NON-ENERGY IMPORT DEMAND FUNCTION IN TURKEY: NEW EVIDENCE

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ABSTRACT

This study estimates the non-energy demand function of Turkey in the period of 2003:Q1-2015:Q3. We estimated a long run and a short run model of imports, based on the traditional import approach. Then we analyzed income and price elasticity of imports using cointegration methodology with multiple structural breaks of Maki (2012). The empirical results show that real non-energy imports cointegrate with real domestic income and relative price with significant structural breaks in 2006:Q1 and 2010:Q3. Contrary to theory, domestic income carries negative coefficient, which suggests that an increase in income will decrease the level of non-energy import in the case of Turkey. Also, cointegration results suggest that non-energy import is income and price elastic in the long-run; income elastic, but price inelastic in the short-run, and income and price elasticity of non-energy import demand in Turkey, are time-varying due to the structural breaks.

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Contribution/ Originality

The paper is one of the few studies which have examined the issue of the non-energy import function in Turkey. It contributes to the existing literature using cointegration methodology with multiple structural breaks, and points out that the time varying income and price elasticity of non-energy import in Turkey.

1. INTRODUCTION

Turkey has liberalised goods and capital markets at the beginning of 1980's. The quantity of import and export has increased tremendously after the liberalization period which is seemed to be an initial step to the liberalisation of Turkey's foreign trade. The other step is Turkey's entry into the European Customs Union in 1996 (Kotan and Saygılı, 1999; Durmaz and Lee, 2015).

After experiencing two major step, Turkey has faced a negative balance of trade consistently from the 1980's to now, as seen in Figure 1. The trade deficits are a matter of current account and economic growth especially in crisis periods as in developing countries. Thus, it is crucial that to establish the import demand elasticity for the trade policy

generally, and the exchange rate policy in particular (Wang and Lee, 2012). The estimated income and price elasticity explain how does economic growth affect the volume of trade, how do restrictive trade policies, such as import duties, influence the growth of imports, and how should domestic policies be designed to reduce the trade deficit (Fukumoto, 2012).
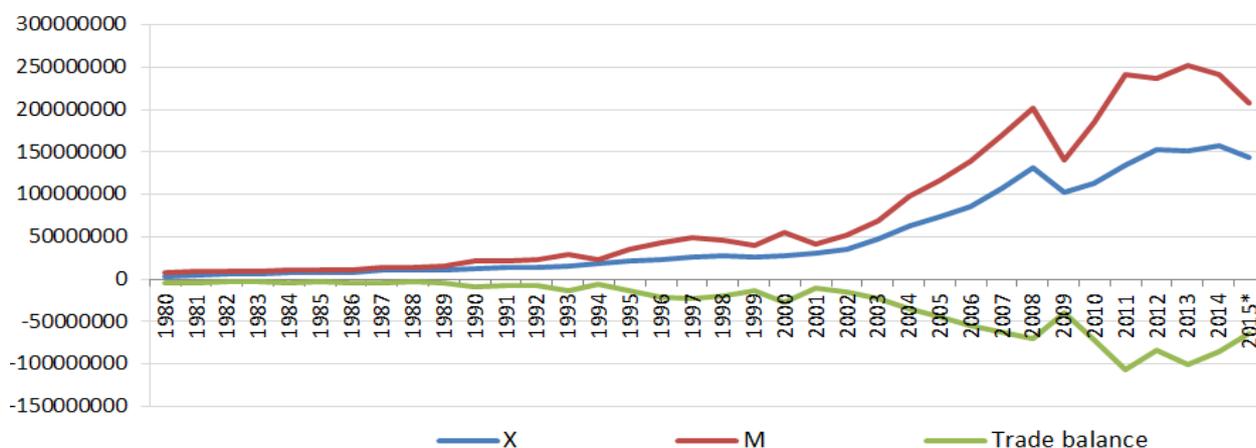

Figure-1. Import, Export and Foreign Trade Balance of Turkey (1980-2015, Thousand $)
Source: TUIK (Turkish Statistical Institute database) http://www.tuik.gov.tr/PreTablo.do?alt_id=1046.

