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# FOREIGN DIRECT INVESTMENT AND IMPORTS GROWTH IN TURKEY

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## ABSTRACT

This paper examines the relatıonship between foreign direct investments (FDI) and import growth in Turkey over the period 1950 to 2004. To test this hypothesis we extend the traditional import demand function to include FDI based on the new theory of trade and employ the bounds testing approach in ARDL (autoregressive distributed lag) framework and Fully Modified OLS (FMOLS) of Philips and Hansen to test the robustness of the results. The results reveal that there is a long run relationship but it is not unique and the most significant determinants of imports growth in Turkey in the long run are income (GDP) growth and domestic price level (CPI). The impact of FDI in the long run is marginal. In the short run, the most significant factors that affect import demand are income growth, relative price and domestic price level. The major implications of these results include: First the import demand in Turkey will be driven principally by income growth and also by foreign direct investment as predicted by the new trade theory but not at desired level. Second continued appreciation of Turkish Lira suggests more import demand, trade deficits and huge import bills which further reduce Turkish foreign reserves. However, as relative price will not affect the import demand in the long run the import bili will remain unchanged.

**Keywords:** imports growth, foreign direct investment and economic reform
**JEL Classification:** F12, F21, F23.

## 1. INTRODUCTION

Imports substitution strategy as policy tool for economic development was popular among the transition economics. Turkey followed a similar policy strategy to stimulate its

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economic growth between the periods of 1960 - 1970s. in 1980, Turkey got set for economic reform and changed its economic development policy from import substitution industrialisation strategy to export-led-growth strategy. To this effect the Turkish economy opened up to the world economy; export promoting incentives were initiated which included tax exemption, rebates, and favourable credit terms; direct import controls were eliminated and quantitative restrictions dismantled. The economic reform strategies result in growth of trade, such that the ratio of total trade to GNP rose from 8.6% in 1970 to 15.7% and 23.4% in 1980 and 1990 respeetively. In 2004 the ratio of trade to GNP was about 54.7%. As result of economic reform exports and imports have increased, to the extent that import payment accounts for a significant part of Turkey's income. Over the period 1990 to 2004 imports payment accounts for around 25.9% of real GNP. Too there is a surge in foreign capital inflow into Turkey.

Due to economic reform and also being in the process of joining the Europe Union (EU) and possibly European single market Turkey has witnessed greater inflows of foreign direct investment since 1980s. Between 1980 and June 2003, 53.0 percent of actual capital inflows were invested in manufacturing, 44.0 percent in services, 1.8 percent in agriculture, and 1.2 percent in mining. The increased foreign capital inflow could lead to increased to demand for imports according to: the prediction of new trade theory. Thus, the demand for capital and intermediate goods together have accounted for about 88.9% of the total imports. This suggests that FDI has a significant effect on import demand. Other factors include its potential locational advantages - nearness to Middle East markets and other developing Eastern European markets, security and good business environment for Multinational firms, production and distribution activities.

The importance of FDI needs not be overemphasised. From the point of view of host country, apart from being a cheap source of external capital, FDI is very important for stimulating technology transfer and fostering exchange of managerial know-how (Kokko, *et al.,* 1996). it is expected to enhance productivity and output growth through increased competition in sectors where Multinational corporations enter (Marksusen and Venables, 1999; Alguacil and Orts, 2003). FDI is considered an alternative mode of supplying foreign markets especially in protected markets. From this view foreign production would be substitute. Thus the relationship between FDI and imports is expected to be negative.

However a positive relationship between FDI and trade might increase the possibility of success of foreign production in reinforcing productivity and manufacturing domestic output (Aguacil and Orts, 2003). As noted by Rodrik (1999) trade especially imports may be an important way to promote economic growth and development through the importation of ideas, investment and intermediate goods. The vehicle of FDI is Multinational Corporations. Thus FDI represents the activities of Multinational corporations (MNCs). To this end imports could be driven by foreign direct investment due to importation of inputs and intermediate goods by MNCs. The host country benefits from factor productivity growth and increased remuneration. From theoretical view point FDI flows are considered as substitutes. Foreign direct investments are alternatives to exports and imports in order to penetrate markets protected by strong trade barriers. On the empirical side there is no consensus on the link between the imports and FDI. However, most empirical results show complementarity. Hence the degree to which foreign direct investments affect imports positively or negatively is an important consideration in assessing the costs and benefits of FDI in the context of economic reform. To our knowledge there is no such study that addresses the link Between FDI and imports in Turkey.

The aim of this paper is twofold. One is to analyse the empirical relationship between imports and FDI in the context of economic reform. To achieve this objective we extend the classical import demand function by incorporating FDI as an explanatory variable. This will invariably help to gauge out if the relationship existing Between FDI and trade in Turkey is that of substitution or complementarity. Sccondly, we aim to establish whether traditional determinants explain the behaviour of the trade in Turkey in the face of economic reform using modern econometrics time series techniques such as bounds testing approach due to Pesaran *et al.* (2001) in the framework of ARDL (Autoregressivc distributed lag model). This will shed some light on whether the reform strategies, undertaken by Turkey government since 1980s, have any impact and if any, the direction of impact.

