Tradable and Non-Tradable Expenditure and Aggregate Demand for Imports in an Emerging Market Economy[§]

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Abstract: Turkish economy has showed a remarkable performance in economic growth in the early years of the 2000s. This has gone along with distinctively high current account deficits and structural transformation in the economy. As noted by Rodrik (2016), falling share of manufacturing sector and a rise in the share of non-tradable sector in GDP have been the prominent feature of the recent Turkish economy. Using the non-separability assumption of non-tradable expenditure from imports, this paper examines the impact of this structural transformation on imports and, in turn, current account stance of Turkey. In this regard, an import demand function is derived under the *non-separability* assumption, and it is estimated by using quarterly time series data from Turkey. Empirical results show that non-separability assumption cannot be rejected in the case of Turkey, and the relative prices of non-tradable goods to tradable ones must be considered as the detrimental factor in addition to standard determinants of import demand (namely the relative price of imports and real GDP). This result also implies that recent increases in import expenditure is, to some extent, due to changes in the relative price structure in favour of non-tradable goods.

Key words: Import demand, non-separability, tradable and non-tradable expenditure, capital inflows; premature de-industrialisation, Turkey.

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1. Introduction

After the 2001 economic crises, Turkey astonished international observers with her good macroeconomic governance and distinctively high growth rates, which were persistently accompanied by high currency account deficits. This was, to great extent, a consequence of increased dependency on imports and poor export performance of the economy (Günçavdı and Kayam, 2016). Despite a recent slowdown in economic growth, current account deficits unavoidably remain high, and rise a concern, especially, about how to curb import expenditure of the country. In this respect, conventional approach to developing policy measures is based upon empirical findings of a standard import demand function and the estimates of its price and income elasticities. However, this standard approach fails to recognise the recent structural change in the Turkish economy and its likely effects on import behaviour. Besides, the balance-of-payment constraint has become a non-binding one due to high and easily accessible international liquidity, and relative prices have assumingly become detrimental factors for demand behaviour of imports and sectoral change in GDP.

Changes in the nature of economic growth has lately become the sources of concern by others not only in Turkey, but also in other emerging market economies (EMs). Most recently, Rodrik (2016), for example, has argued his empirical observations on the falling share of manufacturing in employment and value added far before having gone through a proper experience of industrialisation. Also, he implicitly indicates that developing countries overwhelmingly become dependent on service economies to generate economic growth. He calls this "premature de-industrialisation".

We use the same term for noting both a fall in the share of tradable and a rise in the share of non-tradable components of GDP.[1] Even if globalisation, starting in the early 1980, features in accounting for this process prevailing in emerging market economies, an excessively high level of international liquidity with low interest rate has recently encouraged these countries to expand their economic activities *further* into non-tradable goods producing sectors, rather than into tradable ones. Hence, this has expectedly speeded up the rise of non-tradable activities and de-industrialisation process in emerging market economies, and most importantly has been accounted for changes in the relative price of non-tradable goods to tradable ones (overwhelmingly in favour of the former one). In this regard, Turkey has not been an exception from this trend, and the economic growth after 2001 gradually became non-tradable-driven one. As a consequence of this transformation, Turkey has particularly

[1] Günçavdı et al. (2003) was an ealier study drawing attention to a fall in the share in manufacturing in employment in Turkey.

increased her dependence on capital flows in order to finance both domestic demand, which has predominantly become non-tradable in nature, and imports.

In the beginning of the 2000s, Turkey showed impressive growth performance initially by reforming the economy.[2] Following 7.5 percent contraction due to the economic crises in 2001, the economy impressively grew on average 7.1 percent in the 2002-2007 period. Also the share of tradable components of GDP, as noted by Rodrik (2016), appears to have declined drastically (see Figure 1). This, however, constitutes a serious concern when it is examined together with the increased dependence on imports and current account deficits of the country.[3] This concern is based on the belief that an expansion in domestic demand is a crucial determinant of demand for aggregate imports and current account deficits.[4] Previous studies for Turkey consistently show that Turkish import demand is highly responsive to changes in domestic expenditure with an elasticity greater than its unity (*see* Togan and Olgun, 1987; Günçavdı and Ülengin 2006 and 2008). However all of these studies follow the traditional literature of import demand functions, and implicitly ignore the very important distinction between tradable and non-tradable components of real income, and again implicitly assume that both income components are *separable*[5]. Respectively, in the standard approach to modelling, the import demand function becomes as a component of tradable expenditure and it is assumed to be independent of other components of domestic expenditure.[6] This separability issue is particularly important and must be empirically tested

[2] According to international observers there were a number of factors, at both national and international levels, that played an important role in this success. The first was the high international liquidity in this period that enabled Turkey to have easy access to international financial sources at relatively low cost. The second is the presence of a single-party government which provided political as well as economic stability and reduced uncertainty in macroeconomic policies for international lenders and investors. The beginning of accession talks with the EU in 2005 constituted the third factor which helped Turkey access to international capital markets easily. Sound macroeconomic policies and a fiscal stance which has been guided by a number of standby agreements with the IMF were the last factors playing important role in explaining this exceptional performance of the Turkish economy in recent years. All these favourable conditions have allowed Turkey to access international liquidity easily, and also to expend its domestic expenditure.

[3] Unlike ours, this concern is usual for a country having expansion in its expenditure, and as expected arises in the case of Turkey from the fact that exports have increasingly become dependent on imported inputs (see Günçavdı and Küçükçifçi, 2001 and Günçavdı *et al.* 2008). This, along with an increase in exports leads to a rise in imports and consequently causes a deterioration in the current account balance of the Turkish economy. This concern has recently found echoes among the business community in Turkey, and some prominent Turkish businessmen have advised the current government to take some appropriate measures to increase the value added of Turkish exports, and to correct current account imbalances by doing so.

