⁴ In consistency with the evidence for Turkey, monetary growth stimulates price inflation in Egypt as additional liquidity chases after a limited supply of goods. In contrast to the evidence for Turkey, there is no significant effect of a change in the oil price on price inflation in Egypt.

In contrast to the evidence for Turkey, anticipated exchange rate appreciation does not determine price inflation significantly in Egypt. Further, there is no evidence of a significant effect of unanticipated currency appreciation on price inflation in Egypt. There is a significant positive effect of unanticipated currency depreciation on price inflation in Egypt in the current period. Unanticipated depreciation of the real effective exchange rate accommodates a contemporaneous reduction in price inflation in the current period. Wald test statistic is not statistically significant, however, to establish a clear effect of exchange rate variability on price inflation in light of asymmetry.

Figure 2b of Appendix A illustrates a downward trend of price inflation in Egypt. This trend correlates with exchange rate depreciation, particularly in the nineties. Clearly, inflation is a dominant component of fluctuations in the real effective exchange rate over time.

B3. Fluctuations in Consumption Growth

To analyze the effects of exchange rate fluctuations on components of aggregate demand, Table 3 indicates fluctuations in real consumption demand with policy variables and fluctuations in the exchange rate in Turkey and Egypt.

In Turkey, consistent with the effect of government spending on output growth, private consumption increases significantly with the growth of government spending. Failure of monetary growth to stimulate growth in the current period is further supported by the

23 The import price data exist since 1994 for Turkey. In the face of unanticipated currency appreciation, for the periods 1997, 1999-2000 and 2002-2003, import prices, mostly import prices of consumption goods decreased. Moreover, the composition of imports suggests consumption of imported goods increases with respect to unexpected appreciation. The share of consumption goods constitutes 13 percent of total imports in 2004. This share increases in the years when unexpected appreciation is observed.

24 See, for example, Reuters Newsedge, June 20 2006, "Trimming subsidy spending, especially on energy, is crucial to curbing the budget deficit in Egypt. Nearly a fifth of government spending in 2006/07 has been set aside for energy subsidies."

negative and significant sign on consumption. In the following period, growth picks up and, therefore, consumption demand. The positive spill over effect of an increase in the energy price on growth in Turkey is consistent with an increase in real consumption demand.

As for exchange rate fluctuations in Turkey, consumption does not vary significantly with anticipated changes in the exchange rate. Unanticipated appreciation is also insignificant on real consumption growth. Unanticipated depreciation (lagged) has a positive significant effect on growth and, therefore, consumption demand. In the face of unexpected depreciation, consumers decrease consumption of durable goods, especially imported luxury goods.²⁵

The Wald test statistic indicates significant asymmetry in the response of consumption growth to positive and negative exchange rate shocks. Further, the dummy variable indicates significant reduction in consumption growth in 1999, around the earthquake.

Figure 3A of Appendix A illustrates fluctuations in consumption demand in Turkey with exchange rate shocks. Currency depreciation appears to have led to a decrease in consumption growth in 1988, 1989, 1994, 1999 and 2001.

In contrast to Turkey, the growth of government spending crowds out private consumption in Egypt. Higher government spending increases the deficit and raises the interest rate. Through this channel, private savings may increase, shrinking the growth of private consumption. Similar to the evidence for Turkey, monetary growth (lagged) increases liquidity and stimulates the growth of private consumption in Turkey. In contrast to the evidence in Turkey, there is no significant evidence of the change in oil price on private consumption in Egypt.

Similar to the evidence for Turkey, anticipated exchange rate appreciation does not determine the growth of private consumption significantly. Further, private consumption does not vary significantly with unanticipated currency appreciation. Unanticipated depreciation has a positive significant effect, shrinking the growth of private consumption. As noted for Turkey, depreciation increases the cost of imports and decreases consumption demand significantly in Egypt. In light of asymmetry, statistical significance of the Wald test indicates a reduction in consumption growth with exchange rate variability, on average over time, in Egypt.

Figure 3b of Appendix A illustrates fluctuations in real consumption demand with exchange rate shocks in Egypt. The distribution of observations indicates a clear positive correlation between exchange rate shocks and real consumption growth in Egypt over time.

B4. Fluctuations in Investment Growth

Table 3 indicates fluctuations in real investment growth with policy variables and fluctuations in the exchange rate in Turkey and Egypt.

Consistent with the effects of government spending in stimulating real output growth in Turkey, investment demand increases significantly. In contrast, monetary growth increases to stimulate investment demand during downturns. Nonetheless, the negative and significant effect on investment demand indicates failure of the monetary stimulus to revive investment demand in the current period. The positive spill over effect of an increase in the oil price on growth is consistent with a positive significant effect on investment demand in Turkey.

Both current and lagged anticipated appreciation have negative significant effects on investment growth. This confirms the negative effect of anticipated appreciation on the

25 Consumption of non-durables constitutes 60 per cent of total consumption, and is more-or-less stable for Turkey, i.e., it does not change much with output growth, the exchange rate, or price movements. However, consumption of durable goods is fluctuating and contributes to asymmetry in the behavior of total consumption with respect to unexpected exchange rate fluctuations.

supply side of the Turkish economy. As agents expect a reduction in external demand, the demand for investment decreases. The lagged value of the negative shock to the exchange rate (unanticipated depreciation) has a positive and significant effect on investment demand. Unanticipated depreciation increases the cost of imports and decreases investment demand in Turkey.

The Wald test indicates significant asymmetry in the effects of positive and negative exchange rate shocks on investment in Turkey. Figure 4a of Appendix A indicates fluctuations in real investment growth with exchange rate shocks in Turkey. Unanticipated depreciation decreased investment demand in 1994, 2001, and 2002.

Parameters of structural break indicate significant increase in investment demand in Turkey during the Gulf crisis in 1991. This could be a reflection of an increase in capital inflow from neighboring countries. In contrast, there was a significant decrease in investment growth surrounding the earthquake in 1999.

In contrast to the evidence for Turkey, government spending and the money supply do not stimulate private investment growth in Egypt. This rules out the role of stabilization policies in determining private investment in Egypt. Further, there is no evidence of a significant effect of changes in the oil price on investment demand in Egypt.

In contrast to the evidence for Turkey, exchange rate fluctuations, both anticipated and unanticipated, do not determine private investment significantly in Egypt. The structural break dummy indicates a significant reduction in investment growth in Egypt around the Gulf war in 1991.

Figure 4b of Appendix A indicates fluctuations in real investment growth with exchange rate shocks in Egypt. Despite insignificant time series coefficients, several episodes indicate a negative correlation between exchange rate shocks and real investment growth. Accordingly, unanticipated real depreciation (appreciation) stimulates (curbs) investment growth via improving (deteriorating) competitiveness.

B5. Fluctuations in Export Growth

Table 4 indicates fluctuations in real export growth with policy variables and fluctuations in the exchange rate in Turkey and Egypt.

The increase in government spending has a negative and significant effect on export demand in Turkey. Higher government spending increases the deficit and raises the interest rate (see above). As Turkey moved to liberalize the capital account, the inflow of capital led to currency appreciation, depressing competitiveness and export demand.

Monetary growth increases during downturns to stimulate export growth. Nonetheless, the negative and significant coefficient indicates ineffective monetary stimulus in the current period. The increase in energy price decreases export growth with a lag. Higher energy price increases cost, resulting in a higher price inflation (with a lag). Loss of competitiveness, through this channel, has a negative significant effect on export growth.

Anticipated appreciation of the exchange rate has a negative and statistically significant effect on export growth in Turkey. Anticipated appreciation decreases competitiveness, shrinking demand and switching production in favor of non-tradables. Lagged unanticipated depreciation has a negative and significant effect on export growth. Unanticipated depreciation stimulates export growth, although with a lag.

