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Unravelling the Structure of Turkish Exports: Impediments and Policy[§]

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Abstract: In this study we reveal the structure of exports in an emerging economy, Turkey, to shed light on the impediments not only this country but also other developing countries might face in pursuit of increasing exports to tackle their current account problems. We employ panel data econometrics for estimating exports, labour and imports market specifications simultaneously to address endogeneity issues. The data covers 13 manufacturing industry sectors, 25 main export markets over the period 2000-2011. Our findings reveal that unlike conventional assumptions, export supply is not *infinitely* elastic, and the supply side of the market plays a critical role in reviving export earnings in Turkey.

Key words: Export demand and supply; exchange rate policy; Turkey.

JEL Classification: F14; F41; F43; O24.

1. Introduction

Promoting export revenue to overcome trade deficit in developing countries relies on both causal observation and empirical evidences on the likely detrimental factors of exports, and often an exchange rate adjustment policy, which requires highly responsive exports to changes in prices, is proposed as a remedy. In many developing countries, the exchange rate adjustment is considered as a *reactive* policy action to current account imbalances. However, in order to have sustainable export earnings in the long run, it is plausible to examine whether or not it is likely to undertake any *pro-active* policy measure irrespective of the current account stand of the country. Most importantly, it is also reasonable to question whether a highly used measure, i.e. the exchange rate adjustment policy would or would not be an important component of any pro-active policy. Answering this question requires an empirical research revealing the structural impediments of export performance. This is what we set

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forth to accomplish in this paper, namely diagnose the factors that have pivotal impact on Turkey's export performance. Contrarily to most studies, we propose to do that by examining the sectoral exports in Turkey with a market approach considering both the demand and supply sides simultaneously and addressing the endogeneity problem incorporating the labour and imports markets into our analysis. This perspective allows us to thoroughly explore the structural impediments and prospects of improving export performance through exchange rate policy. For policy considerations, understanding structural constraints, particularly those appearing on the supply side of the market, are very important to come up with right policy actions that will deal with the sluggish response (or sometimes irresponsiveness) of exports to conventional measures.

In this study we intend to reveal the structure of exports in an emerging economy, Turkey, to shed light on the impediments not only this country but also other developing countries might be facing in pursuing an exchange rate policy to tackle their current account problems (see Arslan et al., 2015 for a general framework). As a recent study by Almansour et al. (2015) finds external economic conditions have significant effects on emerging market economies so on Turkey. Therefore, current account problem has recently become important for Turkey. After the deterioration of economic conditions first in the United States in 2008 and then in the EU, the Turkish economy began to surface its long-standing economic difficulties which had already reached the unsustainable levels by 2008 due to the overemphasis merely on macroeconomic stability rather than continuing structural reforms.[1] Lately, it has become evident that favourable market conditions and high liquidity level in the world economy provided a helping hand to the Turkish governments at the time in having high growth rates and it was these conditions that most likely reduced any financial pressure on the ambition of attaining high economic growth rates in the period between 2002 and 2008.

The deteriorating economic circumstances all around the world expectedly urged a suspicion of how the Turkish economy would deal with its prolonged difficulties without disturbing economic growth in the future. In particular, poor records of current account balances continue to increase the vulnerability of the economy, and the Turkish policy maker today began to feel the stringency of the balance-of-payment constraint more than before. In the changing global landscape, large external deficits and high dependence on foreign inflows

[1] Along with targeting the inflation rate, the objective of the central bank of Turkey is to provide financial stability.

that increase vulnerability of the domestic currency have put Turkey in the league of fragile economics, the *Fragile Five*, namely Turkey, Brazil, India, South Africa and Indonesia.[2]

In the past, Turkey has occasionally encountered problems of current account imbalances, most of which ended up with balance of payment crises and consequently prompted governments to implement macroeconomic stabilisation and adjustment policies. On the expenditure side, controlling imports has appeared to be the crucial component of conventional stabilisation policies. Foreign exchange rate adjustment and reductions in domestic absorption with appropriate fiscal and monetary measures are, in turn, two inevitable policy instruments that have been mostly used in curbing import bills. Even though the expenditure reduction policy is considered an option to deal with current account imbalances, this causes slowing down of the economy and may render political consequence for governments.

On the revenue side, however, reviving export earnings as part of conventional measures requires depreciations in the local currency along with fiscal stimulus to improve the profitability of exports production. The exchange rate adjustment can be employed as a reactive policy measure to provide competitiveness to the Turkish exporters. The competitive power gained by a weak local currency has generally been accounted for an immediate, but short term policy action with some adverse effects, most important being the inflationary consequences. The pass-through effects of depreciation in local currency on domestic prices and inflation mainly stem from the high dependence of the economy on imported intermediate goods and the market structure in the Turkish manufacturing sector (Günçavdı and Orbay, 2002).