The paper is organised as follows. In section 2, we review the theoretical issues relating trade to FDI. In section 3, we specify the traditional model, the extended model and estimation techniques. Section 4 discuses the empirical results, while section 5 presents the conclusion and policy implications.

## II. LITERATURE REVIEW

In a Standard Heckscher-Ohlin general equilibrium context FDI could be regarded as capital mobility. With real capital mobility there is tendency for equalization of real rate of return on capital across countries. That is the capital would move internationally until the marginal productivities of capital in the countries equalize. This conventional view of factor price equalization is based on restrictive assumptions that there is perfect competition in all industries, no transport costs between countries, and identical pattern of demand and production functions with constant return to scale. Since the apparent vehicle of capital mobility is Multinational corporations (MNCs) the link between the FDI and trade is underscored in the following principle. If the operations of MNCs can be vertically linked with the host nations, an increase in MNCs activities will generate demand for intermediate goods and capital goods from the home nation (see Lıu and Graham, 1998). This presupposes that FDI could be complementary or substitute and it depends on the nature of FDI. If it is a substitute for imports it improves the host country's balance of payment position indicating that FDI is used for exports. However if it is complementary the balance of payment is adversely affected.

The early attempts to reconcile the activities of the MNCs with trade theory appear in Markusen (1984) and Helpman (1984). Markusen (1984) focused on horizontal investments in which a firm sets up abroad to produce the same products that it produces at home, while Helpman (1984) focused on the vertical investments in which the production process is decomposed by stages according to factor intensities in different countries. In both cases MNCs export services produced from physical factors, rather than those factors themselves. This gives MNCs segmented structure either horizontal or vertical, justifying both complementarity and substitutability of relationship between FDI and trade (Camarero and Tamarit, 2003).

Theories of horizontal MNCs suggest they are substitutes (see Markusen 1984, Alguacil and Orts, 2003). Firms decide vvhether to serve a foreign market by exporting goods or by setting up a plant overseas. When the firm decides to set up a foreign plant, it reduces its exports of goods to that market. As a result an increase in affiliate sales is associated with a fail in exports of goods to that market. These theories typically assume that different activities use factors in the same proportions or only one factor of production; hence there is no factor-price motivation for vertical fragmentation of production stages across countries i.e. vertical FDI is ruled out by assumption. Market access rather than cost consideration influences the location decisions of FDI. However Neary (2002) shows that even when MNC activity is purely horizontal, costs are still crucial in determining where in the union a new plant will be located.

In contrast, theories of vertical MNCs suggest that FDI and trade are complements. Here, firms geographically separate different production stages across countries to take advantage of lower factor prices (see Helpman 1984). For instance, the unskilled intensive stages of the production process are located in a low-wage country and the final goods re-exported back to the source country. The source country exports services and intermediate inputs and imports final goods. Hence, an increase in MNC affiliate sales is associated with an increase in trade. As the geographical dispersion of the production process increases we would expect intra-firm trade to increase correspondingly. These theories typically assume there are zero trade costs throughout; hence there is no motivation for horizontal MNCs i.e. horizontal FDI is ruled out by this assumption.

As there is no consensus on theory about the relationship between trade and FDI, so also the empirical studies have not arrived at any conclusion, whether the link between the trade and FDI is complementary or substitute. However, most studies appear to favour complementarity. Using gravity model, Hejazi and Safarian (2001) found FDI in US to stimulate exports and imports indicating that trade and FDI are complementary. The result that is consistent with the transaction cost theory of MNCs. They showed that outward FDI has more predicted impact on exports than inward FDI while on the other hand inward FDI has more predicted impact on imports than does the outward FDI. This they attributed to large role of intra-firm trade between US affiliates and their foreign owned parents than is the case for US parents and their foreign affiliates. Alguacil and Orts (2003) use the conventional import demand model specification but include as explanatory variables foreign direct investment and political instability. The model was cast in vector autoregressive model for Granger testing and multivariate cointegration analysis. They find that apart from the traditional factors having their expected sign FDI is positively related to imports suggesting the complementary relationship. However their results indicate unidirectional causality in the Granger sense, going from FDI to imports. A recent study by Pacheco-Lopez (2005) shows bi-directional causality between imports and FDI. This suggests that imports and FDI are endogenous; and as FDI increases, import content increases too and vice versa.

Camarero and Tamarit (2003) show mixed results on the relationship Between FDI and trade. However the estimation results generally point at complementary relationship Between FDI and trade confirming the existence of horizontal FDI under an eclectic theoretical framework. Income and relative prices are insignificant. Other country level studies like Grubert and Mutti (1991), Blomstrom and Kokko (1994), Eaton and Tamura (1994), Brenton *et al.* (1999), and Clausing (2000) also find complementary. Evidence of a substitute relation between FDI and trade are found in Frank and Freeman (1978), Cushman (1988) and Blonigen (2001).

