ESTIMATING AN IMPORT FUNCTION FOR TURKEY*

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ABSTRACT

This paper incorporates two different model specifications to estimate an import demand function for Turkey. The estimation performance of the two models is compared and contrasted for the period 1987Q1-1999Q1 by using quarterly data. The significance of variables that affect import demand is individually and jointly tested. Also, the short run elasticities of the two models are compared. The first model estimates imports using the Engle-Granger approach. It is found that in the long run, income level, nominal depreciation rate, inflation rate and international reserves significantly affect imports. While international reserves significantly affect imports, the import function is estimated to be price and income inelastic. In the short run, however, inflation growth and growth of international reserves lose their significant impact on imports and income elasticity improves. In addition, the effect of depreciation rate increases. Export growth and a dummy that captures the crisis in the second half of 1998 and first quarter of 1999 are also found to have significant effects on import growth in the short run. The second approach models import demand using the Bernanke-Sims structural VAR method. The findings indicate that anticipated changes in the real depreciation rate and unanticipated changes in the income growth and real depreciation rate have significant effects on import demand growth. Income growth is effective in both models. Better results are obtained in the former approach with the nominal depreciation rate. However, real depreciation rate fits better in the latter approach.

Keywords: Import function, Engle-Granger methodology, Bernanke-Sims structural VAR.

I. INTRODUCTION

Over the last 19 years Turkey has been undergoing structual adjustments and transformations. One part of this development is related to foreign trade. Turkey shifted from import substitution to export promotion policies with the January 1980 adjustment program. In the subsequent years, Turkey implemented several foreign trade liberalization programs. In the case of imports, trade regime shifted from positive list, the items which are free to import, to negative list, the items which are prohibited to import or requiring legal authority approval. Through this regime shift imports were extensively liberalized except for the items included in the negative list. The second major step in the liberalization of the imports was the acceptance of Turkey into the European Customs Union in 1996.

The main aim of the study is to assess Turkish import developments in the light of domestic income, exchange rate and

foreign exchange reserve movements. Turkey's import demand function is estimated by using two different econometric methods. The first one incorporates long run dynamics into short run developments, Engle-Granger Two Step Cointegration procedure, and the second one concentrates on short run impulse response relations among variables under consideration, Bernanke-Sims VAR approach. Afterwards, the findings of the these two approaches are compared.

The study is organized as follows: in the second part, Turkish foreign trade developments are summarized for the 1980-99 period. In the third part, some empirical studies on the estimation of the import demand function are discussed. Then the applied econometric methods and some basic concepts are introduced. The empirical results are presented in the fifth part with economic interpretation of the results. The sixth part compares and contrasts basic conclusions of the two approaches. The last part concludes.

II. TURKISH EXPERIENCE: 1980-1999 PERIOD

After experiencing a severe balance of payments crisis in the late 1970s, Turkey changed its policies in a radical manner in 1980, shifting from an import substitution program to a more outward oriented program which was called an export promotion program.

In this respect, most quantitative restrictions on imports were reduced to a great extent in the early 80s. Throughout this period, custom duties were reduced and number of commodities subject to tariffs were reduced. Tax rebates, import replenishments, foreign exchange retention and preferential export credits were the tools of intensified export incentives (Uygur, 1993). In particular, tariffs on raw material and intermediate goods imports were decreased. In 1981,

there were two main sets of reforms. First, quota lists were abolished. Second, some administrative reforms were put into effect, such as lowering the stamp duty and guarantee deposits. In 1984, import regime was altered, constituting a major break. Tariff barriers were redefined. A list of items, the importation of which was prohibited or subject to prior approval, was introduced.

In addition, an exchange rate policy, involving the depreciation of Turkish lira (TL) in real terms, was the main policy variable that promoted exports in the early 80s. It aimed at meeting the foreign exchange needs and restructure the economy towards export promotion. Also, TL was considered to be overvalued in the late 70s during the fixed exchange rate regime. Such an overvaluation was another reason for the adjustment of the exchange rate. In the 1980-84 period, the real effective exchange rate was depreciated by 36 percent.

There was a utilization of excess manufacturing capacity in the export sector during this period due to low domestic demand in import substitution period. Moreover, negative growth rates in that phase were followed by an upturn of imports because of reduced domestic demand and high growth rates after 1980 (Şenses, 1990). Wages were declining in real terms. As a consequence, the exports to GNP ratio grew faster than imports to GNP ratio which reduced trade deficit.

By the end of 1984, foreign exchange controls were relaxed by allowing residents to hold foreign exchange deposits. Yet, with the worsening in trade balance, some surcharge rates were reinforced. In the 1985-88 period, real depreciation of the TL was slower. However, improvement in the terms of trade (TOT) continued, especially with

the decline in oil prices. Increase in the real wages after 1986 had a positive effect on domestic demand growth.