In light of asymmetry, exchange rate variability is likely to produce a net positive effect (via the more dominant depreciation channel) on export growth in Turkey. Wald test statistic is significant regarding asymmetry in the effects of exchange rate shocks on export growth.²⁶

In Figure 5a of Appendix A, negative exchange rate shocks stimulated real export demand in 1984, 1988, 1990, 1992, 1994, 2001, and 2002. The structural dummy is significant regarding the increase in export growth following integration into the Customs Union in 1996.

In contrast to the evidence for Turkey, export growth does not vary significantly with demand-side stabilization policies in the current period in Egypt, as approximated by the growth in government spending and the money supply.

The effect of a change in the oil price on export growth in Egypt varies over time. Higher oil price increases export growth significantly in the current period in Egypt. This is the result of an increase in oil exports. Nonetheless, higher energy price increases the cost of fuel and, in turn, the cost of production. This channel has a depressing effect on export growth in the next period.

Similar to the evidence for Turkey, anticipated currency appreciation discourages plans to produce tradables, decreasing real export growth in Egypt. Consistent with inelastic demand, export growth increases significantly with respect to lagged unanticipated appreciation of the real effective exchange rate in Egypt. In contrast, unanticipated depreciation increases export growth significantly, both in the current and lagged periods. Given evidence of asymmetry, exchange rate variability has a net positive effect, increasing export growth, on average over time, in Egypt. This is evident by the statistically significant Wald test statistic.

The significance of the dummy variable indicates significant increase in export growth in 1997. Egypt may have benefited from instability in East Asia by gaining more export markets.

Figure 5b of Appendix A illustrates asymmetry in the effects of exchange rate shocks on export growth in Egypt. Unanticipated appreciation appears to correlate with an increase in export growth in several episodes. In contrast, unanticipated depreciation leads mostly to an increase in export growth, although with a lag.

B6. Fluctuations in Import Growth

Table 4 indicates fluctuations in real import growth with policy variables and fluctuations in the exchange rate in Turkey and Egypt.

All variables are statistically insignificant in the empirical model for Turkey. The structural dummy indicates a significant increase in import growth following integration into the Customs Union in 1996. Figure 6a of Appendix A illustrates movements in import growth with exchange rate shocks in Turkey.

²⁶ This result would be interpreted as the macroeconomic consequence of microeconomic theories. Among the micro-based studies, there are a few studies discussing the asymmetric effects of exchange rate shocks. Most of them discuss these asymmetric effects within a micro-economic modeling framework. Froot and Klemperer (1989) and Knetter (1989) point out that the asymmetric response of stock prices to currency movements may occur due to asymmetric pricing-to-market (PTM) behavior. When the domestic currency appreciates, exporting firms with a market share objective do not permit local currency prices to increase because of the risk of losing their share, so they decrease their profit margins. Hence, exports do not decrease. On the other hand, under currency depreciations, exporting firms with a market share objective maintain, rather than increase, their profit margins as a result of their focus on sales volume. Therefore, exports increase with the increase in the market share. Other studies supporting the same arguments are Marston (1990) and Goldberg (1995).

Wald test results do not support significant asymmetry in the effects of unexpected exchange rate shocks on imports in Turkey. That is, the effects of both positive and negative shocks on movements in the exchange rate are insignificant.

The results for Egypt are very similar. None of the policy variables, including the real effective exchange rate, is statistically significant to explain the growth in real imports. Nonetheless, the sign and significance of the first dummy variable indicates significant reduction in real imports around the first Gulf crisis in 1991. Figure 6b of Appendix A illustrates movements in import growth with exchange rate shocks in Egypt.

As variables in the model are included to measure cyclical, lack of statistical significance indicates that imports in Turkey and Egypt follow a structural process that does not vary in the short-run with determinants of cyclical. This reflects high dependency on imports in both countries.

B7. Fluctuations in Trade Balance

Having analyzed the effects of exchange rate fluctuations on export and import growth, Figure 7a of Appendix A illustrates fluctuations in the trade balance in Turkey with exchange rate shocks. An appreciation of the exchange rate correlates with a deterioration in the trade balance in 1988, 1994, 1999, and 2001. A depreciation of the exchange rate correlates with an improvement in the trade balance in 1993, 1995, 2000 and 2004.

Figure 7b of Appendix A illustrates fluctuations in the trade balance in Egypt with exchange rate shocks. Clearly, the negative correlation spells out the importance of a depreciation in the real effective exchange rate to improvement in the trade balance over time.

SUMMARY AND CONCLUSION

The analysis has focused on the effects of exchange rate fluctuations using annual data for Egypt and Turkey between 1980 and 2004. To that end, a theoretical rational-expectations model that decomposes movements in the exchange rate into anticipated and unanticipated components is used. Anticipated changes in the exchange rate enter the production function through the cost of imported goods and producers' forecasts of relative competitiveness. Unanticipated currency fluctuations determine aggregate demand through exports, imports, and the demand for domestic currency, and determine aggregate supply through the cost of imported intermediate goods.

Let the exchange rate be the real price of the domestic currency in terms of a weighted average of the currencies of major trading partners. Anticipated movements in the exchange rate are assumed to vary with agents' observations of macro-economic fundamentals determining changes in the exchange rate over time. A positive shock to the exchange rate, an unanticipated appreciation of the domestic currency, decreases net exports and money demand and increases the output supplied. Based on the strength of each channel, the combined effects of demand and supply channels may determine the direction of output and price adjustments in the face of currency fluctuations.

In addition to fluctuations in the exchange rate, the empirical model accounts for the growth of government spending, the growth of the money supply, the change in the energy price, and a number of dummy variables for structural break. The dependent variables under investigation are real output growth, price inflation, and the growth in components underlying aggregate demand: real consumption, real investment, real exports, and real imports. Major highlights of the results are as follows.

The growth of government spending is an important determinant of economic conditions in Turkey. An increase in government spending stimulates real output growth and private demand for consumption and investment. Concurrently, the increase in the interest rate may result in an increase in capital inflows that appreciates the exchange rate. Through this channel, the increase in government spending decreases the growth of real exports. Overall, the increased demand attributed to government spending induces an increase in price inflation in the following year.

Compared to Turkey, the impact of growth in government spending appears less pervasive on economic activity in Egypt. Consistent with the evidence for Turkey, real growth increases significantly with government spending in Egypt. In contrast to the evidence for Turkey, higher growth of government spending decreases price inflation and private consumption growth. As the government supports subsidized goods, higher spending may curb price inflation. Moreover, higher government spending increases the interest rate, which supports an increase in private savings.

The economy in Turkey responds to the monetary stimulus with a lag. Hence, the transmission mechanism of monetary policy appears less effective, compared with fiscal policy, in providing an immediate stimulus to economic conditions during the current year. Accordingly, all real variables, including output growth, consumption growth, investment growth, export growth, and import growth respond negatively to an increase in monetary growth in the current period. Nonetheless, there is a contemporaneous inflationary effect with the increase in monetary growth. The stimulus effect of monetary growth is transmitted in the following year, as evident by the increase in real growth of output and consumption. Further, the inflationary effect of monetary growth persists beyond the current period.

Compared to Turkey, the inflationary effect of monetary growth is also evident and significant in the current period in Egypt. There is also a lag in the transmission of monetary growth to real activity. The stimulus effect of monetary growth is transmitted to real output and consumption growth after a year.

Both Egypt and Turkey are surrounded by a number of oil-producing countries (Iran and the Arab Gulf countries). There is evidence of a positive spillover effect from the increase in the oil price on real growth of output, consumption, and investment in Turkey. Concurrently, price inflation slows down, despite the increase in the oil price. The inflationary effect of the increase in oil price is evident in the following year. Through this channel, there is a reduction in real export growth in response to an increase in the oil price in the previous year.