In Turkey Erlat and Erlat (1991) study export and import performance and find that international reserves are the most important variable explaining the variation in import demand function. The relative prices do not explain much change in import demand. Moreover the study by Saygili, *et al.* (1998) shows domestic income as the most significant variable explaining the changes in import demand function in Turkey. The short run income elasticity is 0, 85 and real effective exchange rate is significant in the short run but not in the long run. Also Kotan and Sayili (1999) show that import demand is influenced by the income level, nominal dcpreciation rate, inflation and international reserves but import is found to be income and price inelastic. The studies so far in Turkey indicate the estimated elasticities of price and income differ greatly from theoretical expectation of unity. The magnitude of the elasticities differ, which according to Erkel-Rousse and Mirza (2002) is attributed to econometric misspecification and measurement errors in the import price indexes as well as endogeneity Between price and trade quantities. The present study differs from the previous studies on Turkey import demand in two respects. First it uses long span of data, 1950 to 2004. Second it incorporates foreign direct investment into import demand function and use modern time series econometrics technique in estimation the coefficients of the model.

## III. METHODOLOGY

### 3.1 Import Demand Model

Previous works utilized the Standard import deraand model to examine the import demand behaviour in developing countries (Narayan and Naranya, 2005; Sinha, 2001; Bahamani-Oskooee, 1999). The demand model used here is a Standard one derived from the framework of imperfect substitution theory. The theory ensures that neither domestic nor foreign goods swallow up the whole market when each is produced under constant or decreasing costs

(Magee, 1975) and that each country is both an importer and exporter of the traded good (Rhomberg, 1973). Also the imperfect substitution model rules out import of inferior goods. In this paper we derive import demand model following Camarero and Tamarit (2003) and Alguacil and Orts (2003) which is based on imperfect substitution theory. According to a conventional demand theory since the consumer is maximizing utility subject to a budget constraint, the demand for import is expressed as:

$$Md_t = f(Y_t, P^d{}_t, P^m{}_t) \quad (1)$$

where demand $(M_d)$ for imports is a function of domestic income $(Y_t)$, prices of domestic goods and services or cross prices $(P_t^d)$ and prices of imports or own prices $(P_t^m)$. As investment and intermediate goods constitute about 88.9% of Turkey's imports incorporating FDI in the model is worthwhile. As economic reform enhances business environment its impact on import is assessed through its effect on foreign direct investment or the activities of MNCs, which is expected to increase with the reform. According to new trade theory FDI and MNCs activities could influence the imports of a country apart from the traditional factors - relative price and income growth, especially in the face of economic reform. To this end we include the FDI variable in the model and as well as general price level (CPI).

$$Md, = f(Y_t, P_t^d, P_t^m, FDI, CPI) \quad (2)$$

Microeconomics theory regards demand functions to be homogenous of degree zero in prices and income (Deaton and Muellbauer, 1980). Such a demand function rules out the presence of money illusion. This implies that if one multiplies all prices and money income by a positive constant the quantity demanded will remain unchanged. This involves dividing the right-hand side of equation (2) by domestic price $(P_t^d)$ (see Goldstein and Khan, 1985) and expressing the remaining variables in logarithmic form to give the import demand model for Turkey.

$$\ln M_t = \beta_0 + \beta_1 lnY_t + \beta_2 InRp_t + \beta_3 \ln FDI_t + \beta_4 CPI_t + e_t \quad (3)$$

where $\ln M_t$ is the natural log of real imports of goods and services at period t, $lnY_t$ is the natural log of Turkey real gross domestic income at period t, $\ln Rp_t$ is the natural log of relative price (represented by real effective exchange rate), ln *FDI* is the natural log of foreign direct investment, *CPI* is the general price level and $e_t$ is the error term which is normally distributed with mean zero and constant variance $N(0,\sigma^2)$. The formulation of prices relative term implies that domestic and imported goods are substitutes and it eliminates the problem of multicollinearity that may arise between the price terms or between CPI (general price level) and domestic income (Narayan and Narayan, 2005).

The sign on income coefficient could be either positive or negative. it is positive if imports are treated like any other goods in a consumer's demand "function or if there is no domestic production of the good so that the import demand is the demand function for the good itself (Magee, 1975; Narayan and Narayan, 2005). However, if the imported good has a relatively close substitute then it is possible to have a negative relationship between domestic income and output demand. Sinha (2001) found a negative income elasticity of imports demand for India and Srilanka.

According to demand theory, an increase in import prices reduces demand for imports as imported goods become more expensive while demand for imported goods increase as domestic prices increase. Therefore it is expected that relative price should be negatively related to real import volumes and around unity. However our variable $Rp_t$ might not follow this conventional law of demand, as it is represented by relative import exchange rate. It might take positive or negative sign suggesting appreciation and depreciation.

Concerning the signs of the FDI variable it should depend on the substitutability or complementarity existing between trade and FDI. A positive sign would be expected on FDI stocks when the complementarity hypothesis is the one maintained, whereas a negative sign would appear when substitutability prevails.