Turkey's trade deficit and economic growth have increased in 2000's. Then, current account deficit grew and rose to $74.4 billion in 2011, decreased to $47.9 billion in 2012, $63.6 billion in 2013, $43.5 billion in 2014, 32.1 billion in 2015; which was $10 billion at the beginning of the 2000's. The ratio of current account deficit-to-GDP was small, and it was around 2% on the average before the 2000's in Turkey. After that, this proportion raised to 7.9% in 2013, 6.4% in 2014, 7% in 2015, subject to high economic growth based on import-dependent. As a matter of fact, total import has almost continuously increased after the 2000's and reached $242 billion in 2014 (TUIK (Turkish Statistical Institute), 2016).

When we look at the import composition, undoubtedly that, energy import has a substantial part in total import. Turkey's energy import has increased rapidly after 2000's, as seen in Figure 2. Energy import was $9.5 billion in 2000, constituting the 17.5% of total imports which was $54.5 billion. In 2012, $60 billion energy import was 25% of total import, $56 billion energy import was 22.2% of total import in 2013. In 2014, energy import became $55 billion of total $240 billion comprising 22.6% of total imports (UN Comtrade (United Nations Comtrade Database), 2016). While, we see that energy import has increased dramatically, the share of energy imports in total imports has not increased rapidly in 2000's. It can be explained by the magnitude of significant increases in total import in the period of 2003-2015, and decreases in oil prices since 2010.
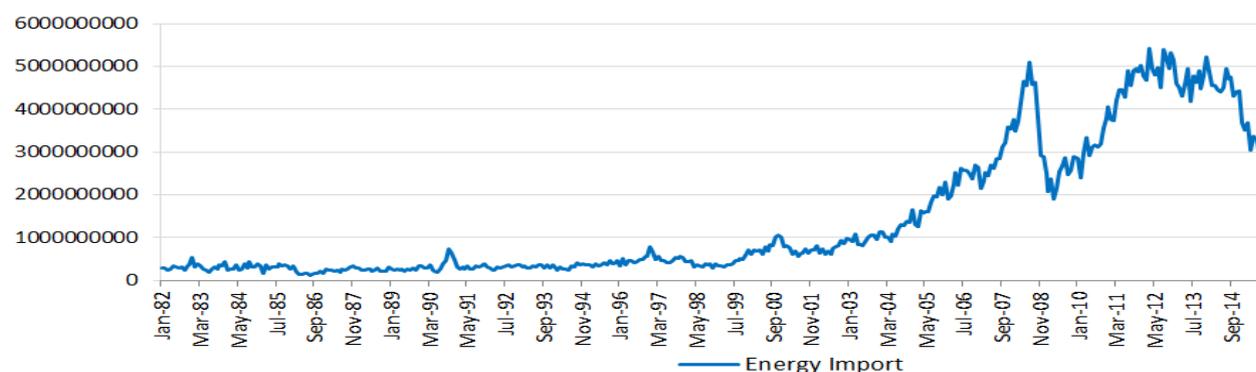

Figure-2. Total Energy Import of Turkey (1982-2015, Thousand $)
Source: UNCD (2016). United Nations Comtrade database. http://comtrade.un.org/data/

751

Energy import is mentioned that the main cause of the trade deficit and current account deficit in Turkey (Üzümcü and Başar, 2011; Dam *et al.*, 2012) but we do not know about non-energy imports much. It became our motivation to do this study.

When we adopt the non-energy import function, we believe that elimination of the energy would be more convenient to analyse some points of the import function in Turkey. Because Turkey is a net energy importer country and energy dependency is crucial for industrial production in Turkey. Also, energy tends to have different distribution among countries, and it makes the demand function hard to examine in the economic theory framework. On the other hand, we want to compare income and price elasticity to the studies analyze import function including energy in the literature. We expect greater elasticity than including energy studies, due to excluding the energy which is an inelastic product.

In this paper, we use cointegration technique with structural breaks to examine three empirical issues. First, we explore whether a long-run relationship exists between real imports, real domestic income, and relative price. Second, provided that the long-run equilibrium exist, we determine the sign, magnitude and statistical significance of the long-run effects of real income and relative price on non-energy import demand. Finally, we investigate the short-run dynamics of the non-energy import demand function for Turkey.

The rest of paper is divided into four sections. The next section reviews previous studies in the literature. The third section describes our model specification and theoretical considerations. The fourth section provides the empirical estimates. The fifth section provides the conclusion.