As Egypt exports some oil, high oil price stimulates export growth in the current period. Nonetheless, higher fuel cost increases the cost of production, forcing a reduction in non-oil exports. This channel determines the response of exports to a change in the oil price in the following year.

Consistent with theory's prediction, anticipated exchange rate appreciation determines the supply side of the economy in Turkey. Anticipated appreciation generates expectations of a loss in competitiveness. Subsequently, producers shrink the output supply, which is inflationary. Concurrently, there is a reduction in real demand for investment and exports in the face of anticipated appreciation of the real effective exchange rate. The contractionary effects of anticipated appreciation on real growth and real investment demand persist into the following year.

The evidence for Egypt provides additional support for the impact of competitiveness in determining exports. Anticipated appreciation has a negative significant effect on export growth, although after one year. Producers adjust planned exports downward as they anticipate loss of competitiveness.

Consistent with theory's predictions, conflicting channels on the demand and supply sides render the effect of unanticipated currency appreciation insignificant in Turkey. The only exception is the lagged significant effect of unanticipated appreciation that counters price inflation. Nonetheless, there is a strong evidence of asymmetry in the effects of exchange rate shocks on the Turkish economy. More precisely, unanticipated depreciation appears to have more important effects, compared with unanticipated appreciation, on the Turkish economy. The significant effects of unanticipated depreciation appear to be lagged, however. Specifically, unanticipated depreciation (through the cost of imported goods) decreases real output growth and the growth of real private consumption and investment. Unanticipated depreciation increases the growth of real exports in the following year, as the improved competitiveness stimulates external demand.

Similar to the evidence for Turkey, the effects of unanticipated depreciation appears to be more pervasive in Egypt, compared to that of unanticipated appreciation. While exports appear inelastic to currency appreciation, a number of channels determine the effects of unanticipated depreciation in Egypt. Consistent with the competitiveness channel, unanticipated depreciation stimulates export growth. Consistent with the cost channel, unanticipated depreciation increases the cost of imports, decreasing consumption and real output.

The Turkish economy, over the time span under investigation (1980-2004), has experienced several structural breaks that mark important political and economic events. In 1988, there was an economic crisis that resulted in a significant decrease in real output growth and a significant increase in price inflation. In 1992, developments related to the Gulf crisis led to an increase in price inflation, coupled with an increase in investment growth. In 1996, integration into the Customs Union resulted in a significant increase in exports and imports, along with a significant decrease in price inflation. Finally, the earthquake of 1996 resulted in a reduction in the real growth of output and in the growth of private consumption and investment.

In Egypt, two major structural breaks are identified. In 1991, the first Gulf war resulted in a significant reduction in real output growth, along with a reduction in private investment and imports. In 1997, there was a major structural increase in exports, suggesting a shift in external demand to Egypt's exports in the aftermath of the Asian crisis.

Overall, the analysis provides interesting insights into determinants of cyclicity in economic activity in Egypt and Turkey. In Turkey, anticipated depreciation may be stimulating of real growth, albeit it may prove inflationary. In Egypt, anticipated depreciation may stimulate export growth. Moreover, variability of unanticipated exchange rate shocks could be detrimental, given asymmetry in the effects of the exchange rate. Higher variability of the real effective exchange rate around its anticipated value has a net negative effect on the trends of real growth of output, private consumption, and investment in Turkey. Similarly, higher variability of the real effective exchange rate around its anticipated value has a net negative effect on output and consumption growth in Egypt. Consistent with export-oriented strategy, the variability of the exchange rate has a net positive effect on export growth in Turkey and Egypt.

While adhering to a flexible exchange rate policy to boost competitiveness, managing fundamentals to reduce excessive volatility impinging on the economic system over time should top the policy agenda. Excessive volatility in the real effective exchange rate could be detrimental to real growth, over time, as the evidence for Turkey and Egypt illustrates in this paper.

REFERENCES

- Agenor, Pierre-Richard, 1991, "Output, Devaluation and the Real Exchange Rate in Developing Countries," *Weltwirtschaftliches Archive*, Band 127.
- Bahmani, Mohsen, 1991, "Are Devaluation Contractionary in LDCs?" *Journal of Economic Development*, (June).
- Barbone, Luca, and Francisco Rivera-Batiz, 1987, "Foreign Capital and the Contractionary Impact of Currency Devaluation, with an Application to Jamaica," *Journal of Development Economics*, Vol. 26, (June), pp. 1–15.
- Bruno, M., 1979, "Stabilization and Stagflation in a Semi-Industrialized Economy," in R. Dornbusch and J. Frankel, eds. *International Economic Policy*, Johns Hopkins University Press, Baltimore, MD.
- Buiter, William H., 1990, *International Macroeconomics*, Oxford University Press.
- Cooper, Richard N., 1971, "Currency Devaluation in Developing Countries," *Essays in International Finance*, No. 86, International Finance Section, Princeton University.
- Diaz-Alejandro, Carlos F., 1963, "Note on the Impact of Devaluation and Redistributive Effect," *Journal of Political Economy*, Vol. 71, (August), pp. 577–80.
- Dornbusch, Rudiger, 1988, *Open Economy Macroeconomics*, 2nd edition, New York.
- Edwards, S., 1986, "Are Devaluations Contractionary?" *Review of Economics and Statistics*, (August).
- Froot, K.A., and P.D. Klemperer, 1989. "Exchange rate pass-through when market share matters" *American Economic Review* 79, pp. 637-54.
- Goldberg, P.K., 1995, "Product Differentiation and Oligopoly in International Markets: The Case of the U.S. Automobile Industry," *Econometrica*, 63:891-951.
- Guittian, Manuel, 1976, "The Effects of Changes in the Exchange Rate on Output, Prices, and the Balance of Payments," *Journal of International Economics*, Vol. 6, pp. 65–74.
- Gylfason, T., and Radetzki, 1991, "Does Devaluation Make Sense in Least Developed Countries?" *Economic Development and Cultural Change*, (October).
- Gylfason, Thorvaldur, and Michael Schmid, 1983, "Does Devaluation Cause Stagflation?"

- Canadian Journal of Economics*, Vol. XV1, November.
- Hanson, James A., 1983, "Contractionary Devaluation, Substitution in Production and Consumption, and the Role of the Labor Market," *Journal of International Economics*, Vol. 14, pp. 179–89.
- Hirschman, Albert O., 1949, "Devaluation and the Trade Balance: A Note," *Review of Economics and Statistics*, Vol. 31, pp. 50–53.
- Hoffmaister A., and C. Vegh, 1996, "Disinflation and the Recession Now Versus Recession Later Hypothesis: Evidence from Uruguay," *IMF Staff Papers*, Vol. 43.
- Kamin, S.B., and J.H. Rogers, 2000, "Output and the Real Exchange Rate in Developing Countries: An Application to Mexico", *Journal of Development Economics*, 61: 85-109.
- Kandil, Magda and Ida Mirzaie, 2002, "Exchange Rate Fluctuations and Disaggregated Economic Activity in the US: Theory and Evidence," *Journal of International Money and Finance*, 21:1-31.
- Kandil, Magda, and Ida Mirzaie, 2003, "The Effects of Dollar Appreciation on Sectoral Labor Market Adjustments: Theory and Evidence," *Quarterly Review of Economics and Finance*, Vol. 43, No. 1, pp. 89–117.
- Knetter, M.M., 1989, "Price Discrimination by U.S. and German Exporters," *American Economic Review*, 79:198-210.
- Krugman, P., and L. Taylor, 1987, "Contractionary Effects of Devaluation," *Journal of International Economics*, No. 8, pp. 445–56.
- Lizondo, S., and P. J. Montiel, 1989. "Contractionary Devaluation in Developing Countries: Analytical Overview" *IMF Staff Papers* 36:182-227.
- Marston, R.C. 1990. "Pricing to Market in Japanese Manufacturing," *Journal of International Economics*, 29:217-236.
- Meade, James E., 1951, *The Theory of International Economic Policy, I: The Balance of Payment*, Oxford University Press, Oxford.
- Mendoza, E. G., 1992, "The Effect of Macroeconomic Shocks in a Basic Equilibrium Framework," *IMF Staff Papers*, 39, 4, pp. 855–89.
- Rogers, and Wang, 1995, "Output, Inflation, and Stabilization in a Small Open Economy: Evidence from Mexico," *Journal of Development Economics*, No. 46.
- Shone, Ronald, 1989, "Open Economy Macroeconomics," Harvester Wheatsheaf.