Another basic assumption is that importers are always on their demand schedules such that demand always equals the actual level of imports. However, it is generally recognised that imports do not immediately adjust to their equilibrium level following a change in any of their determinants (Carone, 1996; Narayan and Narayan, 2005). This may be due to such factors as adjustment costs, inertia, and habit or lags in perceived changes. To capture the speed of adjustment, we estimate the follovving error correction model.

$$\Delta \ln M_t = \beta_0 + \sum_{i=1}^{n} \beta_1 \Delta \ln M_{t-i} + \sum_{i=0}^{n} \beta_2 \Delta \ln Y_{t-i} + \sum_{i=0}^{n} \beta_3 \Delta \ln RP_{t-i} + \sum_{i=0}^{n} \beta_4 \Delta \ln FDI_{t-i} + \sum_{i=0}^{n} \beta_5 \Delta \ln CPI_{t-i} + \beta_6 \varepsilon_{t-1} + \mu_t \quad (4)$$

where all variables are as defined before, except Δ which is the change and $\varepsilon_{t-1}$ which is the error term lagged one period estimated from equation (3). The coefficient on the lagged error correction term measures the speed of adjustment to equilibrium in the event of chock (s) to the system.

### 3.2. Estimation Technique and Data

Import values, foreign direct investment, real import exchange rate and general price level (CPI) are from the Statistical Indicators of Turkish Statistical Institute, 1923 -2004. The GNP data is from International Financial Statistics of International Monetary Fund. We deflate the nominal imports and nominal GNP by GNP deflator. The data span from 1950 through 2004. In estimating the Equations (3) and (4) we employ the bounds testing procedure developed by Pesaran *et al.* 1996 (see also Pesaran *et al.,* 2001) within the autoregressive distributed lag framework (ARDL) to examine the existence of the long run relationship Between the import demand and foreign direct investment, domestic income, general price level and import exchange rate in Turkey. This procedure has several advantages over the alternatives such as the Engle and Granger (1987) two step residual-based procedure for testing the null of no cointegration and the system-based reduced rank regression approach pioneered by Johansen (1988, 1995) and Johansen and Juselius (1990). The first main advantage is that the bounds test approach is applicable irrespective of whether the underlying regressors are purely I (0) or purely I (1) or mutually cointegrated (Narayan and Narayan, 2005). As bounds test does not depend on pre-testing the order of integration of the variables, it eliminates the uncertainty associated with pre-testing the order of integration. Pre-testing is problematic in the unit-root-cointegration literature where the power of unit root tests are low and there is a switch in the distribution function of the test statistics as one or more roots of the *x,* process approaches unity (Pesaran and Pesaran, 1997). Second, the unrestricted error correction model (UECM) is likely to have better statistical properties than the two-step Engle-Granger method because; unlike the Engle-Granger method the UECM does not push the short run dynamics into the residual terms (Narayan and Narayan, 2005; Banerjee *et al.,* 1993, 1998). Third, the bounds test can be applied to small sample size unlike the Engle-Granger and

Johansen methods of cointegration which are not reliable in small sample sizes, such as in the present study. Some past studies have applied the bounds test to relatively small sample sizes. These include among others Narayan and Narayan, 2005 (28 observations), Pattichis, 1999 (20 observations) and Narayan and Smyth, 2005 (31 observations).

Following the Pesaran *et al.* (2001) and also Narayan and Narayan (2005) we construct the vector autoregression (VAR) of order $p$ for the import demand function as:

$$\Omega(L,p)y_t = \alpha_0 + \sum_{i=1}^{k} \beta_i(L,q_i)x_{it} + \delta' w_t + u_t \qquad 5$$

where

$$\Omega(L,p) = 1 - \Omega_1\delta_1 L^1 - \Omega_2\delta_2 L^2 - \ldots - \Omega_p L^p \qquad 6$$

$$\beta_i(L,q_i) = \beta_{i0} + \beta_{i1}L + \beta_{i2}L^2 + \ldots + \beta_{iqi}L^{qi},\ i = 1,2,\ldots,k, \qquad 7$$

where $y_t$ is the dependent variable and $x_{it}$ is the vector of independent variables, where $i = l,2,...,k$ , $\alpha_0$ is a constant terms, L is a lag operator such that $Ly_t = y_{t-1}$, $w_t$ is an s x 1 vector of deterministic variables such as seasonal dummies, time trend or exogenous variables with fixed lags., $\beta_i$ is a matrix of VAR parameters for lag $i$, $u_t$ is the vector of error terms. In the long run, we have $y_t = y_{t-1} = ... = y_{t-p}$; $x_{it} = x_{i,t-1} = ... = x_{i,t-q}$ where $x_{i,t-q}$ denotes the qth lag of the ith variable. The long run equation with respect to the constant term can be written as follows:

$$y = \alpha_0 + \sum_{i=1}^{k} \beta_i x_i + \delta' w_t + v_t \quad \Omega = \frac{\alpha_0}{\Omega(1,p)} \qquad 8$$