2. LITERATURE REVIEW

In the literature, import demand function has been formed of five types. In turn, traditional import model which says real import is a negative function of the relative price of imports, and also a positive function of real domestic income. In the revised traditional model income measured as the real value of GDP minus exports (Senhadjı, 1998). The disaggregated or decomposed GDP model says different macro components of final expenditure have different import contents. This approach takes account the GDP to three categories as a final consumption expenditure, expenditure on investment goods, and exports (Tang, 2003). The model of dynamic structural import with the other name "National Cash Flow" model uses national cash variable measured as the value of GDP minus investment, government expenditure, and exports (Xu, 2002). Finally, Emran and Shilpi (2008) adopted a structural model incorporating a binding foreign exchange constraint.

At first, the ordinary least squares (OLS) method and two-stage OLS method were typically used to estimate the import demand functions, until researchers explored that most macroeconomic variables have unit roots. Hence, recent studies apply the different cointegration approaches to test the long-run relationship between the variables (Fukumoto, 2012).

Reinhart (1994) examines the relationship between relative prices, imports, and exports in a sample of 12 developing countries using Johansen's cointegration approach. He finds that relative prices are a significant determinant of the demand for imports and exports. Senhadjı (1998) computes short-run and long-run income and price elasticity for industrial and developing countries. He examines the models with OLS and Fully Modified OLS (FMOLS) methods. He concludes the short-run elasticity is on average less than 0.5, while the long-run income elasticity are close to 1.5. Industrial countries have both higher income and lower price elasticity than developing countries. The analysis shows that the OLS bias is significantly greater than the FMOLS bias for both short and long-run elasticity estimates.

Sinha (2000) estimates the aggregate import demand function for Greece for the period 1951-92 using cointegration method. The study found that imports are found to be price inelastic (0.8) but income elastic (2.6). Riaz

and Tran (2007) investigate the relationship among aggregate import, relative import prices, and real GDP for Australia during the period 1959-2006. They use Engle-Granger's residual-based test, Johansen and Juselius multivariate test and Bounds Test. They found that in the long-run import demand is fairly income elastic (1.4) and price inelastic (-0.7). In the short-run, import demand is both price and income inelastic in Australian.

Arize and Nippani (2010) examine import demand behaviour in three African economies, namely Kenya, Nigeria and South Africa. They use Johansen and Harris–Inder cointegration analyses with FMOLS, dynamic OLS, and non-linear OLS to estimate long-run import demand functions. They find that there is a statistically significant long-term equilibrium relationship among real imports, real income, relative price, and real foreign exchange reserves. The results show that income elasticity is highly elastic in Nigeria and South Africa whereas, it is inelastic in Kenya.

Wang and Lee (2012) estimate the import demand elasticity for China using autoregressive distributed lag (ARDL) method. Their empirical results show that real imports cointegrate with domestic economic activity, real effective exchange rate, and the perception of global risk. Zhou and Dube (2011) also adopt bounds test approach to verify the validity of the cointegration in many import demand model specifications for China, India, Brazil, and South Africa during the period 1970-2007. They find that long-run income elasticity is much higher compared to earlier studies and price elasticity is not significantly negative for these countries. Fukumoto (2012) estimates the long-run and short-run elasticity of China's disaggregate import demand functions for three basic classes of goods, capital goods, intermediate inputs, and final consumption goods, on the relative prices of imports and relevant macroeconomic variables using data from the period of 1988-2005. His findings show that cointegration between the import of capital goods and both GDP and aggregate investment by ARDL methodology, and import of intermediate goods is cointegrated with exports, and import of consumption goods is cointegrated with GDP and disposable income.

In the case of Turkey, Kotan and Saygılı (1999) use Structural Vector Autoregression VAR (SVAR) and Engle-Granger cointegration method to estimate an import demand function for Turkey. According to Engle-Granger method; income level, nominal depreciation rate, inflation rate and international reserves significantly affect imports in the long run, and the import function is estimated to be income and price inelastic. In the short run, however, the impact of inflation growth and international reserves on imports diminishes and income elasticity improves. SVAR model indicates that both anticipated, and unanticipated changes in the real depreciation rate and income growth have significant effects on import demand growth.

Thomakos and Ulubaşoğlu (2002) analyse the effects of trade liberalisation in the mid-1980s on import demand and derive their implications on economic growth in Turkey over the period of 1970-1995. They test for different elasticity over "closed" and "open" economy periods. They find that the magnitude of the elasticity estimates of some (cotton, crude oil, passenger cars, pig iron, rubber and textile industries) product groups were found to have exhibited a structural break as a result of trade reforms during the trade reforms of the 1980s.