[4] As a developing country Turkey has occasionally experienced a number of economic crises, all of which were initiated by payment difficulties that the economy encountered to finance unsustainable levels of current account deficits (*see* Celasun and Rodrik, 1989).

[5] The separability assumption in our context here means that tradable and non-tradable expenditure in consumers' budget are independent of each other. According to this assumption, expenditure in the preferences of a representative consumer can be partitioned into groups (such as tradable and non-tradable expenditure) so that preferences (or demands) within groups can be described independently of the quantities in other groups (Deaton and Muellbauer, 1980).

[6] To the knowledge of authors, in the traditional import demand literature this distinction between the tradable and non-tradable expenditure components has drawn very little attention. The only exception has been Goldstein

especially if the distinctive rise in the share of non-tradable components of GDP brings about a deterioration in the relative price of non-tradable goods to tradable ones, which inevitably paves way for higher import expenditure under the non-separability assumption.

(*Figure 1 about here*)

Capital inflows, together with an increased reliance on non-tradable activities (and expenditure on the demand side) for growth, particularly urges concerns about the link between non-tradable sector-driven growth and current account stance of the economy. The purpose of the present paper is to establish this link, through demand for imports, by examining the non-separability of non-tradable expenditure from imports in the case of Turkey. Accordingly, import demand is determined not only by its relative price and real income level, but also by the relative prices between non-tradable and tradable goods. For policy considerations, de-industrialisation, which gives rise to an expansion in non-tradable expenditure in the economy, accompanies with deterioration in the relative prices of non-tradable goods to tradable ones expectedly in favour of the former one and leads to high import demand and, in turn, current account deficits.

Following this introductory section, the remainder of the paper is organized as follows. Section II examines the relationship between non-tradable expenditure and imports in the context of weak separability. The empirical specification of the import demand function, which takes into account of weak separability of non-tradable expenditure from imports, is developed in Section III. Section IV briefly involves in the short-run behaviour of import demand. Data and empirical results are reported in Section V. Having intuitively discussed our empirical findings in Section VI, a short summary and our concluding remarks are presented in Section VII.

2. Weak separability of non-tradables from imports

Traditionally, an import demand function in the literature is written as a function of an activity variable (mostly proxied by GDP) and the relative import prices, and this is used to estimate the income and price elasticities of import demand for policy considerations (Houthakker and Magee, 1969; Goldstein and Khan, 1985; Asseery and Peel, 1991; Bahmani-Oskooee, 1998).[7] This traditional approach, however, implicitly assumes an allocation of total

et al. (1980), which examined the role of prices of tradable and non-tradable goods in import demand. However, this paper, like those in the traditional literature, also ignores the distinction between the elasticities of tradable and non-tradable expenditure.

[7] For recent theoretical and empirical survey of the standard approach to modelling import demand, see Günçavdı and Ulengin (2012) and Goldstein and Khan (1985).

expenditure only between domestic and imported goods on the basis on their relative prices, and most importantly, ignores the presence of non-tradable expenditure, which constitutes competition with tradable expenditure within a given consumers' budgets. Accordingly, tradable and non-tradable expenditure are implicitly assumed to be *weakly separable* in the sense that tradable expenditure is independent of neither non-tradable expenditure itself nor of the non-tradable prices.[8] Nevertheless, whether or not this week separability assumption is plausible in practice is, in fact, a matter of empirical testing, and requires a framework for this testing.

Following Emran and Alam (1999), this testing framework can explicitly be established by assuming that a two-stage and separable expenditure allocation behaviour of consumers prevails in the economy. Respectively, at the first stage of budgeting, economic units in the country are assumed to allocate their expenditure between tradable and non-tradable goods on subject to their relative prices and total income. Then, they are assumed to take a decision at the second stage about allocating tradable expenditure, which becomes available after the first stage, between imports and domestically produced tradable goods. As a consequence of this weak separability assumption, the amount of import demand is hypothetically determined at this second stage of budgeting, and accordingly becomes a function of the income which is left for expenditure on tradables after the first stage and the relative prices of imported and domestically produced goods.

More formally, a two-stage budgeting under the weak separability assumption can be introduced by using a utility maximation framework. By assumption, allocating total income between tradable and non-tradable expenditure takes place at the first stage as follows:

$$\max \quad U(T,N) \qquad s.t. \;\; P^T T + P^N N \leq Y \tag{1}$$

where T and N stand for the amounts of tradable and non-tradable goods demanded at the first stage; Y represents the total income available for this allocation. The problem in (1) expectedly yields the optimum amounts of tradable (T^*) and non-tradable (N^*) goods and their shares in total (respectively YT^* and YN^*). The optimum levels of T and N are to be the functions of the relative price of tradable and non-tradable good (P^N/P^T) and the given level of real income (Y/P^T).[9] Then at the second stage, YT^* is assumed to be allocated between imported and domestically produced goods subject to this income share available for tradable expenditure after the first stage and their relative prices as follows:

[8] See Deaton and Muelbauer (1980) for a good discusion of weak seperability assumption in the context of the consumer theory.
[9] The price of tradable goods can be considered as a *numerier* because it is more stable than the other and is exogenously given in the world market.

$$\max \quad U(M,D) \qquad s.t. \quad P^M M + P^D D \leq YT^* \tag{2}$$

where P^M and P^D are the price of imported and domestically produced goods respectively; M and D stand for the amount of imports and domestic goods demanded. From (2), the optimum quantity of imported (M^*) and domestically produced (D^*) goods can be derived as the functions of relative prices (P^D/P^M) and the income share of tradable expenditure (YT^*). More precisely, the optimum level of import demand can explicitly be written from (2) as follows:

$$M^* = M(P^M, P^D, YT^*) \tag{3}$$

According to (3), the optimum demand for imports under the weak separability assumption includes YT^* (not total income as in the traditional approach in the literature) and the relative prices of imported and domestic goods (under the homogeneity of degree zero assumption). Obviously, the non-tradable price and total income do not appear in (3). Therefore, an import function like in (3) implies that the allocational problem at the second stage is independent from the decision at the first stage.[10] In the case where the weak separability assumption does not hold, the variables determining the first stage decision also become detrimental in (3) through YT^*, and equation (3) becomes as follows:

$$M^* = M[(P^M/P^D), (P^N/P^T), (Y/P^T)] \tag{4}$$

where $YT^* = f[(P^N/P^T), (Y/P^T)]$ in (3) under the *non-separability* assumption. The empirically appearance of (P^N/P^T) and (Y/P^T) variables in (4) is considered as the violation of the weak separability assumption, and respectively it can be concluded that income allocation decision at both stages are taken simultaneously and they are not separable.