The long run coefficients for response of $y_t$ to a unit change in $x_{it}$ are estimated by

$$\beta_i = \frac{\hat{\beta}_i(1,\hat{q}_i)}{\hat{\Omega}(1,\hat{p})} = \frac{\hat{\beta}_{i0} + \hat{\beta}_{i1} + \ldots + \hat{\beta}_{i\hat{q}}}{1 - \Omega_1 - \hat{\Omega}_2 - \ldots - \hat{\Omega}_{\hat{p}}}, \quad i = 1,2,\ldots,k \qquad 9$$

where $\hat{p}$ *and* $\hat{q}_i$ $i=1,2,\ldots,k$, are selected values of pand $q_i$, $i = 1,2,\ldots,k$. The error correction term representation of ARDL $(\hat{p},\hat{q}_1,\hat{q}_2,\ldots,\hat{q}_k)$ model can be obtained by writing Eq. (5) in terms of the lagged levels and the first differences of $y_t$, $x_{it}$, $i = 1,2,\ldots, k$ and $w_t$:

$$\Delta y_t = \Delta\alpha_0 + \sum_{j=1}^{p-1}\Omega^*_j \Delta y_{t-j} + \sum_{i=1}^{k}\beta_{i0}\Delta x_{it} + \sum_{i=1}^{k}\sum_{j=1}^{\hat{q}_i-1}\beta^*_{ij}\Delta x_{i,t-j_t} + \delta'\Delta w_t - \Omega(1,\hat{p})ECM_{t-1} + u_t \qquad 10$$

where $ECM_t$ is the correction term defined by

$$ECM_t = y_t - \hat{\alpha} - \sum_{i=1}^{k}\hat{\beta}_i x_{it} - \delta' w_t$$

and Δ, is the first difference operator, $\Omega^*_j$, $\beta'^*_{ij}$ and $\delta'$ are the coefficients relating to the short run dynamics of the model's convergence to equilibrium while $\Omega(1,\hat{p})$ measures the speed of adjustment.

The bounds testing procedure involves two stages. The first stage is to establish the existence of long relationship among the variables using equations (11a to 11e). Once the long run relationship is established, the next stage is the estimation of long run and short run parameters using equations 5 and 10 respectively. The unrestricted error correction version of ARDL regressions for equation (4) is estimated taking each of the variables in turn as a dependent variable.

$$\Delta \ln M_t = \alpha_{0m} + \beta_{1m} \ln M_{t-1} + \beta_{2m} \ln Y_{t-1} + \beta_{3m} \ln RP_{t-1} + \beta_{4m} \ln FDI_{t-1} + \beta_{5m} CPI_{t-1} + \sum_{i=1}^{n} c_{im} \Delta \ln M_{t-i} + \sum_{i=0}^{n} d_{im} \Delta \ln Y_{t-i} + \sum_{i=0}^{n} g_{im} \Delta \ln RP_{t-i} + \sum_{i=0}^{n} h_{im} \Delta \ln FDI_{t-i} + \sum_{i=0}^{n} s_{im} \Delta CPI_{t-i} + u_{1t} \quad (11a)$$

$$\Delta \ln Y_t = \alpha_{0y} + \beta_{1y} \ln Y_{t-1} + \beta_{2y} \ln M_{t-1} + \beta_{3y} \ln RP_{t-1} + \beta_{4y} \ln FDI_{t-1} + \beta_{5y} CPI_{t-1} + \sum_{i=1}^{n} c_{iy} \Delta \ln Y_{t-i} + \sum_{i=0}^{n} d_{yi} \Delta \ln M_{t-i} + \sum_{i=0}^{n} g_{iy} \Delta \ln RP_{t-t} + \sum_{i=0}^{n} h_{iy} \Delta \ln FDI_{t-i} + \sum_{i=0}^{n} s_{iy} \Delta CPI_{t-i} + u_{2t} \quad (11b)$$

$$\Delta \ln RP_t = \alpha_{0RP} + \beta_{1RP} \ln RP_{t-1} + \beta_{2RP} \ln Y_{t-1} + \beta_{3RP} \ln M_{t-1} + \beta_{4RP} \ln FDI_{t-1} + \beta_{5RP} CPI_{t-1} + \sum_{i=1}^{n} c_{iRP} \Delta \ln RP_{t-i} + \sum_{i=0}^{n} d_{iRP} \Delta \ln Y_{t-i} + \sum_{i=0}^{n} g_{iRP} \Delta \ln M_{t-i} + \sum_{i=0}^{n} h_{iRP} \Delta \ln FDI_{t-i} + \sum_{i=0}^{n} s_{iRP} \Delta CPI_{t-i} + u_{3t} \quad (11c)$$