Kutlar and Şimşek (2003) examine the relationship between import demand and GDP, tradable and non-tradable goods price using Johansen cointegration method over the period of 1987-2000. They found that import demand is income elastic and price inelastic. The ratio of import price index to the tradable goods price index has a negative effect on import demand. Aydın et al. (2004) estimate the export supply and import demand for Turkey using both single equation and vector autoregression frameworks for the period of 1987-2003. According to the OLS estimations, imports are both income elastic (2.0) and real exchange rate inelastic (0.4). Similar to the OLS model, VAR model shows that the real exchange rate has the most exogenous behaviour. Kalyoncu (2006) estimates an aggregate import demand function for Turkey during 1994:1-2003:12. In the study, cointegration and error correction modeling approaches are used. The models demonstrate that there is a long-run relationship among real quantities of imports, relative import price (-1.15) and real GNP (2.28).

Bayraktutan and Bıdırdı (2010) explore the key determinants of the long-term import demand for Turkey using Engle-Granger Two Step Forecast Method. The results show that Turkish import is more sensitive to economic growth (2.78) than the real exchange rate (0.2). Ozturk (2012) tries to determine the effects of Export, Gross Domestic Product and the Real Effective Exchange Rate on the import for the period between 1998 and 2012 in Turkey. According to results; export, GDP (0.57) and the real effective exchange rate (0.3) have a positive effect on import.

Durmaz and Lee (2015) examine long-run and short-run elasticity of Turkey's disaggregated import demand using ARDL method for the period of 1980-2011. They find that the independent variables, investment expenditure, export and relative prices have inelastic effects on imports. Nonetheless, total consumption expenditure has elastic effects. Gocer and Elmas (2013) analyse the relationship between real exchange rate and external trade balance of Turkey. They apply cointegration method with multiple structural breaks by Maki (2012) using the intermediate goods, capital goods, consumption goods, and total foreign trade data within the extended Marshall-Lerner Condition framework, for 1989:Q1-2012:Q2 period. Their results show that Marshall-Lerner Condition is valid for all production groups in Turkey, and income elasticity of import (1.49) is greater than real exchange rate elasticity (0.12).

Aldan *et al.* (2012) examine the short-run dynamics of Turkish imports between 2003 and 2011. They apply Kalman filter to obtain time-varying parameters for income and exchange rate in total import, total import excluding energy, intermediate goods import excluding energy, and consumption goods import. They find that GDP elasticity, decreased until 2005, and then it increased steadily to 1.9 until 2009Q1 in the non-energy total import. Also, real exchange rate elasticity increased until 2009 and it has been relatively stable which is around 0.6. In the non-energy intermediate goods equation, GDP elasticity, decreased until 2005Q1, increased until 2008Q4, and decreased since the first quarter of 2009 because of the global financial crisis. Moreover they do not find a statistically significant effect of real exchange rate in the short run on non-energy intermediate goods.

3. MODEL SPECIFICATION AND THEORETICAL CONSIDERATIONS

To test for cointegration characteristics of variables under the view of a structural break presence, a Maki (2012) test was employed, where unknown structural shifts were detected. Due to using predetermined structural break number, Maki (2012) criticised one-break Gregory and Hansen (1996) and two-break Hatemi (2008) cointegration tests and developed a cointegration test where structural breaks can be determined internally. This test allows for the breaks in the four alternative models; breaks in the level shifts (model 0), the regime shifts model (model 1), model 1 with a trend (model 2), and breaks in the level, trend and regressors (model 3).

$$Model\, 0 : y_t = \mu + \sum_{i=1}^{k} \mu_i D_{it} + \beta' x_t + u_t \tag{1}$$

$$Model\, 1 : y_t = \mu + \sum_{i=1}^{k} \mu_i D_{it} + \beta' x_t + \sum_{i=1}^{k} \beta'_i x_t D_{i,t} + u_t \tag{2}$$

$$Model\, 2 : y_t = \mu + \sum_{i=1}^{k} \mu_i D_{it} + \gamma t + \beta' x_t + \sum_{i=1}^{k} \beta'_i x_t D_{i,t} + u_t \tag{3}$$

$$Model\, 3 : y_t = \mu + \sum_{i=1}^{k} \mu_i D_{it} + \gamma t + \sum_{i=1}^{k} \gamma_i t D_{i,t} + \beta' x_t + \sum_{i=1}^{k} \beta'_i x_t D_{i,t} + u_t \tag{4}$$

Where D_{it} is binary indicator variable and k is the number of breaks. The null hypothesis of the test is no cointegration, with the alternative hypothesis of cointegration with an unspecified number of breaks i that are smaller or equal to the maximum number of breaks ($i \le k$). The Maki (2012) test has an advantage over standard cointegration tests whereby allowing for one or two structural changes in cointegration relationships when multiple unknown numbers of breaks exist.