Solimano, Andres, 1986, "Contractionary Devaluation in the Southern Cone: The Case of Chile," *Journal of Development Economics*, No. 23, pp. 135–51.

Van Wijnbergen, Sweder Van, 1989, "Exchange Rate Management and Stabilization Policies in Developing Countries," *Journal of Development Economics*, No. 23, pp. 227–47.

Table 1. Real Exchange Rate Models ⁽⁺⁾

Turkey									
	constant	Drs _{t-1}	Drs _{t-2}	Dtb _{t-1}	Dtb _{t-2}	Dopen _{t-1}	Dopen _{t-1}	d1	d2
Drs _t	0.05	0.41	-0.10	1.40	1.14	-1.23*	0.13	0.20*	0.28*
	(1.20)	(1.49)	(-0.04)	(1.44)	(0.26)	(-2.43)	(0.33)	(2.04)	(2.71)
R ²	0.66								
Egypt									
	constant	Drs _{t-1}	Dtb _{t-1}	Dgt _{t-1}	d1	d2			
Drs _t	0.05*	0.37*	0.13*	0.71*	-0.44*	-0.41*			
	(2.47)	(2.78)	(0.52)	(2.26)	(-4.81)	(-4.44)			
R ²	0.74								

* indicates significance at the 5% level.

Table 2. Models of Output and Prices for Turkey and Egypt

Variables	Turkey		Egypt	
	Dy _t	DP _t	Dy _t	DP _t
Constant	0.12* (5.66)	0.05 (1.28)	0.02 (1.08)	0.01 (0.41)
Dg _t	0.54* (6.34)	-0.31 (-1.39)	0.12* (1.91)	-0.16* (-1.97)
Dg _{t-1}	0.10 (1.31)	0.44* (2.23)	0.06 (1.40)	-0.01 (-0.21)
Dm _t	-0.30* (-7.87)	0.58* (6.89)	-0.02 (-0.23)	0.51* (4.16)
Dm _{t-1}	0.21* (6.04)	0.21* (2.79)	0.20 (2.01)	0.12 (0.90)
Do _t	0.64* (11.19)	-0.53* (-2.43)	-0.05 (-0.72)	-0.14 (-1.51)
Do _{t-1}	-0.13 (-1.56)	0.71* (3.24)	-0.07 (-1.15)	-0.17 (-1.33)
E _{t-1} Dr _s	-0.30* (-5.12)	0.65* (4.51)	0.04 (0.87)	0.06 (0.91)
E _{t-2} Dr _s	-0.17* (-3.54)	-0.01 (-0.07)	0.05 (1.61)	-0.07 (-1.61)
pos _t	-0.33 (-1.72)	-0.09 (-0.24)	-0.26 (-1.74)	0.21 (0.87)
pos _{t-1}	-0.09 (-0.60)	-1.15* (-2.59)	-0.06 (-0.41)	0.09 (0.40)
neg _t	0.19 (0.21)	0.39 (1.26)	0.05 (0.38)	0.31* (2.07)
neg _{t-1}	0.39* (11.13)	0.18 (0.98)	0.13 (0.97)	0.14 (0.74)
d1	-0.06* (-4.06)	0.16* (4.19)	-0.05* (-3.00)	
d2		0.08* (2.45)		
d3		-0.13* (-3.71)		
d4	-0.15* (-12.20)			
R ²	0.98	0.99	0.59	0.95
Asym	12.64*	5.16*	3.94*	0.11

Dy is real output growth and Dp is aggregate price inflation.

* indicates significance at the 5% level, Asym is the result of the Wald test where the null hypothesis is no asymmetry.

The explanatory variables of the model are the growth rates of g_t for government spending, m_t for the money supply, o_t for energy prices, E_{t-1}Dr_s for expected change in the real exchange rate, pos_t for unanticipated exchange rate appreciation, neg_t for unanticipated exchange rate depreciation, and dummy variables for structural breaks, d1 for the economic crisis in 1988, d2 for the Gulf crisis in 1992, d3 for integration in the Customs Union in 1996, and d4 for the earthquake in 1999. For Egypt, d1 is for the Gulf crisis in 1991 and d2 is for 1997 for the Luxor attack, the recession of the Arab countries and the Asian Crisis.

Table 3. Models of Consumption and Investment for Turkey and Egypt

Variables	Turkey		Egypt	
	Dc _t	Di _t	Dc _t	Di _t
Constant	0.09* (2.58)	0.45* (3.49)	0.14* (4.48)	0.08 (0.36)
Dg _t	0.74* (3.75)	2.81* (3.17)	-0.25* (-2.71)	0.07 (0.13)
Dg _{t-1}	-0.12 (-0.71)	-0.07 (-0.12)	-0.21* (-2.93)	-0.33 (-0.85)
Dm _t	-0.19* (-2.80)	-0.65* (-2.87)	-0.07 (-0.38)	-0.91 (-1.05)
Dm _{t-1}	0.15* (2.05)	0.15 (0.61)	0.38* (2.04)	1.10 (1.16)
Do _t	0.78* (3.39)	3.30* (4.75)	0.10 (0.64)	-0.61 (-0.77)
Do _{t-1}	-0.15 (-0.79)	-1.03 (-0.81)	-0.14 (-0.77)	-0.53 (-0.77)
E _{t-1} Dr _{s_t}	-0.25 (-1.88)	-0.99* (-2.29)	0.02 (0.31)	0.49 (1.07)
E _{t-2} Dr _{s_{t-1}}	-0.05 (-0.56)	-1.20* (-2.75)	0.07 (1.08)	-0.11 (-0.32)
pos _t	-0.42 (-1.20)	-0.84 (-0.65)	0.20 (0.70)	-3.17 (-1.33)
pos _{t-1}	-0.23 (-0.51)	-1.40 (-1.12)	-0.18 (-0.72)	1.00 (0.47)
neg _t	0.13 (0.56)	-0.16 (-0.19)	1.00* (4.43)	0.22 (0.16)
neg _{t-1}	0.51* (2.67)	2.46* (2.13)	0.18 (0.83)	-0.16 (-0.14)
d1			-0.05 (-1.19)	-0.42* (-2.43)
d2		0.17* (2.34)		
d3				
d4	-0.13* (-3.62)	-0.55* (-4.48)		
R ²	0.90	0.89	0.93	0.58
Asym	2.96*	3.57*	3.14*	0.24

* indicates significance at the 5% level, Asym is the result of the Wald test where the null hypothesis is no asymmetry.

The explanatory variables of the model are the growth rates of g_t for government spending, m_t for the money supply, o_t for energy prices, E_{t-1}Dr_{s_t} for expected change in the real exchange rate, pos_t for unanticipated exchange rate appreciation, neg_t for unanticipated exchange rate depreciation, and dummy variables for structural breaks, d1 for the economic crisis in 1988, d2 for the Gulf crisis in 1992, d3 for integration in the Customs Union in 1996, and d4 for the earthquake in 1999. For Egypt, d1 is for the Gulf crisis in 1991 and d2 is for 1997 for the Luxor attack, the recession of the Arab countries and the Asian Crisis.