In 1989, capital accounts are totally liberalized. Furthermore, the surcharge rates that had been imposed in 1984 were abolished. After capital account liberalization in 1989, there was a policy shift from exports promotion to capital inflows promotion. This policy shift was mainly carried out by real appreciation after 1989. However, there were two corrections, namely the 1991 Gulf Crisis and the 1994 Currency Crisis, which led to 10.3 and 41.3 percent devaluations, respectively. The second major step in the liberalization of imports was the acceptance of Turkey into the European Customs Union in 1996.However, the liberalization of capital account increased both the volume and volatility of capital flows from 1989 onwards.

Especially after 1992, an increasing trend can be observed in imports. In this period, following the above developments, a great shift was observed in imports. As a consequence, the average annual growth rate of exports lagged behind the average annual import expansion. Exports increased by 10 percent while imports increased by 15 percent annually on average.

III. LITERATURE SURVEY

Import function constructions usually appear as a part of balance of payments block of macroeconomic/macroeconometric models. An econometric model of the Reserve Bank for the New Zealand economy (XII) was estimated by Brooks and Gibbs (1994). The model is estimated by OLS using two step cointegration/error-correction Engle Granger methodology. Imports of goods are modeled at a disaggregated level. Imports of goods are split into 4 sub-categories by the major SITC codes. Imports of goods in the long

run are modeled as a function of an appropriate domestic demand variable and price of the particular category of imports relative to domestic output price adjusted for the effective tariff rate. The weighted average price elasticity is found to be -0.6 in the long run.

Simulations in the model aim to obtain a better understanding of the reaction of the model to various policy changes or shocks and as a consequence, provide linkages in the model. Real exchange rate is found to influence the import demand. When there is a fall in the nominal exchange rate, it decreases the 90-day interest rate, raisies the relative price of tradables -both exportables and importables- leading to import substitution. This effect occurs when the rise in the nominal exchange rate is permanent.

In the macroeconomic model of the Federal Reserve Board for the United States (1996) developed by FED Division of Research and Statistics, the real imports equation is defined by open-interest parity arbitrage with an expected long-term real interest rate and a country risk premium, which is a function of US net foreign indebtedness. In addition, non-oil imports are modeled as a function of domestic GDP and relative price of imports where all variables are in log forms. These equations are estimated by OLS as an error-correction formulation, where a long run neoclassical condition for equilibrium and short run sticky price disequilibria are assumed. Long run income elasticities are constrained to unity and long run price elasticities to minus unity. An unrestricted Vector Autoregression (VAR) estimation is used and system responses to transitory and permanent shocks are analyzed. Yet, there are no variables related to the external sector in the system. It is a three-variable system of aggregate output, inflation and the federal funds rate.

A small macroeconometric model was developed and estimated by Haque, *et al.* (1990). Generalized, non-linear, three-stage least squares estimation is used due to the non-linearities and cross equation restrictions in the model for the annual data over the period 1963-87. The conventional specification that real imports are negatively related to the real exchange rate and positively to real domestic output is assumed. A lagged import term is added in the equation to capture partial adjustment behavior. In developing countries, restricted foreign exchange availability may act as a constraint. As a consequence, one period lagged reserve-import ratio is added in the equation. All expected signs of the parameters are significantly realized in the estimation results. Real imports are found to be real exchange rate inelastic and income inelastic.

An econometric model of the Kenyan economy was constructed by Elliot, *et al.* (1986). This model describes a small and open economy that is affected by the world credit and commodity market conditions and sensitive to world commodity price movements. Therefore, imports are disaggregated as petroleum and non-petroleum imports and OLS estimation technique is applied for the period 1968-80. Kenyan exports of refined petroleum products depend on petroleum imports to a great extent. As a consequence, petroleum imports are estimated as a function of exports of refined petroleum products and real GDP, where both variables have a positive impact on petroleum imports. The negative impact of the break down of East African Community is represented by an intercept dummy, which has a negative impact on petroleum imports. In addition, non- petroleum imports are estimated as a function of real GDP, net foreign assets divided by the real exchange rate and the GDP price deflator divided by the other commodity imports prices. All

variables in the equation have significant positive effects on non-petroleum imports.

In the study by Deyak, *et al.* (1989), the stability of the U.S. aggregate and disaggregated import demand functions were considered. These functions are estimated by OLS from 1958:Q4 to 1983:Q4. Import demand is disaggregated by economic class: crude foods, crude materials, manufactured foods, semi-manufactured foods, and finished manufactures. All real import definitions are estimated on the ratio of the import unit index to the US wholesale price index multiplied by the one period lagged value of that ratio; the real GNP multiplied by the one period lagged value of real GNP; one period lagged value of the dependent variable and seasonal dummies. Except for the crude materials, estimated price elasticities have the correct negative sign and they are statistically significant. For the income elasticities, the significant positive sign is estimated again except for the crude materials. The coefficient of the lagged dependent variable is also significantly positive.