Before we form the cointegration, we first specify the traditional import demand function in the following form:

$$M_t = f(Y_t, PM_t / PD_t) \qquad (5)$$

Where M_t represents the real import demand, and PM_t / PD_t accounts for the relative price of imports to domestic products as given by Sundararajan and Thakur (1976); Goldstein and Khan (1985); (Carone, 1996); Tang (2003). The log-linear specification is suitable to the linear formulation to model an aggregate import demand function (Khan and Ross, 1977; Salas, 1982; Kalyoncu, 2006). Thus, we use the log-linear specification to estimate import demand function for Turkey.

This estimation takes the following log-linear form:

$$\ln(M_t) = \alpha_0 + \alpha_1 \ln(TRGDP_t) + \alpha_2 \ln(PM / PD_t) + u_t \qquad (6)$$

The coefficients α_1 and α_2 represent the income and price elasticity of import demand respectively.

According to the theory of demand, the partial derivative of the real domestic income for imports would be positive (see Eq. (6)). Real income would be expected to increase imports with in two ways. Assuming a stable distribution of income, more foreign goods will be purchased should increase in real income lead to an increase in real consumption. Second, if an increase in income also results in an increase in real investment, then investment goods not produced domestically must be bought from abroad. On the other hand, the effect of relative prices on import demand will be adverse as consumers substitute import products for domestic when the price of domestic increases. That is, higher import prices about domestic prices should reduce the quantity of goods demanded from abroad (Arize and Nippani, 2010).

Table-1. Summary of the Descriptive Statistics

Statistics	LnGDP	LnMPM/PD	LnM
Mean	17.06401	4.654526	18.03850
Median	17.05298	4.701370	18.16569
Maximum	17.30119	4.940708	18.81805
Minimum	16.72079	4.097570	17.49251
Std. Dev.	0.158605	0.199357	0.347816
Skewness	-0.342975	-0.950305	0.068336
Kurtosis	2.226835	3.391253	2.027402
Jarque-Bera	2.270160	8.001478	2.049831
Probability	0.321396	0.018302	0.358827
Sum	870.2647	237.3808	919.9633
Sum Sq. Dev.	1.257774	1.987164	6.048816
Observations	51	51	51

Source: Based on the Authors' calculations.