$$\Delta \ln FDI_t = \alpha_{0FDI} + \beta_{1FDI} \ln FDI_{t-1} + \beta_{2FDI} \ln Y_{t-1} + \beta_{3FDI} \ln RP_{t-1} + \beta_{4FDI} \ln M_{t-1} + \beta_{5FDI} CPI_{t-1} + \sum_{i=1}^{n} c_{iFDI} \Delta \ln FDI_{t-i} + \sum_{i=0}^{n} d_{iFDI} \Delta \ln Y_{t-i} + \sum_{i=0}^{n} g_{iFDI} \Delta \ln RP_{t-i} + \sum_{i=0}^{n} h_{iFDI} \Delta \ln M_{t-i} + \sum_{i=0}^{n} s_{iFDI} \Delta CPI_{t-i} + u_{4t} \quad (11d)$$

$$\Delta \ln CPI_t = \alpha_{0CPI} + \beta_{1CPI} \ln CPI_{t-1} + \beta_{2CPI} \ln Y_{t-1} + \beta_{3CPI} \ln RP_{t-1} + \beta_{4CPI} \ln FDI_{t-1} + \beta_{5CPI} \ln M_{t-1} + \sum_{i=1}^{n} c_{iCPI} \Delta CPI_{t-i} + \sum_{i=0}^{n} d_{iCPI} \Delta \ln Y_{t-i} + \sum_{i=0}^{n} g_{iCPI} \Delta \ln RP_{t-i} + \sum_{i=0}^{n} h_{iCPI} \Delta \ln FDI_{t-i} + \sum_{i=0}^{n} s_{iCPI} \Delta \ln M_{t-i} + u_{5t} \quad (11e)$$

where Δ is the first difference operator, and $u_t$ is the white noise; ali the variables are expressed in logarithmic form. The null hypothesis for no cointegration among the variables in equation (11a) *is* $H_0 : \beta_1 = \beta_2 = \beta_3 = \beta_4 = \beta_5 = 0$, represented by $F_M(M|Y,RP,FDI,CPI)$ against the alternative *is* $H_A : \beta_1 \neq \beta_2 \neq \beta_3 \neq \beta_4 \neq \beta_5 \neq 0$. This is also carried out for

$F_Y(Y \backslash M,RP,FDI,CPI)$,

$F_{RP}(RP \backslash M,Y,FDI,CPI)$,

$F_{FDI}(FDI \backslash M,Y,RP,CPI)$

$F_{CPI}(CPI \backslash M,Y,RP,FDI)$.

The F- test has non-standard distribution, which depends on, whether variables included in the ARDL model are I (0) or I (1), the number of regressors and whether the ARDL model contains an intercept and or a trend. The decision rule is if the computed F-statistics falls outside the critical bounds, a conclusive decision can be made about the cointegration regardless of order of integration of the variables. For instance if computed F-statistics is higher than the upper bounds critical value then the null hypothesis of no cointegration is rejected and if it is less than upper bound critical value but higher than the lower bound critical value it is inconclusive. Once the long run relationship is established, a further two step procedure to estimate the model is carried out.

## IV. EMPIRICAL RESULTS AND DISCUSSION

We begin the analysis by testing the order of integration of data series. Though this is not necessary in bounds testing for long run relationship but because we intend to employ the Fully Modified OLS (FMOLS) of Phillips and Hansen (1990) to test for existence of long run relationship too, it is becomes necessary to determine the order of integration. The results of the augmented Dickey-Fuller (ADF) unit root test are presented in Table 1. As shown all the variables are first difference stationary (i.e. I (1)) with the exception of CPI.

### 4.1 Cointegration Test

Having confirmed that the variables are *I (1),* we apply the bounds testing procedure to determine whether any long run relationship exists among the variables. The maximum lag order is 4. The bounds approach compares the calculated *F-statistics* against the critical values reported in Pesaran *et al.* (1999); the results are presented in Table 2.

From the Table 2, there seems to be no unique cointegration relationship among the variables in the Turkey demand function. For Eq. (11a), the calculated *F -statistics* is higher than the upper bound critical value of 3.94 at 95% level, regardless whether the underlying data are I (0), I (1) or fractionally integrated. Hence the null hypothesis of no cointegration cannot be accepted for the import demand function when import volume is a dependent variable. To investigate whether we have a unique long-run relationship between the variables in the model, we find that the null hypothesis of no cointegration cannot be accepted when relative price is the dependent variable (Eq. 11c). This implies that relative price and import volume are endogenous to the model and there is bi-directional causal relationship between the two in the Granger sense. That is import determines relative price and vice-versa. However, when the other variables FDI, CPI and Y are made dependent variables respectively the null hypothesis of no cointegratoin cannot be rejected. Thus FDI, Y and CPI can be treated as the exogenous "long-run forcing" variables in the equation.

### 4.2. Long-Run Equilibrium Estimation

Given the existence of a long-run relationship, the next step is to use the ARDL approach to estimate the parameters of this long run relationship. Using this method has the advantage of yielding consistent estimates of the long-run coefficients that are asymptotically normal irrespective of whether the variables under consideration are I (0), I (1) or fractionally integrated (see Pesaran *et al,* 1999; Pesaran *et al* 2001; Alam and Ouazi, 2003). We also estimate the coefficients using FMOLS technique. This is done to check the robustness of the results.