A disequilibrium monetary model is constructed as a quarterly macroeconometric model for Turkey by Özatay(1997). The 1977:Q1-1996:Q4 period is covered in the estimation. The model is estimated by two-step procedure of Engle-Granger methodology. Total imports of goods in US dollars are explained as a function of real income and real exchange rate. The hypothesis is the existance of long run relationships between the level of real imports and real manufacturing output, real total investments and real exchange rate. The short run dynamics is modeled as an adjustment to this long run relationship. In the long run, income is found to be significant but it loses its significance in the short run. There is a correction to the long run equilibrium every period in the short run. Real exchange rate is

negatively influencing total imports of goods, both in the long and short run.

Erlat and Erlat (1991) study Turkish export and import performance and use annual data for the period 1967-87. Export supply, export demand and import demand functions are estimated by OLS first, then three equations are estimated as a set of seemingly unrelated regressions. Total volume of imports is regressed on domestic real income, price of imports (including tariffs) divided by domestic prices, real international reserves and one period lagged value of the dependent variable. Two dummies are introduced for the years 1978 and 1979 to explain the structural shift. International reserves are found to be the most important variable in explaining import demand. Relative prices, however, have no significant explanatory power on import demand.

A RMSM-X model was constructed by Everaert *et al.* (1990) for Turkey. Imports, as a part of the expenditure side functions, are disaggregated into consumption, investment, intermediate goods imports and non-monetary gold imports (which is assumed to be exogenous). The first three are estimated as a function of total consumption, total investment and GDP, respectively. Real exchange rate is also added as an explanatory variable. For the period 1988-1995, consumption and investment imports are found to be real exchange rate elastic, however intermediate imports are inelastic.

In the study by Saygılı, *et al.* (1998), long run and short run export and import functions are estimated in order to test how good the measures of competitiveness predict trade performance of Turkey. Import demand is estimated by domestic income, real effective exchange rate and a number of competitiveness indicators. The Johansen cointegration technique is used for long run estimation.

Estimation results reveal that domestic income is the most significant variable in the explanation of imports. Results show that short run income elasticity of imports is significant and 0.85. In the short run, real effective exchange has a significant coefficient with the expected sign but in the long run, it loses its significance on imports.

IV. EMPIRICAL RESULTS

IV.1. The Data

Quarterly data of gross national product, nominal exchange rate basket which is weighted by an average of US dollar and German mark with weights 1 and 1.5 respectively, total international reserves, total nominal export volume, consumers price index (1987=100) and total nominal non-oil import volume are used in this study.

Turkey is considered to be an open and small country. Hence, developments in the world commodity prices are easily reflected on trade volume. Due to the fact that oil imports depend strongly on world oil prices and that changes in oil prices are considered as exogenous shocks, oil imports are excluded from the total imports. Such price shocks may adversely affect our estimation results. Therefore, it is preferable to estimate the import function excluding oil imports.

All variables are in US dollar terms. The sample period of estimation is from 1987:Q1 to 1999:Q1. Data sources of the estimations are the Central Bank of the Republic of Turkey and State Institute of Statistics.

IV.2 Unit Root Tests

The following abbreviations are used from this part onwards:

lnM: Log of total nominal non-oil import volume in US dollars

lnY: Log of gross national product in US dollars

dlnY: first difference of gross national product in US dollars (growth of income)

lnX: Log of total nominal exports in US dollars

dlnX: first difference of total nominal exports in US dollars (export growth)

lnCPI: Log of consumer price index

dlnCPI: Inflation rate

lnEX: Log of nominal exchange rate basket

dlnEX: Nominal depreciation rate

ddlnEX: second difference of nominal exchange rate basket (growth of depreciation rate)

Res: Log of total international reserves

First, the presence of unit root in the variables, that would be used in the estimation, is tested. Standard ADF test procedure is used for this purpose.

TABLE 1

Variable	Level (with trend)	Level (without trend)	First Difference	Second Difference
LnM	-3.3665	-1.1484	-3.9136***	
LnY	-4.0300	-1.8237	-4.8971***	
LnX	-2.3878	-0,2594	-2,6438*	
LnCPI	2.3293	2.7105	-2.0416	-1.6223**
LnEX	2.7167	2.8622	1.7572	-2.3650**
LnEXR	-0,3400	-2,4900	-5,2500***	
RES	-2.7943	0.2951	-3.5079**	

*, ** and *** denotes significance at 10%, 5% and 1% levels, respectively. VAR length is taken as 4 in the ADF tests.