4. DATA AND EMPIRICAL RESULTS

4.1. Data

In our study, *M* is the real import, generated using nominal imports deflated by the import price index. PM/PD is the relative price index, the ratio of *PM* (the import price index, 1994=100), to the *PD* (the domestic consumer price index, 1994=100), and *GDP* is the real gross domestic product. We use data for quarterly period 2003:Q1 through 2015:Q3 in US Dollars. GDP data is seasonally adjusted by Census X-13. *GDP, PM* and *PD* data obtained from Turkish Statistical Institute (TUIK), and *M* is from United Nations Comtrade Database (UN Comtrade). Summary of the descriptive statistics and time series plots of the variables are presented in turn, Table 1 and Figure 3.
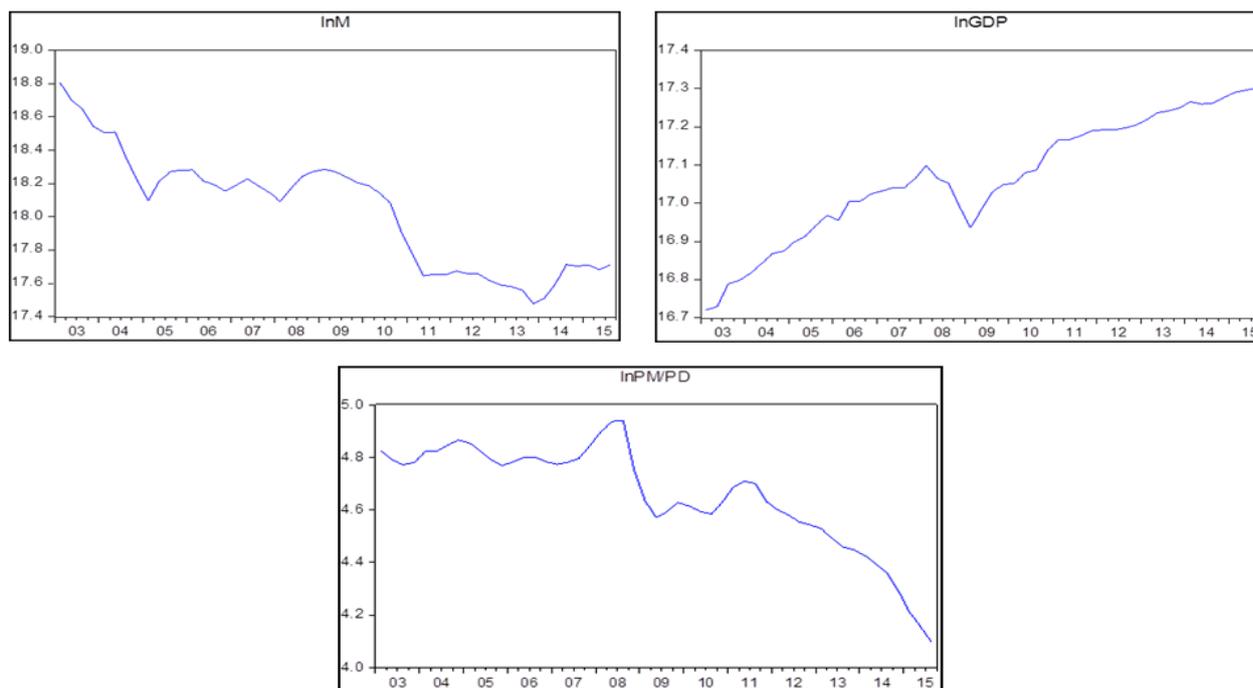

Figure-3. Time series plots of variables (log-scaled).

Source: Based on the Authors' calculations

4.2. Unit Root Tests

In this section, we analyze the stationary of the data. We have conducted the Augmented (Dickey and Fuller, 1979); Phillips and Perron (1988); Ng and Perron (2001) and Zivot and Andrews (1992) unit root tests. Table 2 shows the results of the ADF, PP, and ZW unit root tests, and the results of the Ng and Perron (2001) are presented in Table 2. All unit roots results say that all variables have unit root, and they are integrated order one, I(1).

Table-2. The Result of Unit Root Tests

Variables	ADF (Level) Intercept	ADF (First Difference) Intercept	PP (Level) Intercept	PP (First Difference) Intercept	ZW Intercept t statistics break	ZW Trend t statistics break	ZW Both t statistics break
lnM	0.3927	0.0010*	0.1884	0.0043*	-4.4780 2010Q4	-2.5256 2008Q3	-3.9196 2010Q4
lnGDP	0.3688	0.0000*	0.3688	0.0000*	-4.5727 2008Q2	-3.0278 2013Q3	-4.8452 2008Q2
lnPM/PD	0.9981	0.0001*	0.9987	0.0188**	-2.0794 2013Q4	-2.9116 2013Q1	-2.9022 2012Q1

Note: "*", and ** indicate that stationarity in %1 and 5% significance level. Akaike Information Criterion (AIC) is used to determine lag order. The critic values of the 4 lags models by Zivot and Andrews (1992) are that Model A: 1% -5.34 and 5%-4.93. Model B: 1% -4.80 and 5%-4.42. Model C: 1% -5.57 and 5% -5.08

Table-3. Unit Roots Test Ng and Perron (2001)

Variables	MZ_α	MZ_t	MSB	MPT
Ln(M)	-0.6878	-0.3779	0.5494	18.8058
Ln(GDP)	1.3125	1.5206	1.1585	96.8120
Ln(PM/PD)	3.3337	1.7771	0.5330	33.7906

Note: MZ_α is the modified Phillip-Perron MZ_α test, MZ_T is the modified Phillip-Perron MZ_t test; *MSB* is the modified Sargan-Bhargava test; *MPT* is the modified point optimal test. The order of lag to compute the test is chosen using the modified AIC (MAIC) suggested by Ng and Perron (2001). Asymptotic critical values by Ng and Perron (2001) Table 1) for MZ_α: 1% -13.8000 and 5% -8.10000. MZ_t: 1% -2.58000 and 5% -1.98000. MSB: 1% 0.17400 and 5% 0.233000. MPT: 1% 1.78000 and 5% 3.17000. According to the Ng and Perron (2001) all variables have a unit root due to MZ_α and MZ_t test statistics are lower, and MSB, MPT test statistics greater than critical values.