3. Empirical specification of the model

Under the assumption of the utility function in a *Cobb-Douglass* functional form, a standard linearized function of aggregate import demand can be written as follows:[11]

[10] To our knowledge, there have been two popular exceptions in the literature which explicitly concern about the importance of non-tradable expenditure andthe price of the non-tradable goods in the determination of import demand (see Goldstein, Khan and Officer, 1980; Emran and Alam, 1999). However there has been no other study other than the present one examining the issue of weak separability for Turkey.

[11] Traditional modelling includes the relative price variables in (5) under the assumption of unit homogeneity in prices. In other words, (5) implicitly assumes that there exists the illusion of money. Another assumption of this model is that on the supply side, the price elasticity of import supply is infinite; i.e. the supply of imported goods is given. Therefore, the supply-and-demand equality in the imported goods market can be reduced to an equation such as (5) in equilibrium.

$$m_t^* = \alpha_0 + \alpha_1 y_t + \alpha_2\left(p_t^m - p_t^d\right), \qquad \alpha_1 > 0,\ \alpha_2 < 0 \tag{5}$$

where small cases show the logarithms of all relevant variables in (5); m_t^* is the demand for imports in equilibrium.[12] The homogeneity of degree zero assumption in (6) is accounted for the imposition of the same coefficient α_2, the price elasticity of imports, on both price variables.

Following the theoretical discussion in the earlier section, a separable import demand function like (3) under the homogeneity-of-degree-zero assumption can explicitly be written as follows:

$$m_t^* = \beta_0 + \beta_1\left(yt_t^* - p_t^d\right) + \beta_2\left(p_t^m - p_t^d\right), \qquad \beta_1 > 0,\ \beta_2 < 0 \tag{6}$$

where total real income variable (y_t) is replaced in (6) by ($yt_t^* - p_t^d$), the amount of income left over after the first stage of budgeting decisions. Under the weak separability assumption, the allocational problem of the second-stage-budgeting decisions becomes independent from those at the first stage, and hence demand for imports become dependent on the constraints prevailing only at the second stage as seen in (6).

A theoretically consistent test of weak separability of non-tradables requires an estimation of *a nested regression equation*, which is augmented by those variables that are relevant at the first stage of budgeting decisions. Unlike (6), this new regression equation additionally includes the relative price of non-tradables and real total income as seen below:

$$m_t^* = \delta_0 + \delta_1\left(yt_t^* - p_t^d\right) + \delta_2\left(p_t^m - p_t^d\right) + \delta_3(p_t^N - p_t^T) + \delta_4(y_t - p_t^T), \tag{7}$$

Equation (7) is the nested equation employed to test the separability of non-tradables from import demand decision. The third and fourth term on the right hand side of (7) are the variables prevailing at the first stage budget allocation problem and the presence of these variables in (7) establishes a channel of interaction between decisions at both stages. In particular, the third variable, namely the logarithm of the relative price of non-tradables to tradable goods, can be considered as the real exchange rate. Under the rejection of the weak separability assumption, the real exchange rate as defined in (7) becomes one of the detrimental factor of import demand, it is expected to influence the demand for imports

[12] Economic theory does not provide enough insight on the correnct specification of (5), and the most appropriate measure of variables in concern. Khan and Ross (1977) and Boylan et al. (1980) suggested long-linear forms purly on the basis of statistical testing. Additionally convenstional import demand equations have mostly been secified in double-log-linear form due to its convenience and ease of interpretation.

positively due to the *substitubility* of non-tradable expenditure to tradables at the first stage of budgeting decisions.

Therefore, the weak separability assumption in (7) can statistically be tested through the null hypothesis, H_0: $\delta_3 = 0;\ \delta_4 = 0$ and $\delta_3 = \delta_4 = 0$. This is a joint test, and implies that the rejection of the null does not necessarily means the rejection of the weak separability of non-tradables. This rejection would also be due to other statistical problems of the estimation, such as the violation of maintained assumptions of estimation (omitted variables and functional form misspecification etc.). We must also bear in mind that under the null hypothesis of weak separability, once tradable expenditure is included as a regressor, all first stage variables irrelevant for the determination of import demand at the second stage (see Emran and Alam, 1999).

Goldstein et al (1980)'s approach

Goldstein et al. (1980) was an earlier attempt to examine the importance of the price of non-tradables in the demand for import function. Although they recognised the two-steps budgeting approach to justify the presence of non-tradable prices in an empirical import demand function, their model was loosely based on the theory as define in (1) - (3). Goldstein et al. (1980) employed a standard import demand function augmented only by the relative price of non-tradable variable, and the separability assumption was tested by imposing a zero-restriction on the coefficient of this variable. They proposed the following function:

$$m_t^* = \pi_0 + \pi_1\left(p_t^m - p_t^d\right) + \pi_2(p_t^N - p_t^T) + \pi_3(y_t - \bar{y}_t) + \pi_4\bar{y}_t \qquad (8)$$

where $\bar{y}_t$ is the trend level of real income; $(y_t - \bar{y}_t)$ is the output gap variable, defined as a difference between the real actual level of income and its trend value. In case where the price of non-tradable goods are irrelevant in the determination of imports, π_2 is expected to be zero. Hence, this implies that imports and non-tradable goods are do not substitute in this case.