It is apparent from ADF test results that price level and exchange rate are I(2) while income, exports, non-oil imports and international reserves are I(1). The unit root null is rejected at 5% significance level for the second differences of exchange rate and inflation, and for the first difference of international reserves. At 1% significance level, we are able to reject the first differences of income level, exports and non-oil imports (Table 1).

IV.3 Cointegration Analysis

IV.3.a. Long Run Equilibrium

The first step is to recover a long run relationship between non-oil imports (M), income level (Y), nominal depreciation rate (dlnEX), inflation rate(dlnCPI) and international reserves(RES). By including all I(1) variables in the estimation, existence of a long run equilibrium is tested.

$$lnM_t=b_0+b_1lnY_t+b_2dlnEX_t+b_3dlnCPI_t+b_4lnRes_t \quad (1)$$

In equation (1), b's are income, depreciation, inflation and reserve elasticities of the import demand. As domestic income level(Y) increases, demand for imports(M) increases, so b_1 is expected to be positive. b_2, on the other hand, is expected to be negative. An increase in the nominal rate of depreciation (dlnEX) would deteriorate demand for imports as foreign goods would be relatively more expensive. The price elasticity of import demand is expressed by b_3. When domestic prices increase, foreign goods are relatively cheaper (ceteris paribus) and demand for imports increase. Therefore, its expected sign is positive. Foreign exchange reserves (Res) can be considered as an important determinant of import demand in developing countries. Therefore, it should be included in the equation. The sign of b_4 is expected to be positive, i.e., increase

in foreign exchange reserves means there will be more funds available for imports.

Import data has a strong seasonal pattern, so the model is deseasonalized by seasonal (intercept) dummies. After an ordinary least squares (OLS) estimation, the following equation was obtained:

$$\ln M_t = -0.257 - 0.074D1 - 0.034D2 - 0.207D3 + 0.259\ln Y_t$$
$$\quad (1.24) \quad (0.07) \quad (0.08) \quad (0.07) \quad (0.18)$$
$$-0.244 d\ln KUR_t + 0.373 d\ln CPI_t + 0.656 \ln R_t \qquad (2)$$
$$\quad (0.38) \quad (0.87) \quad (0.08)$$
$$R^2 = 0.93$$

where D1, D2, D3 are the seasonal dummies. Values in parentheses are standard errors.

The estimation results in equation (2) indicate that income level, nominal depreciation rate, inflation rate and international reserves significantly affect non-oil imports. Constant term is also significant. This implies that there are some structural effects (other than the variables mentioned above) that are important in the determination of import demand. The constant term at a value of –0.257 means that there is a tendency for the import demand to decrease and implies an adverse effect of 0.25 percent on imports.

It can be inferred from the coefficient of Y that import demand is income inelastic. Thus, when there is a one percent increase in Y, there will be a 0.26 percent increase in M in the long run equilibrium relation. Import demand is also price and exchange rate inelastic. These results can be extracted from the coefficients of dlnCPI and dlnEX, respectively. While import demand rises by 0.37 percent with

one percent inflation, it falls by 0.24 percent with a one percent nominal depreciation.

In addition, international reserves of the Central Bank have an elevating effect on import demand. When reserves increase by one percent, this will be reflected on import demand as a 0.66 percent rise.

IV.3.b. Short Run Dynamic Equation

Following the identification of a long run equilibrium relationship, the short run import demand function is estimated. Long run equation is inserted in the equation as an error correction term (ecm). The estimated sign of the coefficient of ecm is negative. This implies that when there is a deviation from the long run equilibrium in the short run at time t-1, it is corrected by the amount of its coefficient at time t.

In addition to the ecm term, a dummy for the year 1998 and growth of total exports is included in the estimation. After the first quarter of 1998, an economic recession occured. In August 1998, Russian financial crisis contributed to the adverse effects of this recession. There was a sharp decrease in the import volume in the second half of 1998 and in the first quarter of 1999. The dummy for 1998 aims to capture the effects of this recession (D98). The growth of exports (dlnX) is also included in the estimation. In particular, capital and intermediate goods imports are inputs for the exportable goods. Therefore, if exports are increasing, inputs to their production should also be increasing. In addition, income growth, exchange rate growth and their respective lagged values are also included in the estimation.

The OLS estimations can be stated as follows:

$$dlnM_t = -0.335 + 0.029D1 - 0.439D2 - 0.956D3 + 0.781dlnY_t - 0.435dlnY_{t-2}$$
$$\quad (0.07) \quad (0.09) \quad (0.13) \quad (0.20) \quad (0.12) \quad (0.22)$$
$$+0.455dlnY_{t-4} - 0.575ddlnEX_{t-1} - 0.764ddlnEX_{t-2} - 0.271ddlnEX_{t-3}$$
$$\quad (0.19) \quad (0.13) \quad (0.24) \quad (0.15)$$
$$+0.212dlnM_{t-3} + 0.712dlnX_t - 0.089D98 - 0.148ecm_{t-1} \qquad (3)$$
$$\quad (0.12) \quad (0.14) \quad (0.03) \quad (0.08)$$
$$R^2 = 0.92$$

where D1, D2, D3 are the seasonal dummies. Values in parentheses are standard errors.