The results of an ARDL $(p,q,,...,q_k)$ models based on SBC criteria and FMOLS technique are reported in Table 3. As we can see from the Table 3, the results from the two estimation approaches are slightly different but the signs of most of the variables under consideration are consistent with a priori expectations and significant. However we base the interpretation on ARDL results. The coefficients of FDI and GDP are positive and are significant confirming the new trade theory view that apart from income and import price FDI is a significant determinant of import demand in developing countries. Thus a 1% growth in FDI increases import demand by 0.6%. The Turkish GDP level is found to affect the import demand, though inelastic in the sense that it is Iess than one. One percentage increase in income will only increase import demand by 0.15%. The domestic price (consumer price index) has expected sign and statistically significant, implying that as domestic price rises, foreign goods become less expensive and import demand increases. Its elasticity is more than one suggesting that a 1% increase in domestic prices induces approximately 1.47% rise in import demand.

The coefficient of relative price (proxied by import exchange rate) differs in signs in the two estimation techniques. While it is negative in ARDL model and slightly equal to unity, it is positive in FMOLS model, in both cases it is not significant. Though it is not significant it has some policy implications. First, had it been that it is significant, it implies that further depreciation of Turkish Lira would decrease imports and the imported goods would be more expensive than domestically produced goods. Kotan and Saygili (1999) shared a similar view. However if it is positive and significant it implies that appreciation of Turkish Lira would increase imports as the foreign goods become less expensive. Second, import bills may not change based on the result of this study (as a 1% increase in depreciation will lead to equivalent 1% reduction in imports). Third, a further depreciation of Turkish Lira may cause a decrease in the imports Ieading to decrease in the production for exports.

**4.3. Short Run Results of Turkey import Demand**

The short run results and diagnostics tests are presented in Table 4. In order to test the reliability of the error correction model, a number of diagnostic tests, including tests of autocorrelation, normality and heteroscedasticity in the error term, stability and accuracy of model were applied. We found no evidence of autocorrelation in the error term. The model passes the Jarque-Bera normality test suggesting that the errors are normally distributed. The RESET test indicates that the model is correctly specified. Adjusted R-square is 0.69. Thus it is reasonable to say that the model is well behaved. We employ the CUSUM test, which is based on the cumulative sum of recursive residuals, based on first of r observations. The CUSUM statistic is updated recursively and is plotted against break points. If the plot of CUSUM statistic stays within 5% significance level (portrayed by two straight lines whose equations are given in Brown *et al.* 1975), then the coefficient estimates are said to be stable. A graphical presentation of the test is provided in Figure l. The CUSUM test indicates that the coefficients are stable over time as the plot of cumulative sum of recursive residuals and cumulative sum of squares of recursive residuals lies within the critical bound at *5%* significance level.

The coefficient of error correction term is negative and is statistically significant at *5%.* This ensures that the series are non-explosive and that the long run equilibrium is attainable. The error term measures the speed at which the imports adjust to the changes in explanatory variables before converging to its long run equilibrium level and it shows that the adjustment dose not occur instantaneously. The coefficient of -0.16 suggests that a deviation from the long run equilibrium level of import demand in the current year is corrected by about 16 percent in the next year

From Table 4 we find that the short run coefficients are lower than those from the long run model. FDI however is positive but has statistically insignificant impact on the import demand function. On the other hand, GDP (income), CPI (domestic price), relative price (relative exchange rate) are all statistically significant and have an inelastic impact on import demand. In the short run import demand in Turkey is driven by the income, appreciation of Lira, and rising level of domestic price.

## V. CONCLUSION AND POLICY IMPLICATIONS

In this paper we examine the effect of foreign direct investment on import demand in Turkey using modern econometric technique - bounds testing approach in ARDL framework - aggregate import data. The study covers the period Between 1950 and 2004. We take into account the order of integration and employ Philips and Hansen Fully Modified OLS to test the robustness of our results. The two techniques slightly differ a bit in the sign of relative exchange rate (relative price) and significance level of FDI. However we based our interpretation on the results of ARDL results. Our test reveals that in the long run FDI, GDP, and CPI affect import demand; while in the short run only GDP, CPI and RP have influence on the import demand.

The results of this study yield some useful policy implications. First, the Turkish import demand appears to be driven by appreciation of Turkish Lira and rising domestic price level of good and services in the short run. As the Lira continued to appreciate the demand for import will continue to rise, suggesting trade deficits and huge import bills which further reduces Turkish foreign reserves. In the long run, changes in the relative exchange rate would not affect the import demand, and if any it would leave the import bill unchanged. A rise in domestic price level would lead to cry for more imports in the near future. Second, the import growth will depend slightly on FDI growth in the long run but more on income growth. Income growth not only measures the potential market but also roughly measures the welfare of a country.