Dc is growth of real consumption, and Di is growth of real investment.

Table 4. Models of Exports and Imports for Turkey and Egypt

Variables	Turkey		Egypt	
	Dx _t	Dim _t	Dx _t	Dim _t
Constant	0.09 (1.70)	0.22 (1.22)	-0.35* (-2.04)	0.10 (0.62)
Dg _t	-1.09* (-4.30)	0.63 (0.77)	0.15 (0.44)	0.17 (0.32)
Dg _{t-1}	0.12 (0.43)	-0.50 (-0.84)	0.47 (0.82)	-0.53 (-1.63)
Dm _t	-0.20* (-2.78)	-0.49 (-1.66)	0.36 (0.38)	-1.04 (-1.53)
Dm _{t-1}	0.18 (1.81)	0.34 (0.73)	0.27 (0.36)	1.10 (1.06)
Do _t	0.28 (1.26)	0.64 (0.60)	2.01* (3.08)	-0.19 (-0.24)
Do _{t-1}	-0.69* (-2.51)	-0.54 (-0.74)	-1.32* (-2.34)	-0.82 (-0.96)
E _{t-1} Dr _{s_t}	-0.40* (-3.24)	-0.06 (-0.09)	0.08 (0.29)	-0.01 (-0.02)
E _{t-2} Dr _{s_{t-1}}	0.17 (1.57)	-0.07 (-0.11)	-0.65* (-2.21)	-0.12 (-0.45)
pos _t	0.14 (0.32)	0.10 (0.04)	-0.56 (-0.38)	-0.62 (-0.30)
pos _{t-1}	0.34 (0.67)	-2.05 (-1.31)	3.09* (3.27)	-0.26 (-0.24)
neg _t	-0.22 (-0.59)	0.07 (0.10)	-2.49* (-1.98)	-0.33 (-0.19)
neg _{t-1}	-0.80* (-2.54)	0.45 (0.72)	-3.12* (-2.37)	1.37 (0.88)
d1				-0.96* (-5.28)
d2			0.41* (4.57)	
d3	0.10* (3.86)	0.27* (3.32)	0.78 5.62*	0.78 0.42
d4				
R ²	0.90	0.85		
Asym	8.08*	0.49		

* indicates significance at the 5% level, Asym is the result of the Wald test where the null hypothesis is no asymmetry.

The explanatory variables of the model are the growth rates of g_t for government spending, m_t for the money supply, o_t for energy prices, E_{t-1}Dr_{s_t} for expected change in the real exchange rate, pos_t for unanticipated exchange rate appreciation, neg_t for unanticipated exchange rate depreciation, and dummy variables for structural breaks, d1 for the economic crisis in 1988, d2 for the Gulf crisis in 1992, d3 for integration in the Customs Union in 1996, and d4 for the earthquake in 1999. For Egypt, d1 is for the Gulf crisis in 1991 and d2 is for 1997 for the Luxor attack, the recession of the Arab countries and the Asian Crisis.

Dx is growth of real exports and Dm is growth of real imports.