The error correction term, ecm, is significant and has a negative sign. Hence, it can be inferred that at time t 15 percent of the deviation from the long run equilibrium at time t-1 is corrected. In addition, D98 is found to be significant with a negative sign in the short run model. The recession in the second half of 1998 and first quarter of 1999 influenced import demand growth adversely. Inflation and international reserves lose their significance on import demand in the short run while the nominal depreciation rate preserves its influence. In the short run, growth of the depreciation rate is found to have a significant negative impact on import growth. This finding is consistent with the long run model. Although the second lag of the income growth has a negative sign, the overall effect of income growth on import growth is found to be positive.

IV.4. Structural Var Analysis

Non-oil import growth, income growth, real depreciation rate and growth of international reserves are included in the VAR system. All variables are in stationary form. Seasonal dummies are present in the model to control for the strong seasonality in the series of non-oil imports. A VAR lag length of 4 has been selected.

Especially in developing countries, international reserves are considered as a constraint on import demand (Erlat and Erlat, 1991). As a consequence, reserves are included in the VAR system in the preliminary estimations. However, in impulse response analysis, the impact of reserves on imports and income is found to be insignificant. Our findings differ from Erlat and Erlat (1991) probably due to the method of estimation applied here. The VAR approach concentrates on short run analysis. In sum, import demand is assumed to be responsive to impulses from income, real exchange rate and imports themselves. In addition to reserves, income is assumed to be unresponsive to real exchange rate innovations within a quarter. Parallel to this analysis, impulses from income are deleted from the real exchange rate equation assuming that innovations in income are not significant on real exchange rate within the quarter. Reserves are assumed to be affected by financial factors such as capital flows and exchange rate rather than real factors such as income and imports in a quarter. Hence, only innovations in reserves and real exchange rates are postulated to influence reserves within a quarter.

TABLE 2

Variable	DlnM	DlnY	dlnEXR	dlnRes
dlnM	x	x	x	0
dlnY	x	x	0	0
dlnEXR	x	0	x	x
dlnRes	0	0	x	x

The restrictions discussed above are summarized in table 2. x's indicate the unrestricted coefficients and 0's indicate coefficients that are restricted to be zero in the B matrix of equation (4).

The results of the above system are given in figures 1 and 2. The former traces the effects of a shock to an endogenous variable on the variables of VAR. The latter gives the accumulated responses of the corresponding variables.

The first row of figure 1 represents the response of import demand to the innovations of the variables in VAR. Innovations in import demand have a positive effect on imports in the first quarter. Similarly, a shock to the growth of income has a positive effect on import demand in the first quarter. In both cases, the significance of the responses is lost for the later periods. However, the effect of a shock to real depreciation lasts for 3 quarters. Coinciding with our prior restrictions, innovations of reserves have no significant effect on import demand.

In order to see the effects of the innovations of the variables at the end of three years, it isnecessary to look at the accumulated responses in figure 2. In spite of the significant positive effect of the shocks in import demand on imports in the first quarter, it loses its significance at the end of three years. Although the positive effect of a shock to income on import demand continues for one year, it converges to zero at the end of the third year. Innovations in the real exchange rate depreciation have a long lasting effect on import function. This effect is negative and significant throughout a three year period. However, there is no effect resulting from reserves in the same period.