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## Appendix

### Data

Import values, foreign direct investment, real import exchange rate and general price level (CPI) are from the Statistical indicators of Turkish Statistical Institute, 1923 -2004

Real effective exchange rate is used as variable that represents the relative price ratio.
The real effective exchange rate is calculated by suing the definition:
$REER = e(P_f/P_d)$

where $P_f$ is the foreign price, $P_d$ is the domestic price and $e$ is the nominal exchange rate (see Atabek and Çevik, 2001). This indicates the quantity of Turkish goods that a firm in Turkey has to give in return of USA goods.

Table 1: Unit Root Test

| Variables | Level | | First Differences | |
|---|---|---|---|---|
| | No Trend | With Trend | No Trend | With Trend |
| $\ln M$ | 4.214 | -1.829 | -3.586 | -4.732 |
| $\ln Y$ | -1.181 | -1.046 | -6896 | -7.091 |
| $\ln FDI$ | 1.044 | -1.703 | -8.449 | -8.974 |
| $\ln CPI$ | 6.539 | -1.069 | -1.951 | -2.026 |
| $\ln RP$ | 3.907 | -1.230 | -3.259 | -3.736 |
| Critical values (5%) | -2.916 | -3.495 | -2.918 | -3.497 |

Table 2: Bounds Test for Cointegration Relationship

| Calculated *F-statistics* | | | | | | |
|---|---|---|---|---|---|---|
| $F_M(M \mid fdi, Y, RP, CPI)$ | 4.235 | | 0.007 | | | |
| $F_{FDI}(fdi \mid M, Y, RP, CPI)$ | 0.925 | | 0.483 | | | |
| $F_Y(Y \mid M, fdi, RP, CPI)$ | 0.477 | | 0.790 | | | |
| $F_{RP}(RP \mid M, fdi, Y, CPI)$ | 2.328 | | 0.075 | | | |
| $F_{CPI}(CPI \mid M, fdi, Y, RP)$ | 4.225 | | 0.007 | | | |
| Critical value bound of the *F-statistic*: intercept and no trend | | | | | | |
| k | 90% level | | 95% level | | 99% level | |
| | I (0) | I (1) | I (0) | I (1) | I (0) | I (1) |
| 5 | 2.43 | 3.50 | 2.78 | 3.94 | 3.57 | 4.84 |

Table 3: Estimated Long Run Coefficients using the ARDL Approach
(ARDL (1, 1, 0, 0, 2) selected based on Schwarz Bayesian Criterion)

| Variables | Coefficients | Standard error | T-statistics | Probability |
|---|---|---|---|---|
| Constant | 3.1464 | 3.2085 | 0.9806 | 0.332 |
| $\ln FDI$ | 0.6042* | 0.33912 | 1.782 | 0.082 |
| $\ln Y$ | 0.1487*** | 0.045177 | 3.2912 | 0.002 |
| $\ln CPI$ | 1.4738** | 0.59454 | 2.4785 | 0.017 |
| $\ln RP$ | -1.0079 | 0.91619 | -1.1001 | 0.278 |
| **FMOLS** | | | | |
| Constant | 7.6404*** | 1.1169 | 6.841 | 0.000 |
| $\ln Y$ | 0.11794*** | 0.015786 | 7.4713 | 0.000 |
| $\ln FDI$ | 0.034654 | 0.091902 | 0.37708 | 0.708 |
| $\ln CPI$ | 0.82437*** | 0.22707 | 3.6306 | 0.001 |
| $\ln RP$ | 0.45587 | 0.29480 | 1.5464 | 0.128 |

*** denotes significance at 1% level, ** denotes significance at 5% level, * denotes significance 10% level

Table 4: Error Correction Representation for the Selected ARDL Model
(ARDL (1, 1, 0, 0, 2) selected based on Schwarz Bayesian Criterion)

| Variables | Coefficients | Standard errors | T-statistics | Probability |
|---|---|---|---|---|
| Constant | 0.5072 | 0.64212 | 0.78989 | 0.434 |
| $\Delta \ln FDI$ | 0.017215 | 0.038106 | 0.4517 | 0.654 |
| $\Delta \ln Y$ | 0.02397*** | 0.008693 | 2.757 | 0.008 |
| $\Delta\Delta \ln CPI$ | 0.23758** | 0.10572 | 2..2472 | 0.030 |
| $\Delta \ln RP$ | 0.45766*** | 0.17507 | 2.7056 | 0.010 |
| $\Delta \ln RP(-1)$ | 0.27921** | 0.13362 | 2.0896 | 0.042 |
| $ecm(-1)$ | -0.16120** | 0.063580 | -2.5354 | 0.015 |

| Diagnostics | Statistics |
|---|---|
| $\bar{R}^2$ | 0.689 |
| $\sigma$ | 0.298 |
| $\chi^2_{Auto}$ (1) | 0.7462 [0.388] |
| $\chi^2_{RESET}$ (1) | 2.2936 [0.130] |
| $\chi^2_{Norm}$ (2) | 0.09174 [0.955] |
| $\chi^2_{White}$ (1) | 0.02429 [0.876] |

*** denotes significance at 1% level, ** denotes significance at 5% level, * denotes significance 10% level

Figure 1: Stability Test