Equations such as (5), (7) and (8) are considered as an equilibrium relationship in the empirical foreign trade literature, and it is assumed to hold in the long run. However, it is also plausible to expect that this equilibrium condition does not hold in the short run. Because of various imperfections in practice (see Marston, 1971). In other words, imports do not always remain at their long-run equilibrium level as described in (5), (7) and (8).

4. Short-run dynamics of the model

Although the theory says nothing about how to incorporate the short-run dynamic behaviour of import demand, we can suppose that the short-run import demand is in disequilibrium, which creates extra costs for the economy. This assumption helps us in justifying and deriving the dynamic behaviour of import demand in the short run. Hence disequilibrium gives rise to the following penalty function describing the total cost of being disequilibrium:

$$E\{\sum_{s=0}^{\infty}\beta^{s}\theta_{1}(m_{t+s}-m_{t+s}^{*})^{2}+\Delta m_{t+s}^{2}-2\theta_{2}\Delta m_{t+s}\Delta m_{t+s}^{*}|\Omega_{t}\},\ \theta_{1},\theta_{2}\geq 0 \qquad (9)$$

where small cases in equation (9) indicates the logarithm of all relevant variables; m_{t+s}, for example implies the logarithm of m_{t+s}. Equation (9) represents the total costs that the country encounters due to the short-run import demand being in disequilibrium (Nickell, 1985). This penalty is assumed to be minimised by choice of m_{t+s} (s=0,...,∞) where Ω_t is the information set at time t; β (0≤β≤1) is the discount factor; m_{t+s}^{*} is the equilibrium level of imports for period ($t+s$) as described in equation (1); θ_1 and θ_2 are parameters. The first term in the square brackets represents the cost of being away from the long-run equilibrium level of imports. The second term reflects the costs of changing the rate of imports, whereas the last term indicates that the loss is attenuated if the firm moves in the right direction (towards the equilibrium rate of imports); this last term will go to zero if the equilibrium level of imports remain constant.

Minimising equation (9) with respect to m_{t+s} yields a second order difference equation. Using only the stable root, λ, of its characteristic equation (λ<1), and assuming that the expected future level of import demand follows a random course with drift (μ), the following familiar error-correction representation can be derived as the dynamic function describing the short-run behaviour of import demand:

$$\Delta m_{t}=a_{0}+a_{1}\Delta m_{t}^{*}+a_{2}(m_{t-1}^{*}-m_{t-1}) \qquad (10)$$

where a_0=(1-λ)$(1-\theta_2)\beta\lambda\mu/(1-\beta\lambda)$, $a_1=[1-(1-\theta_2\lambda)]$, $\alpha_2=(1-\lambda)$. Equation (10) shows the dynamics of short-run import demand. The unobservable, desired level of import demand is given by either (7) or (8), as a co-integration relationship, depending on the testing result of the weak separability hypothesis. The unobservable Δm_t^{*} is replaced by the first-differences in the independent variables in equation (7) or (8).

5. Data and empirical results

In this section, the weak separability hypothesis is statistically tested by equation (7) and (8), and then the import demand functions in the short and the long run are estimated in accordance with this test result. The data used for this empirical investigation was readily available in the website of the Central Bank of Turkey for the period between 1998Q1 and 2013Q2. Before reporting econometric results, the decomposition of total income into its tradable and non-tradable components require a further attention. Although the GDP statistics is not readily available in this decomposition level, an extra calculation is necessary for this decomposition by economic activities. Accordingly, economic activities such as agriculture, mining and manufacturing are simply considered as tradable goods, whereas the rest of the activities in GDP are taken as non-tradable goods.

The prices of tradable goods and non-tradable goods are not readily available either. Aggregate price statistics are available at the macroeconomic level, but its decomposition into tradable and non-tradable is very demanding. However, the relative price of non-tradable to tradable goods is in fact the definition of real exchange rate (see Edwards, 1988 and 1989), and the Central bank real effective exchange rate can be used as a proxy variable for this.

It is now well-known that most time series variables are non-stationary, and any regression running between them is likely to render spurious correlation (Granger and Newbold, 1974). We accordingly start our empirical investigation with the determination of the statistical properties of the macroeconomic variables in equation (7). Traditionally the Augmented Dickey-Fuller (ADF) unit root test is first used to check for the non-stationarity of the variables (see Charemza and Deadman, 1992). All variables appear to have a unit root, and require differentiation in order to achieve their stationarity.[13]

Having determined the statistical properties of macroeconomic series required for our investigation, the weak separability hypothesis of non-tradable expenditure from imports is tested by using Equation (7) as a test equation. Under this hypothesis, it is tested that, given tradable expenditure, (YT^{*}), demand for imports is independent of all the first stage variables, namely the prices of non-tradable to tradable goods and total real income. The results are reported in Table 1. We perform *Chi-square* tests on individual coefficients, assuming them to be equal to zero, separately as well as jointly. The relevant test results in Table 1 evidently show that the weak-separability hypothesis as defined in Table 1 is rejected at any level of statistical significance.

Although Emran and Alam (1999) claims to have a theoretically consistent test of the weak separability, they propose a nested regression equation (7), which includes the tradable

[13] Due to the fact that the unit root testing methodology is already well established, we did not report the test results for each variable here. However, the results are available upon request.

expenditure variable together with the real income variable for the empirical purpose. This variable however constitutes the channel through which two stages of budgeting decisions are related, and it is theoretically substituted by the real income and the relative price of non-tradable to tradable goods at the second stage decisions. To keep the tradable expenditure variable in (7) along with the another activity variable (namely real income) inevitable causes the multi-collinearity problem in the estimation of (7). In order to avoid from this problem, equation (7) is re-estimated without the tradable expenditure variables. This estimated equation is theoretically more consistent than earlier one and the results are reported in the second column of Table 1. The weak separability hypothesis is tested by imposing the similar restrictions. The test results show no difference from the earlier one and imply that both budgeting decisions are not separable.