FIGURE 1
IMPULSE RESPONSE FUNCTIONS

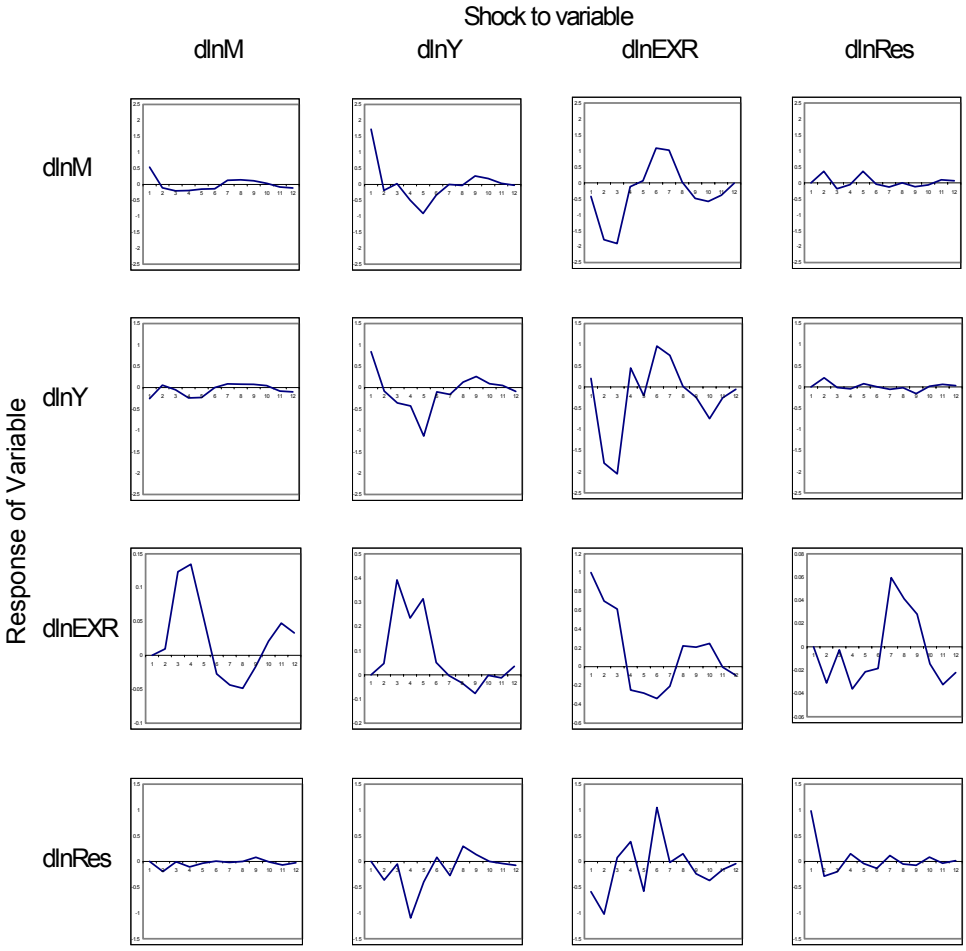
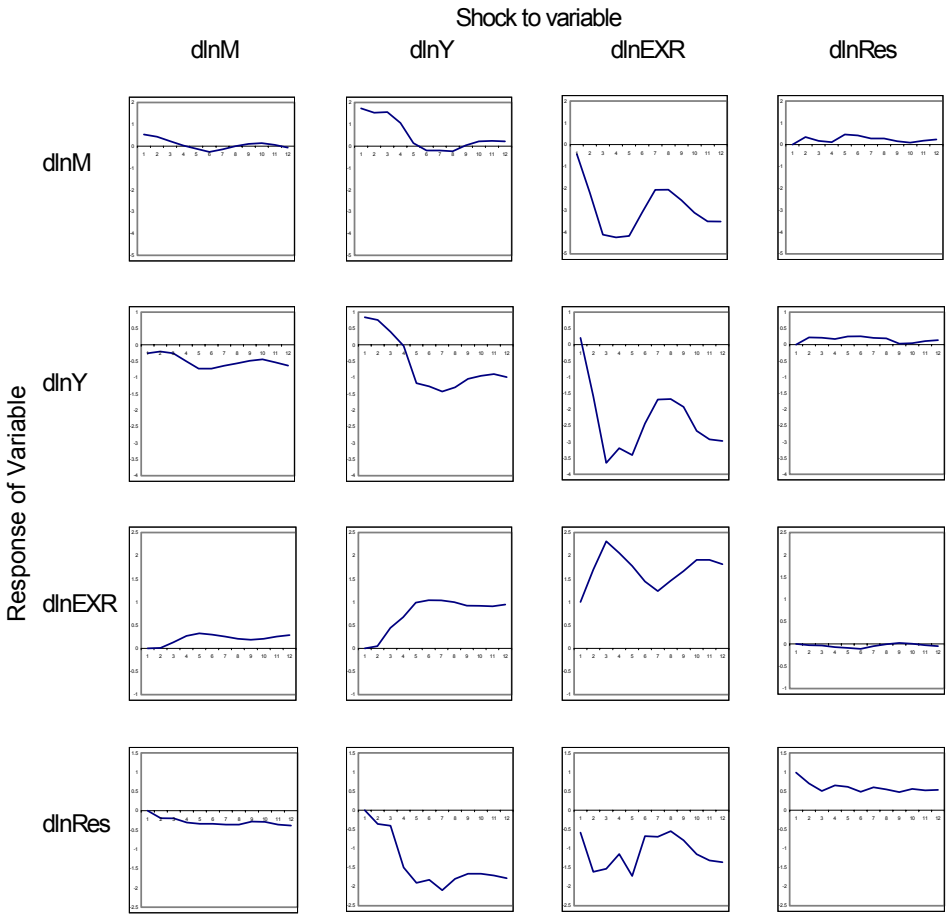


FIGURE 2
IMPULSE RESPONSE FUNCTIONS (ACCUMULATED)



V. COMPARING AND CONTRASTING THE ESTIMATION RESULTS

In this part of the study, we would like to evaluate the basic findings of the two different methods. In this respect, the effects and significance of income, exchange rate and reserves on the import demand function are analyzed.