4.3. Cointegration Test

Cointegration test is applied to analyse the existence of the long-run relationship between the series. In Maki (2012) test, structural breaks are determined endogenously. In the test applied, critical values are computed by t statistics, and points with the lowest t statistics are considered as structural break points. Table 3 shows the results of this cointegration test. The results indicate that the import demand function is cointegrated when multiple unknown numbers of breaks are allowed. The test statistics fail to reject the null hypothesis of no cointegration between non-energy import, income and relative price for Turkey (model 2).

Table-4. The cointegration test (Maki, 2012) with unknown number of breaks

	At most 1	At most 2	At most 3	At most 4	At most 5
Model 0	-3.87535 (−5.541)* (−5,005)** (−4,733)***	-4.27888 (−5,717)* (−5,211)** (−4,957)***	-4.48307 (−5,943)* (−5,392)** (−5,125)***	-5.84667 (−6,075)* (−5,550)** (−5,297)***	-5.84667 (−6,296)* (−5,760)** (−5,491)***
Model 1	-4.28107 (−5,840)* (−5,359)** (−5,117)***	-4.28107 (−6,011)* (−5,518)** (−5,247)***	-5.03692 (−6,169)* (−5,691)** (−5,408)***	-5.03692 (−6,329)* (−5,831)** (−5,558)***	-5.03692 (−6,530)* (−5,993)** (−5,722)***
Model 2	-4.03602 (−6,020)* (−5,558)** (−5,287)***	-5.52991 (−6,628)* (−6,093)** (−5,833)***	**-7.56616** (−7,031)* (−6,516)** (−6,210)***	**-8.71369** (−7,470)* (−6,872)** (−6,563)***	**-8.71369** (−7,839)* (−7,288)** (−6,976)***
Model 3	-5.270901 (−6,523)* (−6,055)** (−5,795)***	-6.369842 (−7,153)* (−6,657)** (−6,397)***	-6.950029 (−7,673)* (−7,145)** (−6,873)***	-7.700113 (−8,217)* (−7,636)** (−7,341)***	-7.700113 (−8,713)* (−8,129)** (−7,811)***

Note: *, **, and *** denote critical values at 1%, 5%, 10% level respectively.

4.4. Long-Run Elasticity

The cointegration equation using the Dynamic Ordinary Least Squares (DOLS) method provides a robust correction to the possible presence of endogeneity in the explanatory variables, as well as serial correlation in the error terms of the OLS estimation (Stock and Watson, 1993; Shin, 1994; Esteve and Requena, 2006). The long-run equilibrium relation is expressed in eq. (7) below:

$$\ln M_t = \mu_0 + \mu_1 D_{1t} + \mu_2 D_{2t} + \mu_3 D_{3t} + \gamma t + \beta_1 \ln GPD_t + \beta_2 \ln PM / PD_t + \beta_3 \ln GDP_t . D_{1t} + \tag{7}$$
$$\beta_4 \ln PM / PD_t D_{1t} + \beta_5 \ln GDP_t D_{2t} + \beta_6 \ln PM / PD_t D_{2t} + \beta_7 \ln GDP_t D_{3t} + \beta_8 \ln PM / PD_t D_{3t} + u_t$$

Following Table 5 presents Dynamic Modified Least Square (DOLS) estimation results for the sample period.

Table-5. Cointegration Results

Variables	Coefficient	Std. Error	t-Statistic	Prob.
D1	-31.6522	5.0668	-6.2469	0.0000
D2	67.1903	14.5668	4.6125	0.0000
D3	91.8016	74.8448	1.2265	0.2273
GDP	-2.4438	0.1407	-17.3571	0.0000
PM/PD	-2.1440	0.3300	-6.4955	0.0000
D1*GDP	1.2574	0.2822	4.4542	0.0001
D1* PM/PD	2.1725	0.3391	6.4055	0.0000
D2*GDP	-3.6935	0.7856	-4.7016	0.0000
D2* PM/PD	-0.8770	0.2895	-3.0288	0.0043
D3*GDP	-5.0784	4.1846	-1.2135	0.2322
D3* PM/PD	-0.9137	0.6364	-1.4357	0.1591
C	69.9227	2.9854	23.4209	0.0000
R^2	0.9839			

Note: The number of lags is determined via the AIC. The bandwidth is selected by Newey-West estimator using the Bartlett Kernel. Dummy variables are D_1:2006Q1, D_2:2010Q3, D_3:2013Q4.