(*Table 1 about here*)

Following the practice of Goldstein et al. (1980), equation (8) is estimated for the Turkish case and the results are reported in the third column of Table 1. However, this test did not change the earlier result either.

In the end, all these results shows that the first and second stages of budgeting decision cannot be separated in the Turkish case, and hence, the first stage variables, namely the relative prices of non-tradable to tradable goods and total income deflated by the price of tradable goods, are indeed detrimental factors in demand for imports function.

Next, we investigate the presence of a co-integration relationship between variables in equation (7) in the long run. However, the variable representing tradable expenditure (YT^*) is excluded from equation (7) on the basis of weak separability test results in Table 2. Therefore, the non-separable import function to be estimated is to be as follows:

$$m_t^* = \sigma_0 + \sigma_1\left(p_t^m - p_t^d\right) + \sigma_2(p_t^N - p_t^T) + \sigma_3(y_t - p_t^T) \qquad (11)$$

The results in the second and third columns are the estimates of equation (11). The test for the presence of the co-integration relationship between the variables in (11) is based on checking the stationarity of the residuals, which is obtained from the estimation of this equilibrium relationship. The *ADF* result for residual yields the value of -3.13 for equation (11), indicating the stationarity of the residuals of the equilibrium relationship at the 5 per cent significance level. Therefore, the relationship described in equation (11) can be viewed as the co-integration relationship.

The important drawback of the two-stage Engel and Granger test for co-integration is that it *a priori* assumes the presence of one co-integration vector between the variables in

equation (11). In order to test this presumption, we apply to the Johanson multivariate co-integration test, and we report the results of this test in Table 2 (Johansen, 1988; Johansen and Juselius, 1990). At both 5 % significance level, the null hypothesis of zero co-integrating vector appears to be strongly rejected, while the hypothesis of one or more co-integrating vector is not. According to both tests results there exits, at most one co-integrating vector as specified in the second column of Table 1.[14]

(*Table 2 about here*)

According to the estimated co-integration relationship, given in Table 1, all variables are statistically significant and have expected signs. In particular long-run price and income elasticities are crucial parameters for policy considerations and their values are usually revealed from estimating an import demand function like equations (5) and (11). From the third column of Table 1, the long-run income and price elasticities appears to be 1.18 and -0.07 respectively.[15] It is also interesting that specifying the import demand function under the non-separability assumption changes the magnitudes of these elasticities significantly. More precisely, the standard model estimates the price elasticity 63 percent higher than the model with non-separability, whereas income elasticity in the estimation of the standard model is approximately 36 percent higher than the that in the non-separable import demand function.

The price of non-tradable goods, on the other hand, seems to have a significantly high and positive impact on import demand with 1.2 in Turkey. This is a critical variable in the estimated equation and is a clear evidence, together with the total real income, for the non-separability of demand for imports from non-tradable expenditure. This also indicates that an increase in the price of non-tradable goods first deteriorates the relative prices between tradable and non-tradable goods, and changes the overall incentive structure for the allocation of expenditure by making imports relatively cheaper than before. In addition to this direct effect, higher non-tradable prices also create distortions against domestic goods in the relative prices of foreign tradable (namely imports) and domestically produced tradable goods.

[14] In addition to the Engle and Granger test procedure and the Johanson multivariate co-integration test, we also use the bound test for co-integration (Pesaran et al., 2001). it is jointly tested the significance of the coefficients on the one period lagged levels of the variables in the Unrestricted Error Correction Model (UECM). We conducted the bound test only for the UECM with import demand as the dependent variable, and the calculated *F*-statistics for k=4 (which is require to find the critical values) confirms the presence of one co-integration relationship with the calculated *F* value 11.14.

[15] Togan and Olgun (1987) and Günçavdı and Ülengin (2006) are two different empirical studies on the determinants of Turkish import demand by relying on the standard import demand specification. Using an annual data and covering the period of 1960-1985, the former found the income and relative price elasticity of imports 1.42 and 0.47 respectively. A recent study Günçavdı and Ülengin (2006), on the other hand, utilises a montly data set for a relatively recent period, namely 1981M1-1996M12, and found similar results with 1.64 for the income elasticity and 0.39 for the price elasticity of import demand.

(*Table 3 and Figure 2 about here*)

Having estimated the co-integration relationship in equation (11), the estimated the dynamic import demand function are reported in Table 3. According to the conventional statistical test for the goodness-of fit, the short run estimated equation appears to fit the Turkish data quite well. According to the results of the diagnostic tests, the short-run model appears to be well behaved with a white noise error term and diagnostic test results in Table 3.[16] Adjusted R^2 is reasonable high for this kind of dynamic model, and postulates that the existing variables in the model explain almost 68% of total variation in import demand. The coefficients are generally significant and of the expected signs. In particular, the error-correction term, res_{t-1}, which is given by the residual term estimated from the co-integration equation, is statistically significant and has expected negative sign, showing the support for the error-correction representation of equation (11) (Engle and Granger, 1987). The estimated coefficient of this error-correction term is the adjustment coefficient, and appears to be 0.27 implying a sluggish adjustment of imports to equilibrium. This then implies that the adjustment of import expenditure in Turkey is to be very sluggish after a policy change which aims to correct current account imbalances. This result could be due to both the high dependency level of the domestic production on importation and supply constraint on the domestic production that possibly substitutes importation. The signs of all variables are in expected directions except the sign of change in the relative price of imports, which appears to be statistically insignificant in the short run. The significance of two variables, namely the change in the relative price of non-tradable goods to tradable ones and the real growth rate, can also be considered as the non-separability of non-tradable expenditure from imports in the short run. Interestingly, the detrimental impact of the former variable with the coefficient of 0.61also overcomes that of the real growth rate in the short run, and implies that demand for Turkish imports are relatively more responsive to changes in relative prices of non-tradable goods rather than real economic growth rate. Lastly, the CUSUM Square test of stability (see Figure 2) indicates that the estimated parameters of the model have remained stable over the sample period.