The income effect follows similar patterns in both estimation results. Import demand is more responsive to income in the short run. In Engle-Granger, the coefficient of income is 0.8 and its current, second lag and forth lag values have significant effects on import. However, income elasticity of import demand declines to 0.3 in the long run. In a parallel fashion, the effect of innovations in income has a positive significant effect in the first four quarter in the VAR approach but dies out at the end of the third year.

In the case of exchange rates, different forms are used in the two methods. While the real depreciation rate is augmented to the VAR system, it is decomposed as nominal depreciation and inflation rate in the Engle-Granger approach. This is due to the relative dominance of inflation rate over nominal depreciation in the import function over the longer period. The signs of the coefficients of nominal depreciation and inflation are as expected. However, the coefficient of inflation is larger than the coefficient of nominal depreciation in absolute terms. Therefore, in the long run equation, the sign of the coefficient of the real depreciation rate becomes positive.

The short run analysis has similar conclusions for both approaches. In VAR, a one period shock to real depreciation has a significant negative effect on import demand in the first three

quarters. Moreover, nominal depreciation has a significant effect, which continues for the first, second and third lags, on imports with a coefficient of –0,6 in Engle-Granger. Although the findings of the two approaches are parallel in the short run, they diverge as the time horizon extends. While, the effect of real depreciation continues even after third year in the VAR approach, the coefficient of nominal depreciation falls to –0,2 in Engle-Granger.

Reserves have no significant effect on import demand in the short run in either approach. In VAR, accumulated responses to innovations in reserves have no influence even at the end of the third year while the reserves are effective on import demand with a coefficient of 0,7 in Engle-Granger.

In general, the short run dynamic equation of Engle-Granger and VAR results are compatible. However, the Engle-Granger long run equation and accumulated responses of VAR indicate different results. This is due to the fact that the Engle-Granger methodology tests to see if there is a long run equilibrium relationship between the variables. If so, a short run equation is constructed so as to revert short run deviations back to the long run equilibrium. However, the VAR approach does not consider a long run equilibrium. Instead, it analyzes the effects of pure innovations to the variables in the system. Such effects are considered as transitory and unanticipated shocks. Hence, divergence in the long run results should not be considered as an inconsistence.

Consequently, the exchange rate is found to be the policy tool that has the greatest effect on import demand in the short run. Import demand contracts when the rate of depreciation increases. In the long run, on the other hand, domestic demand and stock of international reserves are the main determinants of import demand.

VI. CONCLUDING REMARKS

Over the last 19 years, Turkey has been undergoing structual adjustments and transformations. One part of this development is related to foreign trade. Therefore, the main aim of the study is to assess Turkish import developments in the light of domestic income, exchange rate and foreign exchange reserve movements. In light of this, we try to estimate an import function for Turkey. Two different model specifications are used in the estimation. The first specification is the Engle-Granger cointegration methodology which allowed us to estimate both the long run equilibrium equation and a short run dynamic equation for import demand. The Bernanke-Sims structural VAR is the second method of estimation. This technique allows us to impose restrictions on the innovations of the variables in the system according to economic theory.

In general, the short run dynamic equation of Engle-Granger and VAR results are compatible. However, Engle-Granger long run equation and accumulated responses of VAR give different results. This difference in results could be due to the fact that Engle-Granger method tests to see if there is a long run equilibrium relationship between the variables. However, there is no such constraint for the VAR approach. Hence, divergence in the long run results should not be considered as an inconsistency.

As a result, in the short run, exchange rate is found to be the most effective policy tool that is most effective on import demand while domestic demand and stock of international reserves are the main determinants of import demand in the long run.

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APPENDIX 1

dlnM

Response to innovations in

	DlnM	dlnY	DlnEXR	DlnRes
1	0,539	1,728	-0,428	0,000
2	-0,106	-0,191	-1,787	0,357
3	-0,203	0,023	-1,902	-0,186
4	-0,200	-0,496	-0,123	-0,057
5	-0,152	-0,917	0,058	0,356
6	-0,139	-0,338	1,086	-0,046
7	0,124	-0,002	1,022	-0,134
8	0,143	-0,035	0,020	-0,003
9	0,106	0,263	-0,488	-0,127
10	0,027	0,184	-0,580	-0,069
11	-0,081	0,029	-0,388	0,091
12	-0,117	-0,027	-0,014	0,064