Income and relative price coefficients are significant and negative in case of import demand function, and they appear elastic. According to the results in Table 5, relative price is in line with the expectations and consistent with economic theory. On the contrary, domestic income is not consistent with economic theory. Table 5 shows that 1% increase in domestic income decreases real import at a rate of 2.4%, and 1% increase in relative prices decreases real import at a rate of 2.1%. D_1:2006Q1 and D_2:2010Q3 dummy variables representing structural breaks are significant. They have a strong relation with real import and influence the magnitude of real import at -31.6% and 67.1% rates respectively. When we look at the structural break dates represented by dummy variables, we see some shifts in the world economy. At first, economic growth slowed down in most of the developed countries during 2005, after a good year in 2004, with no recovery expected in 2006. After this slowdown, all of the world's foreign trade, including Turkey, fell in 2006 (UN (United Nation), 2006). Second, in 2010, a debt crisis became apparent in Eurozone countries such as Spain, Italy, Ireland and Greece. These developments influenced Turkish economy and caused structural breaks of our variables.

We found that income and price elasticity are time-varying due to the structural breaks similar to Aldan *et al.* (2012). The results indicate that structural breaks affect the variables in the same direction. First structural break causes an increase while the second structural break causes a decrease in the coefficients. Income coefficient become -1,19 by rising 1,26 points, and relative prices coefficient become 0,03 by rising 2,17 points with the first structural break. Income coefficient become -6,14 by declining 3,69 points, and relative prices coefficient become -3,02 by declining 0,88 points at the second structural break. Last structural break is not statistically significant for both variables.

4.5. Short-Run Elasticity

Table-6. Error Correction Model

Variables	Coefficient	Std.Error	t-Statistic	Prob.
ECT_{t-1}	-0.6737	0.2224	-3.0291	0.0040*
DDGDP	-1.0429	0.4777	-2.1830	0.0342**
DPM/PD	-0.2858	0.2266	-1.2611	0.2136
C	-0.0134	0.0121	-1.1114	0.2722

Note: "*", and ** indicate stationarity at %1 and 5% significance level. Newey-West method is used to deal with autocorrelation and heteroskedasticity.

According to Table 6, error correction term's coefficient is significant and negative; that means short-run deviations between series are removed, and series converge to the equilibrium in the long-run. This documents that long-run analysis is reliable. Table 6 shows that income coefficient is significant in the short run, while price coefficient is insignificant. Also, results indicate less short run elasticity than the long run, consistent with the traditional price theory.

5. CONCLUSION

This study investigates long- and short-run elasticity of non-energy import demand in Turkey using data from the period of 2003:Q1-2015:Q3. We first examine the existence of structural cointegration among non-energy import, relative price, and domestic income by adopting Maki (2012) unknown structural break cointegration procedure. Then, based on the test results, the long-run and the short-run coefficients are estimated using Maki approach for cointegrated equations.

We have three main conclusions from the estimation of elasticity in the period of 2003-2015. To summarise the first one, we find that income elasticity of non-energy imports is higher than relative price elasticity. Specifically, income elasticity is -2.44 in the long run, -1.04 in the short run; and price elasticity is -2.14 in the long run, -0.29 in the short run.

The second conclusion relates to the signs of coefficients, in the sense that obtained relative price negative coefficient signs are consistent with the previous import demand studies in the literature, as consumers substitute domestic products for imports when the price of imports increases. That is, import prices higher than domestic prices should reduce the quantity of goods demanded from abroad. Contrary to the theory, income coefficient carries a positive sign can be explained by increasing the competitiveness of Turkey's industrial production, dependence on the weak Turkish lira, favourable interest rate, and political stability through the time. Thus, some intermediate non-energy goods could be domestically produced instead of buying from abroad.

The third conclusion is there are two statistically and economically significant structural breaks at the dates of 2006:Q1, 2010:Q3 as Maki cointegration test. We conclude that income and price elasticity of non-energy import demand in Turkey, are time-varying due to the structural breaks.

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