6. What have we learned from this research?

Our empirical results reveal a number of structural characteristics of the Turkish economy, and particularly one of them have not, so far, drawn a significant attention in the literature.

[16] The diagnostic tests used includes the Durbin-Watson test; Lagrange-multiplier test for serial correlation; Lagrange multiplier test for autoregressive conditional heteroscedasticity; the Ramsey reset test functional form test; the Jargue-Bera test for normality; the Koenker test for Heteroscedasticity and the Hausman test for exogenity.

They are namely *i) non-separability* of imports from non-tradable expenditure and, as a result, the *substitutability* of domestic tradable goods with imports, and *ii)* high dependence of the economy on imports. The last one is already well-known feature of the Turkish economy, and, as discussed here, they are also other studies to show this. However, the present research introduces a new dimension into this dependence issue, and empirically shows that lately changes in relative prices in favour non-tradable goods could have increased this dependency.

The first finding on non-separability of our research is, on the other hand, is novel, and can be expected to have a policy implication in practice, especially in deciding appropriate measure to curb expenditure on imports. Most importantly, there would be important economic consequences of the non-separability of non-tradable expenditure from imports in circumstances where domestic demand and non-tradable economic activities distinctively become the main motives to stimulate economic growth. An overall rise in non-tradable economic activities constitutes a major obstacle to control demand for foreign tradable goods due to the presence of the relative price channel between non-tradables and tradables. This channel also presents an explanation of how premature de-industrialisation of Rodrik (2016) takes place in an emerging market economy.

(a) Non-separability and substitutability

Conventional approach to modelling import demand has mostly ignored the likely interaction between import demand and non-tradable expenditure, and has implicitly assumed that both expenditures are separable. All attention has accordingly been paid to the estimations of income and price elasticities for policy considerations. However, these two components of total expenditure theoretically become related under a given budget constraint, and the empirical results in Table 2 shows that this is indeed the case for the Turkish economy. Respectively, import decisions in Turkey appear to be taken by considering the full budgetary income (proxied by the total real income), rather than the share of tradable component of total income (which refers to the level of income left after spending on non-tradable goods) and the relative price of non-tradable goods. In other words, import decisions are taken simultaneously with decisions on non-tradable expenditure on the basis of the relative prices of non-tradables to tradables. As long as these relative prices remain in favour of non-tradable goods, it would, accordingly, be extremely difficult to control importation, and, to same extent, to stop de-industrialisation in Turkey.

The implication of non-separability of imports from non-tradable expenditure is especially vital for the Turkish economy because economic growth has lately been relied on

domestic demand and non-tradable expenditure. In our case, both the size and sign of the relative price of non-tradable goods in the import demand equation yield an importance of the non-separability assumption in practice. The estimated elasticity of non-tradable prices in the long-run co-integration relationship is statistically significant and its value is over unity (more precisely 1.2). This, accordingly, implies that demand-driven expenditure on non-tradable goods is most likely accounted for an increase in imports and current account deficits.

Within the framework developed in this paper, there would be two channels to have such a result. First, higher non-tradable expenditure can take place only by squeezing tradable expenditure under a given budget constraint. However, this is the case only if the separability hypothesis holds. If not, the second channel prevails under the non-separability condition. In this case, non-tradable expenditure and import demand become simultaneously related through price channels, and increases in non-tradable expenditure eventually distorts the relative price structure prevailing in the economy, which is indeed the case in Turkey. This price distortion expectedly takes place in favour of non-tradable goods, and, in turn, brings about a change in the relative prices between foreign and domestic tradable goods, largely against domestically produced tradable goods.[17] Higher the substitutability between imported and domestic goods is, higher will be importation as a consequence of distortion in domestic prices. The positive sign of the price elasticity of non-tradable goods in the estimation of equation (11) in Table 2, accordingly, shows that an increase in the price of non-tradable goods evidently encourages demand for foreign tradable goods rather than domestic ones.

These findings regarding the non-separability of non-tradable expenditure from imports are important for future policy considerations in Turkey. Policy makers, who wish to curb expenditure on imports, traditionally rely on policy recommendation of the standard import demand function with paying no attention to the interaction between non-tradable expenditure and imports. Our findings show that under the non-separability assumption, non-tradable expenditure could be the cause of the price distortions, which eventually deteriorate the relative price of tradable goods against domestically produced tradable goods. Correcting

[17] The relative price of imports to domestic goods is given by $(p_t^m - p_t^d)$ in the import demand function. p_t^d in this definition is the geometric average of the prices of tradable and non-tradable goods in practice with the weights α and $(1-\alpha)$ respectively. Upon substituting all these components in the earlier definition of the relative import price, $(p_t^m - p_t^d) = p_t^m - \alpha p_t^T - (1-\alpha)p_t^N$. We can also assume the tradable goods' prices as a weighted average of imported (p_t^m) and exported goods (p_t^x) with weights of β and $(1-\beta)$ respectively. Substituting this in the previous representation of the relative import price, $(p_t^m - p_t^d) = (1-\alpha\beta)p_t^m - \alpha(1-\beta)p_t^x - (1-\alpha)p_t^N$. Then, it is clear in this representation of the relative import price that an increase in the price of non-tradable goods encourgage imports through the partial derivation of $(p_t^m - p_t^d)$ with respect to p_t^N; $d(p_t^m - p_t^d) \,/dp_t^N = -(1-\alpha) < 0$. Accordingly, higher non-tradable goods prices can also be accounted for an increase in imports by reducing the relative price of imports.

imbalances in current account deficits, a priori, requires eradicating these price distortions by both re-adjusting total expenditure between non-tradable and tradable goods and allowing for a rise in the share of domestically produced tradables in GDP. A new incentive scheme also seems to be necessary to improve the attractiveness of domestic tradables.