DlnY

Response of dlnyd to innovations in

	DlnM	dlnY	DlnEXR	DlnRes
1	-0,254	0,839	0,202	0,000
2	0,054	-0,083	-1,797	0,219
3	-0,053	-0,358	-2,053	-0,010
4	-0,246	-0,430	0,449	-0,040
5	-0,233	-1,138	-0,208	0,077
6	0,003	-0,100	0,969	0,009
7	0,089	-0,160	0,747	-0,052
8	0,079	0,127	0,012	-0,019
9	0,072	0,264	-0,240	-0,157
10	0,044	0,093	-0,748	0,019
11	-0,085	0,050	-0,256	0,060
12	-0,099	-0,090	-0,052	0,030

dlnEXR

Response of dlnkurr to innovations in

	DlnM	dlnY	DlnEXR	dlnRes
1	0,000	0,000	1,000	0,000
2	0,010	0,047	0,697	-0,031
3	0,123	0,391	0,612	-0,003
4	0,134	0,235	-0,247	-0,036
5	0,055	0,314	-0,282	-0,021
6	-0,027	0,051	-0,337	-0,018
7	-0,043	-0,004	-0,207	0,060
8	-0,048	-0,035	0,222	0,041
9	-0,017	-0,077	0,209	0,028
10	0,021	-0,003	0,246	-0,015
11	0,047	-0,013	-0,004	-0,032
12	0,033	0,034	-0,092	-0,022

dlnRes

Response to innovations in

	DlnM	dlnY	DlnEXR	dlnRes
1	0,000	0,000	-0,589	0,983
2	-0,192	-0,359	-1,020	-0,284
3	-0,005	-0,047	0,076	-0,197
4	-0,106	-1,097	0,386	0,150
5	-0,037	-0,398	-0,577	-0,037
6	0,004	0,079	1,046	-0,133
7	-0,022	-0,274	-0,022	0,116
8	0,002	0,296	0,151	-0,049
9	0,078	0,137	-0,238	-0,074
10	-0,010	-0,002	-0,371	0,083
11	-0,068	-0,040	-0,160	-0,036
12	-0,024	-0,074	-0,043	0,013

APPENDIX 2

DlnM

Accululated response to innovations in

	dlnM	dlnY	dlnEXR	dlnRes
1	0,539	1,728	-0,428	0,000
2	0,433	1,537	-2,215	0,357
3	0,230	1,559	-4,117	0,171
4	0,030	1,063	-4,240	0,114
5	-0,123	0,145	-4,182	0,470
6	-0,262	-0,193	-3,096	0,424
7	-0,138	-0,195	-2,074	0,289
8	0,005	-0,230	-2,054	0,286
9	0,111	0,033	-2,541	0,159
10	0,138	0,217	-3,122	0,091
11	0,057	0,246	-3,509	0,181
12	-0,059	0,219	-3,524	0,246

dlnY

Accululated response to innovations in

	dlnM	dlnY	dlnEXR	dlnRes
1	-0,254	0,839	0,202	0,000
2	-0,201	0,756	-1,595	0,219
3	-0,253	0,397	-3,648	0,210
4	-0,499	-0,032	-3,199	0,170
5	-0,733	-1,170	-3,406	0,247
6	-0,730	-1,270	-2,438	0,256
7	-0,641	-1,430	-1,690	0,204
8	-0,562	-1,303	-1,678	0,185
9	-0,490	-1,040	-1,918	0,027
10	-0,446	-0,946	-2,666	0,047
11	-0,530	-0,896	-2,922	0,106
12	-0,630	-0,986	-2,974	0,136

dlnEXR

Accululated response to innovations in

	dlnM	dlnY	dlnEXR	dlnRes
1	0,000	0,000	1,000	0,000
2	0,010	0,047	1,697	-0,031
3	0,133	0,438	2,309	-0,034
4	0,267	0,673	2,061	-0,070
5	0,322	0,987	1,780	-0,091
6	0,295	1,038	1,442	-0,110
7	0,252	1,034	1,235	-0,050
8	0,203	0,999	1,457	-0,009
9	0,186	0,923	1,667	0,019
10	0,207	0,920	1,913	0,005
11	0,254	0,907	1,909	-0,028
12	0,288	0,941	1,817	-0,049

dlnRes

Accululated response to innovations in

	dlnM	dlnY	dlnEXR	dlnRes
1	0,000	0,000	-0,589	0,983
2	-0,192	-0,359	-1,609	0,698
3	-0,197	-0,407	-1,532	0,501
4	-0,303	-1,504	-1,146	0,651
5	-0,340	-1,901	-1,723	0,613
6	-0,335	-1,822	-0,677	0,480
7	-0,358	-2,096	-0,699	0,596
8	-0,355	-1,800	-0,548	0,547
9	-0,278	-1,663	-0,786	0,473
10	-0,288	-1,666	-1,157	0,556
11	-0,356	-1,705	-1,317	0,520
12	-0,380	-1,780	-1,360	0,533