APPENDIX A. FIGURES ON TURKEY AND EGYPT

Figure 1a. Output Growth and Unexpected Real Exchange Rate Shocks for Turkey

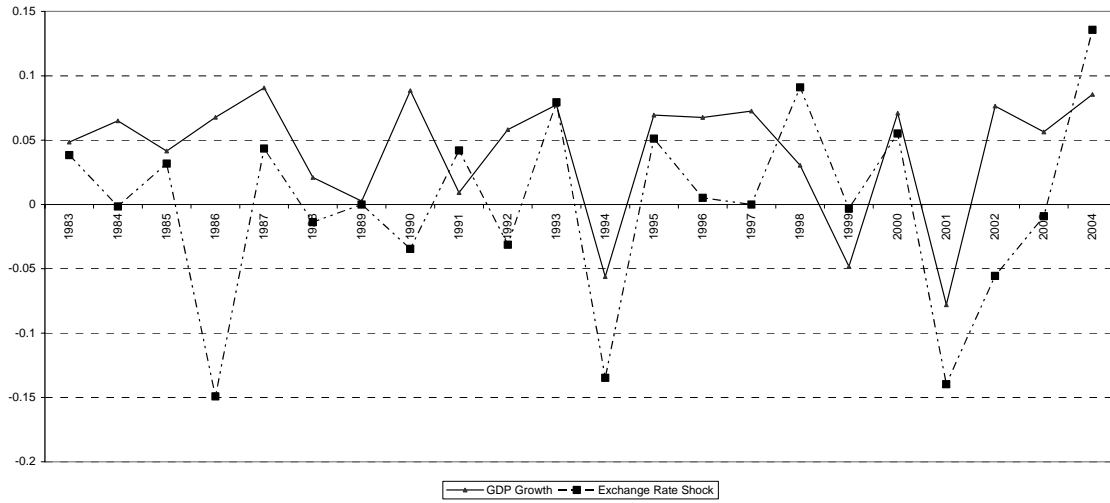


Figure 1b. Output Growth and Unexpected Real Exchange Rate Shocks for Egypt

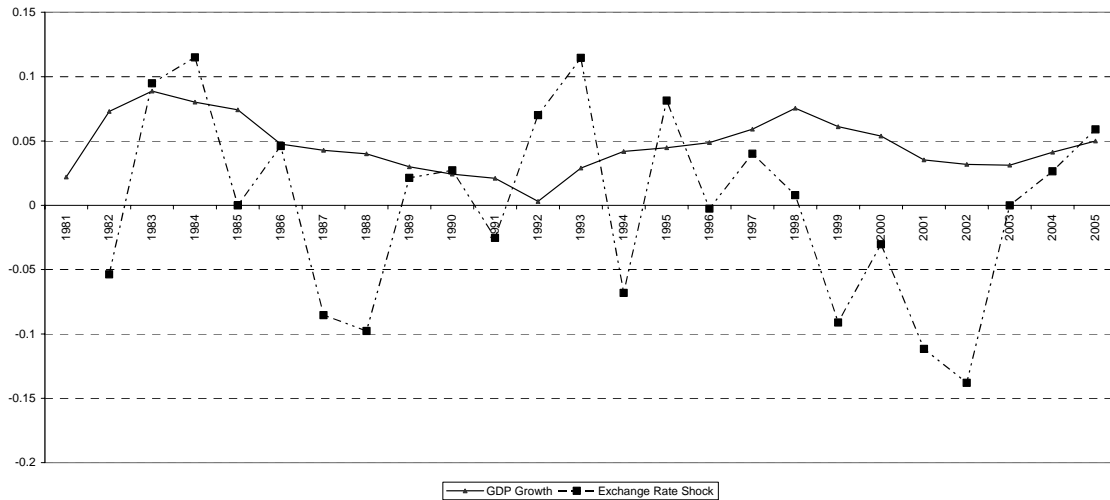


Figure 2a. CPI Inflation and Unexpected Real Exchange Rate Shocks for Turkey

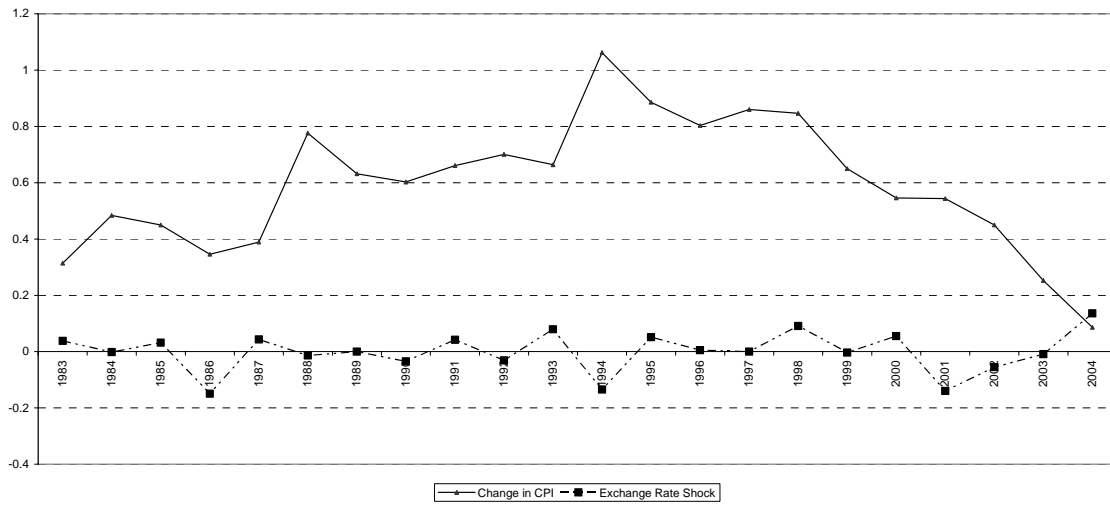


Figure 2b. CPI Inflation and Unexpected Real Exchange Rate Shocks for Egypt

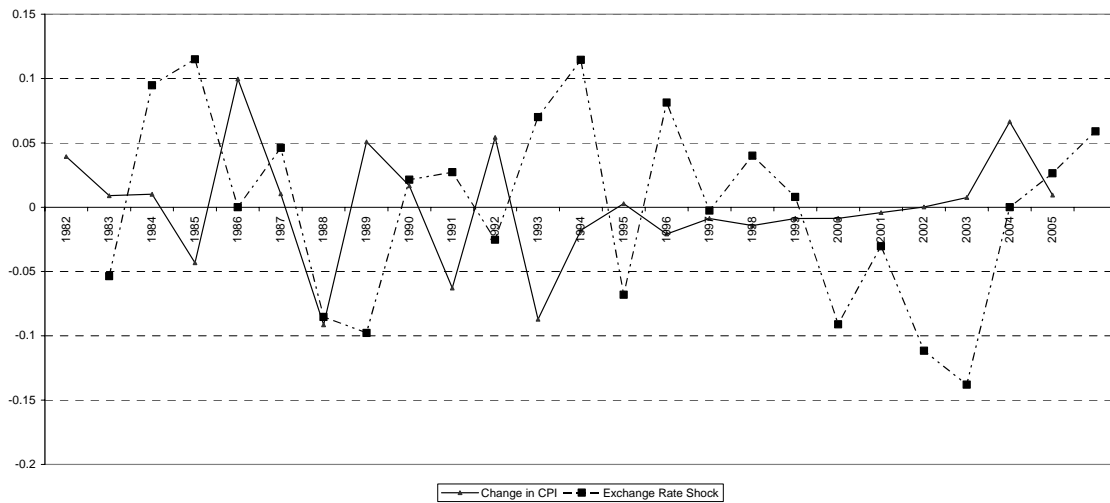


Figure 3a. Consumption Growth and Unexpected Real Exchange Rate Shocks for Turkey