(b) Import dependence

The results in Table 2 and 3 also confirm the well-known fact that the Turkish economy is highly dependent on imports. In our research, his feature is proved to be as a consequence of the non-separability of non-tradables from imports. We empirically revealed that the price elasticity of import is low (far lower than unity) in the long-run equation. This is, in fact, an indication of low responsiveness (high dependence on) of imports to changes in prices. Besides, the price of imports variable turns to be insignificant in the short-run import demand equation implying that the Turkish economy is highly dependent on imports.

This conclusion *per se* is not novel, and there have been other researches in the literature to have reached this conclusion. However, it becomes evident in our research that the inclusion of the non-separability of imports from non-tradable expenditure into modelling import demand substantially lowers the price elasticity as well as income elasticity. For policy consideration, this implies that the Turkish demand for imports is to be less responsive to any policy shock stemmed from foreign exchange rate adjustment and expenditure reduction.

7. Conclusion

In the literature, capital inflows are usually incorporated into modelling demand for imports via the consideration of the strictly binding balance-of-payment constraint prevailing in developing countries, and capital inflows are assumed to relax the stringency of this constraint and to allow expenditure on foreign goods. However, there is nowadays no use to sustain this constraint particularly with the presence of the recent abundance of international liquidity and easy access to it by emerging market economies. One implication of such a presumption is that emerging market economies become exposed to price incentives rather than quantity constraints.

However, the new problem that emerging market economies have lately encountered is not the balance-of-payment constraint (as it was the case in the 1980s and 1990s), but instead, premature de-industrialisation due to easy access to relatively cheap international liquidity in order to finance domestic expenditure, which has lately been dominated by non-tradable economic activities. Turkey has not been an exception from this trend, and her

economic growth has become dependent increasingly on non-tradable economic activities and has been encountered a fall in the share of manufacturing sector in GDP. But, the problem is that despite the presence of positive and high economic growth rates, the Turkish economy unavoidably remains dependent on imports and currency account deficits. This expectedly rises concerns about understanding the reason behind high current account deficits through examining import behaviour.

In this regard, the present paper puts forward a hypothesis to be tested that a rise in the share of non-tradable economic activities deteriorates the incentive structure in the economy through the relative price channel, encourages the high use of imported tradables. We theoretically discuss that this price channel is a consequence of the violation of the separability assumption of non-tradable expenditure from imports. Despite its importance, this separability issue has usually been ignored field of research in the studies explaining import behaviour. In fact, it becomes crucial to explain some reasons behind the de-industrialisation experiences of Turkey and other emerging market economies.

The present paper provides evidence from Turkey in this line. Our empirical results postulate that non-tradable expenditure is not separable from imports, and both are simultaneously taken decisions on the basis of their relative prices. This finding implies that changes in the relative price of non-tradables stimulate demand for foreign tradables, rather than domestic ones, and paves the way for increased reliance on non-tradable sector activities with a fall in tradables. Our research also emphasizes that controlling expenditure on imports requires unconventional policy measures to be taken, other than those relying on the elasticities on import demand function. The introduction of a new incentive scheme in order to revers de-industrialisation in Turkey is necessary and such schemes must include measures that aim at correcting the deformation in the relative prices of non-tradables to tradables.

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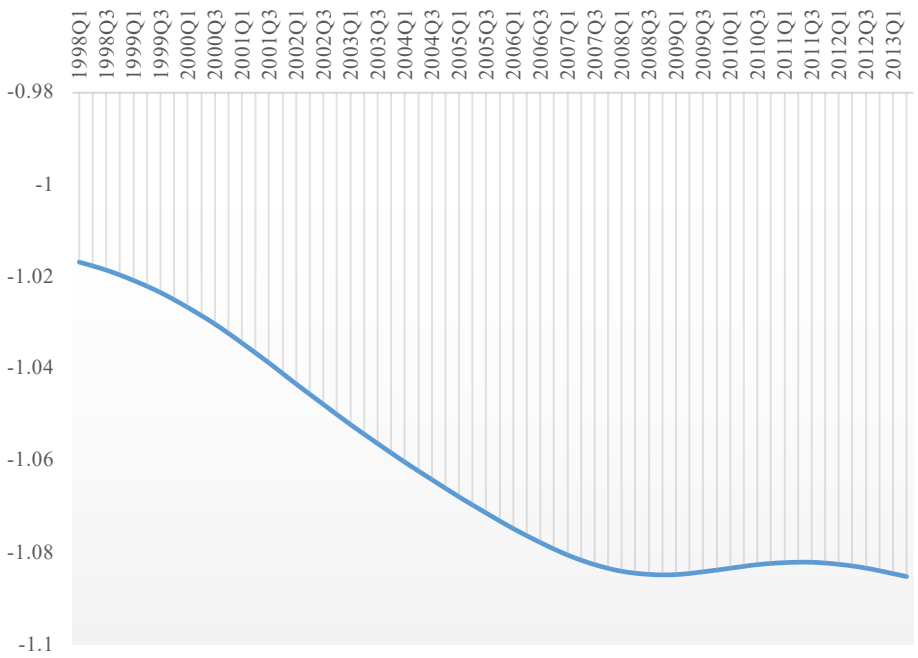

Figure 1- Trend of the tradable component of GDP
(Source: Author's calculation from the data obtained from www.tcmb.gov.tr)

Table 1 – Tests of the weak separability hypothesis and co-integration relationships

Emran and Alam (1999): $m_t^* = \delta_0 + \delta_1(yt_t^* - p_t^d) + \delta_2(p_t^m - p_t^d) + \delta_3(p_t^N - p_t^T) + \delta_4(y_t - p_t^T)$

Goldstein et al. (1980): $m_t^* = \pi_0 + \pi_1(p_t^m - p_t^d) + \pi_2(p_t^N - p_t^T) + \pi_3(y_t - \bar{y}_t) + \pi_4\bar{y}_t$

	Emran and Alam (1999)'s test, The nested Eq. (7)	Theoretically consistent model, the non-nested Eq. (11)	Goldstein et al. (1980)'s test Eq. (8)	Standard Model Eq. (5)
constant	24.984 (-21.193)***	-19.982 (-14.795)***	-23.177 (-14.160)***	-21.709 (-12.613)***
$(yt_t^* - p_t^d)$	-0.783 (-6.329)***	---	---	---
$(p_t^m - p_t^d)$	-0.037 (-1.549)	-0.065 (-32.248)***	-0.059 (-1.844)*	-0.173 (-4.216)***
$(p_t^N - p_t^T)$	0.697 (5.382)***	1.237 (7.624)***	1.014 (6.994)***	---
$(y_t - p_t^T)$	2.355 (12.121)***	1.178 (11.989)***	---	1.619 (15.874)***
$(y_t - \bar{y}_t)$	---	---	0.964 (8.120)***	---
$\bar{y}_t$	---	---	1.427 (11.906)***	---
Dum(-2)	0.092 (4.839)***	---	0.079 (3.317)***	0.098 (2.615)***
Stationarity test of residuals (ADF)		-3.134**		
Test Statistics for the weak separability hypothesis				
$\delta_3 = 0$	$\chi^2(1) = 29.0$	$\chi^2(1) = 74.3$	$(\pi_2 = 0)\ \chi^2(1) = 48.9$	
$\delta_4 = 0$	$\chi^2(1) = 146.9$	$\chi^2(1) = 205.1$	---	
$\delta_3 = \delta_4 = 0$	$\chi^2(2) = 547.5$	$\chi^2(2) = 655.8$	---	

Note: All variables are in logarithms and $*** p < 0.01$; $** p < 0.05$; $* p < 0.1$.

Table 2. Johanson co-integration test for Eq. (11)

(a) Unrestricted Co-Integration Rank Test (Trace)

Null hypothesis	Eigenvalue	Trace Statistics	95% critical value	Prob.
r = 0*	0.379	55.752	47.56	0.008
r <= 1	0.239	27.669	29.797	0.086
r <= 2	0.139	11.591	15.495	0.176
r <= 3	0.045	2.729	3.842	0.100

Note: The critical values are taken from MacKinnon-Haug-Michelis (1999)
r: the number of co-integrating vector. * denotes rejection of the null hypothesis at the 0.05 level.

(b) Unrestricted Co-Integration Rank Test (Maximum Eigenvalue)

Null hypothesis	Eigenvalue	Max-Eigen. Statistics	95% critical value	Prob.
r = 0*	0.379	28.083	27.584	0.043
r <= 1	0.239	16.078	21.132	0.220
r <= 2	0.139	8.862	14.264	0.298
r <= 3	0.045	2.729	3.841	0.100

Note: The critical values are taken from MacKinnon-Haug-Michelis (1999)
r: the number of co-integrating vector. * denotes rejection of the null hypothesis at the 0.05 level.

Table 3 – Short-run estimation of equation (11)
$(Dependent\ variable: \Delta m_t)$

constant	$\Delta(p_t^m - p_t^d)$	$\Delta(p_t^N - p_t^T)$	$\Delta(y_t - p_t^T)$	$\Delta(y_{t-1} - p_{t-1}^T)$	*Res(-1)*	*dum*
-0.029	0.262	0.613	0.958	-0.739	-0.272	0.216
(-2.064)**	(1.487)	(3.116)***	(7.309)***	(-6.312)***	(-2.959)***	(5.322)***

Adj-R^2=0.684; D.W.=1,96; Serial correlation: $\chi^2(4)$= 0.232; Functional form F(1, 51)=1.25; Normality (Jarque-Bera) = 0.628; Heteroscedasticity: $\chi^2(6)$= 0.006

Note: All variables are in logarithms and $***\ p < 0.01$; $**\ p < 0.05$; $*\ p < 0.1$

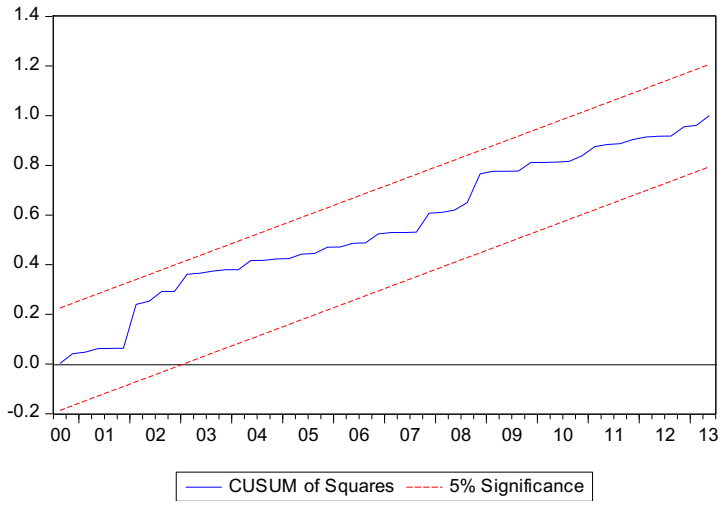

Figure 2 - CASUM Stability Tests