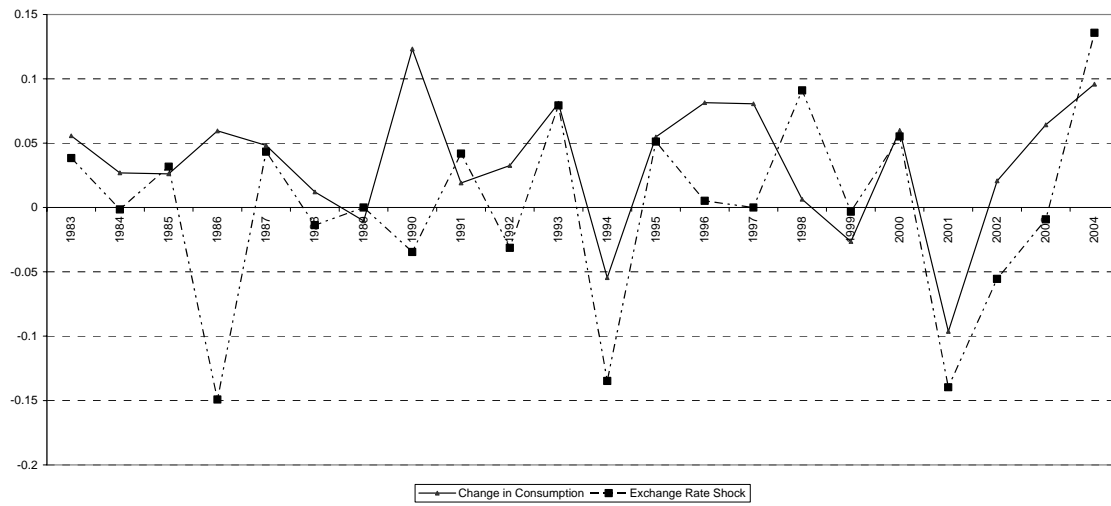


Figure 3b. Consumption Growth and Unexpected Real Exchange Rate Shocks for Egypt

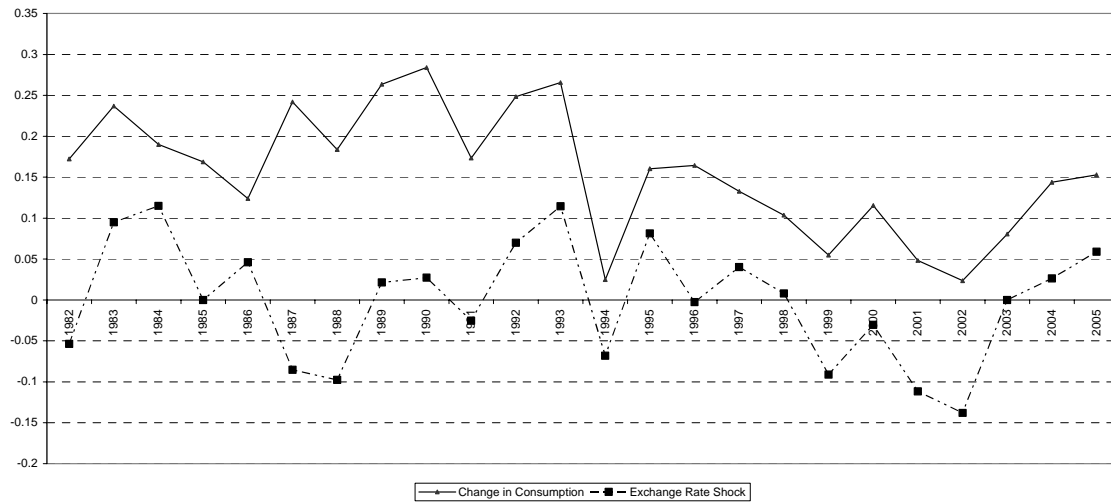


Figure 4a. Investment Growth and Unexpected Real Exchange Rate Shocks for Turkey

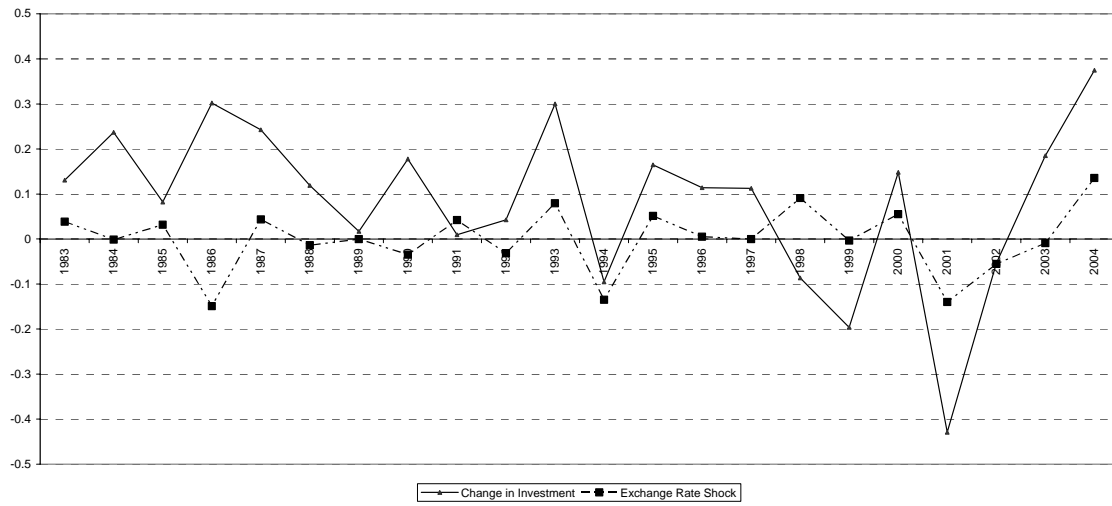


Figure 4b. Investment Growth and Unexpected Real Exchange Rate Shocks for Egypt

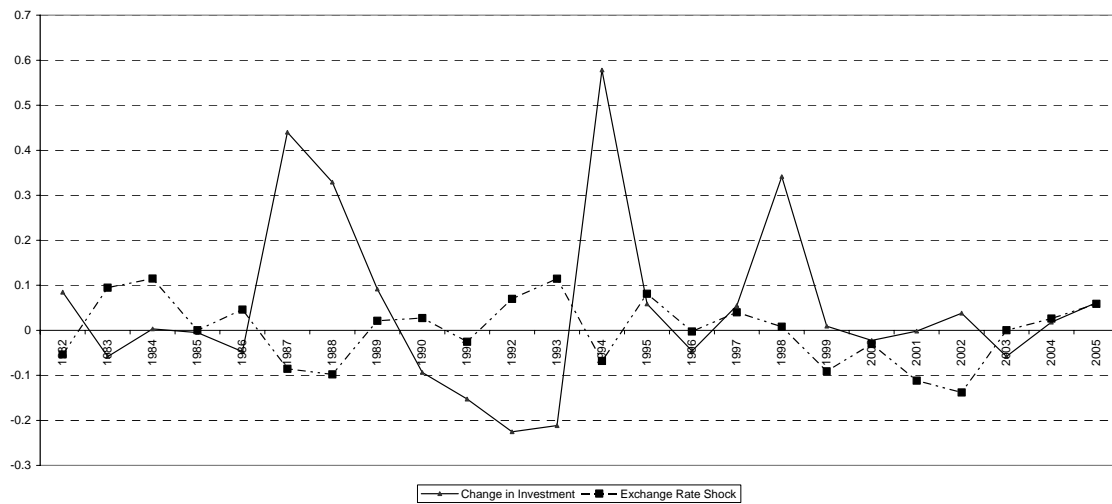


Figure 5a. Export Growth and Unexpected Real Exchange Rate Shocks for Turkey

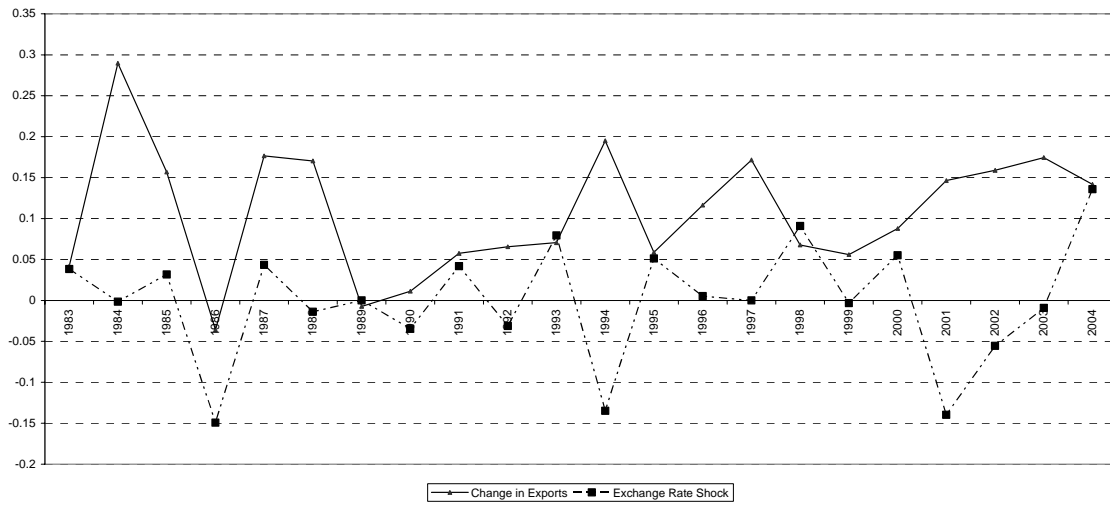


Figure 5b. Export Growth and Unexpected Real Exchange Rate Shocks for Egypt

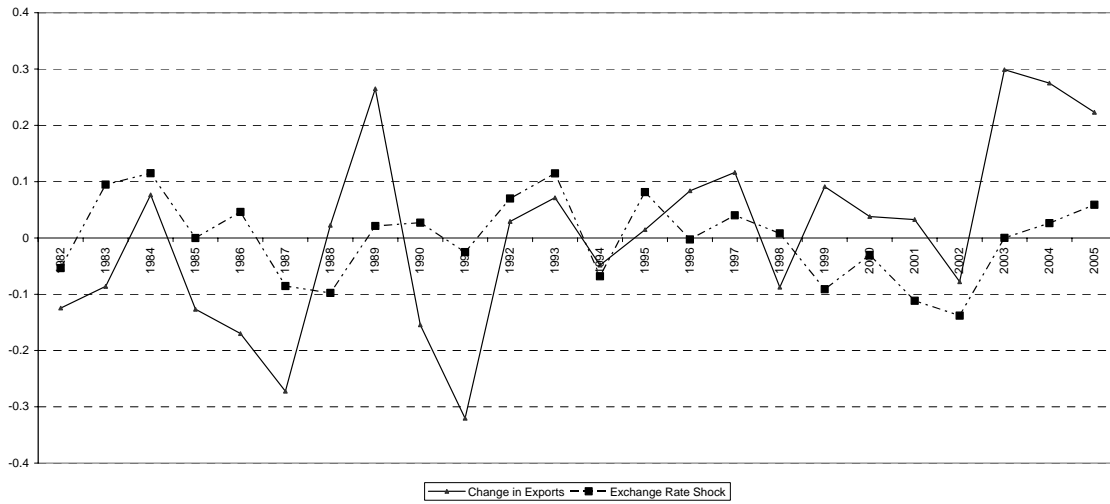


Figure 6a. Import Growth and Unexpected Real Exchange Rate Shocks for Turkey

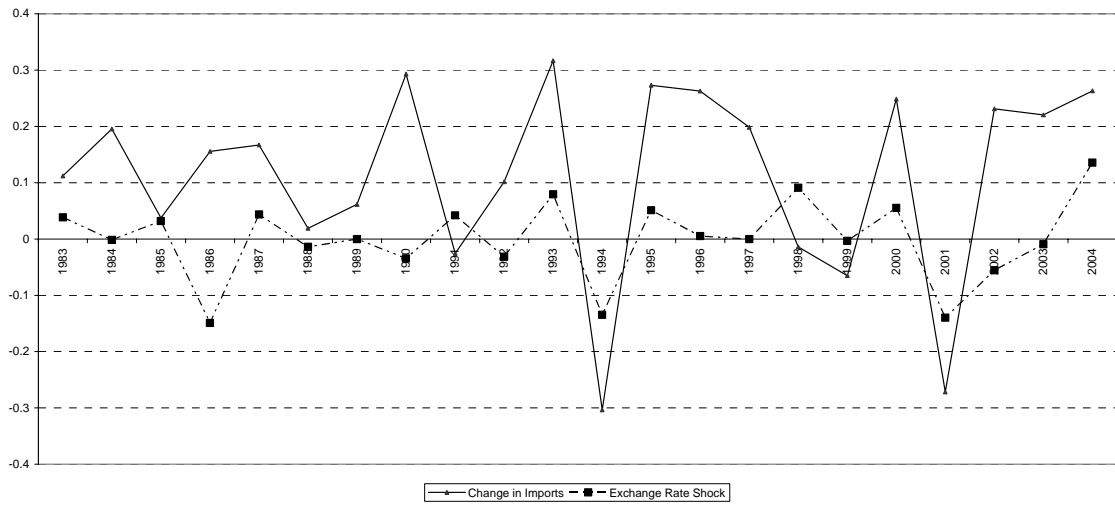


Figure 6b. Import Growth and Unexpected Real Exchange Rate Shocks for Egypt

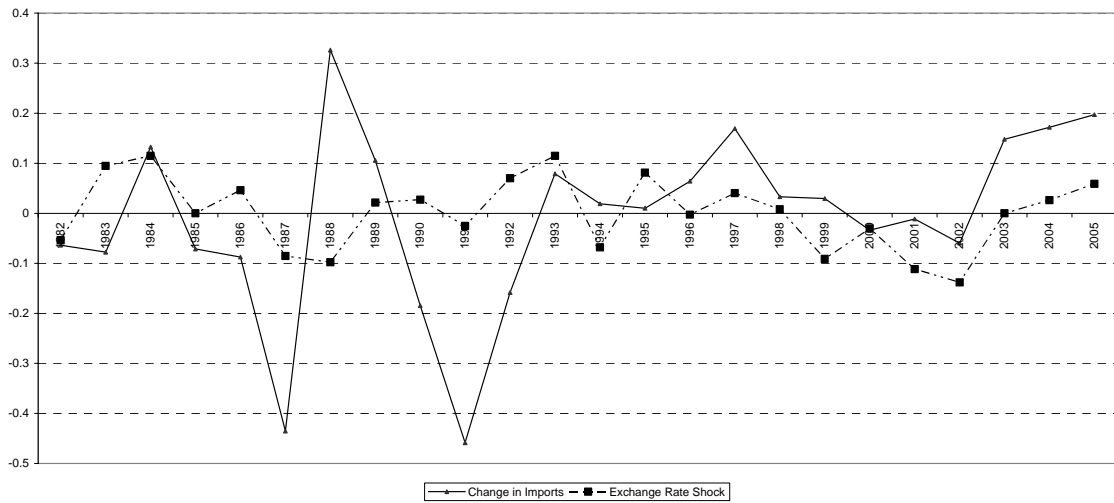


Figure 7a. Trade Balance and Unexpected Real Exchange Rate Shocks for Turkey

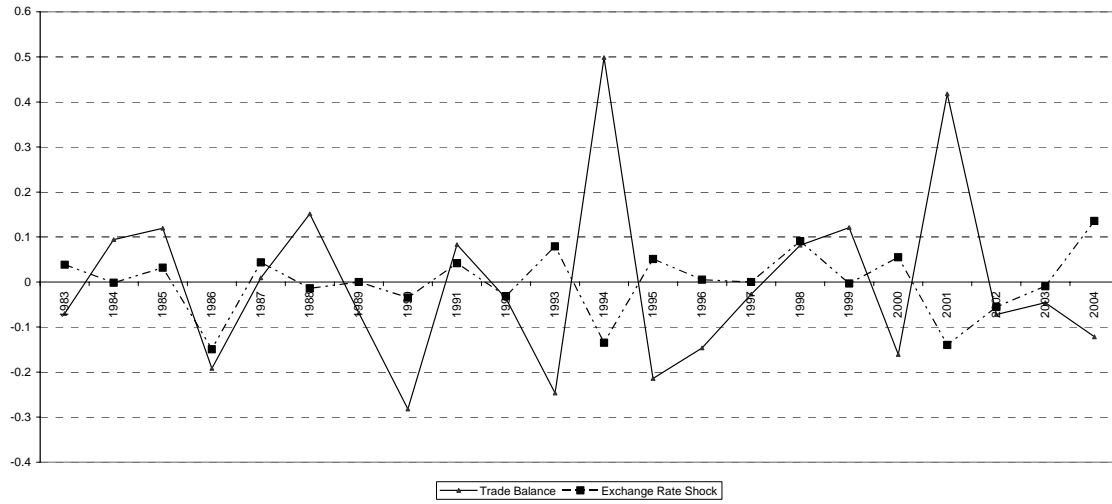
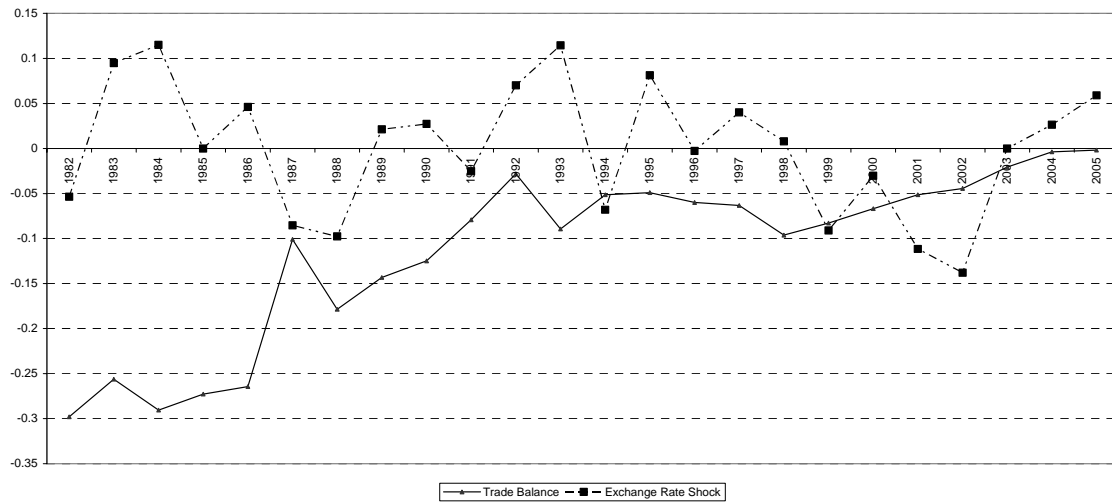


Figure 7b. Trade Balance and Unexpected Real Exchange Rate Shocks for Egypt



APPENDIX B.

DATA Description and Sources

The analysis is based on an annual data set which covers the 1980-2004 period.

Data Sources: Turkey

Real exchange rate is the trade weighted real exchange rate from Central Bank of Republic of Turkey (CBRT).

Price inflation is the official consumer price index of CBRT.

Money is represented by M2Y.

Real output is GDP in 1987 prices which is announced by the State Institute of Statistics of Turkey.

Real private consumption, real government consumption, and real investment are from the State Institute of Statistics in 1987 prices.

Exports and imports are taken from the balance of payments statistics of the CBRT. The figures are deflated by the price index and real figures are used in the analysis for consistency purposes.

Trade balance is the difference between exports and imports, and openness is the ratio of the sum of exports and imports to GDP.

Data Sources: Egypt

All variables are provided by the Desk Economist for Egypt, International Monetary Fund. Figures are compiled in consultation with the Egyptian authorities or based on IMF staff estimates.

Energy prices:

Prices are taken from the International Energy Agency Yearbook.