In addition to exchange rate adjustment measures, boosting export earnings depends on the economic conditions in the export markets of Turkey, and these cannot be controlled completely by the Turkish policy makers. The recessions in the US and EU economies are currently restraining factors for Turkish exports and possibility of a fast recovery in these markets seems to be very little. The adverse effects of this weak external demand urges exporters to first consider changing the market orientation then to compensate the loss of export markets by improving the competitiveness of exportation.[3] So far, the recent Turkish export appears not to have satisfactorily responded to all these conventional measures, and

[2] The name is coined by James Lord, a research analyst at Morgan Stanley in the summer of 2013. Downloaded on April 29, 2014 http://graphics8.nytimes.com/packages/pdf/business/MorganStanleyFragileFive.pdf

[3] There has been some diversion of trade (exports) from the US and EU to MENA countries following the crises but it is not evident whether the crises was the main reason or not.

hence this raises concern on if there might be room for another explanation of the Turkish exports by considering the supply side of the export market.

The rest of the paper focuses on modelling the export structure of Turkey and identifying elements possibly impeding export performance. In the next section, we provide the principles of our thought process in the form of a very simple theoretical framework and empirical specifications of the model.

In pursuing our goal, we employ panel data econometrics methods for estimating exports, labour and imports market specifications. The sectoral data for Turkish manufacturing industry over the period 2000-2011 is obtained from various sources and employed after some transformations. We cover 25 most important export markets and a panel of 13 sectors for the 12 years.

The paper is constructed as follows: Section 2 provides a review of the most relevant literature followed by an exhaustive explanation of the theoretical framework. Empirical strategy and estimation results are provided in section 3. The findings are interpreted under the title of "What's New So Far in This Research?" with an emphasis on the novelty of two aspects: *i*) finite price elasticity of export supply and its meaning; *ii*) substitutability of domestic and foreign markets for Turkish exporters and inferior good standing of Turkish export goods. Section 5 explains how this research implicates policy alternatives. The final section concludes with brief evaluation of the findings and structural impediments of Turkish trade.

2. Related Literature

The experiential evidences from both developed and developing economies show that exports are sensitive to changes in two factors[4]: 1) the income levels in the export markets and 2) prices.

In any empirical study on export and/or import markets, the roles played by incomes and prices on trade depends on relationship between foreign and domestic goods. If domestic and foreign goods are perfect substitutes of each other in all markets and therefore, import demand and export supply are the *excess* demand and supply for domestic goods, e.g. export supply is the residual from domestic demand, then an increase in domestic supply decreases import demand or an increase in domestic demand decreases export supply. On the other

[4] Among other studies see Houthakker and Magee (1969), Marquez and McNeilly (1988), Bahmani-Oskooee and Kara (2005) for income and price, Reinhart (1995) for price and Berumert et al. (2014) for income effects.

hand, if domestic and foreign goods are imperfect substitutes, then there is the coexistence of imports and domestic output and significant price differences between domestic and export goods (except for homogenous goods largely traded in international commodity exchanges) (Goldstein and Khan, 1985).

In a global world with imperfect knowledge and asymmetric information, entrepreneurs are most likely to react to opportunities they are aware of or familiar with and refrain from incurring additional costs to gather more information on consumers and suppliers, and to develop new products to ensure competitive edge (Linder, 1961). Therefore, sustainability in export markets relies on the responsiveness of export supply to domestic income and of export demand to foreign income (Lall, 2000). A high income elasticity is accepted as an indication of impactfulness of exports on growth.

Export performance of countries depends also on export prices in local currency and exchange rate, as factors that impact the cost of export goods to foreigners. The relationship between real exchange rate and trade has extensively been analysed in both theory and empirics. Exchange rate is generally considered as a policy instrument but its effectiveness relies on the responsiveness of the export demand and supply to this instrument. The standard Marshall-Lerner condition states that the sum of the price elasticities of demands for imports and exports of a country to be unity for a devaluation to affect trade balance positively (Marshall, 1923; Lerner, 1944). Sizes of price elasticities determine whether real depreciation will be influential on exports or not. Real devaluations boost competitiveness and are more effective on exports if and when export demand is highly responsive to prices (Riedel, 1984; Senhadji and Montenegro, 1999; Marquez and McNeilly, 1988; Reinhart, 1995) and sometimes with a lag (Bahmani-Oskooee and Artatrana, 2004). Rose (1990, 1991) and Ostry and Rose (1992) claim that devaluations have no significant impact on trade balance. Exporting firms decide on their export quantities regarding the profitability of each market demand, it is obvious that *ceteris paribus* (including sales price in foreign market) an increase in domestic currency price of the export good as a result of depreciation in domestic currency, increases the quantity supplied. On the other hand, intensive use of imported intermediate inputs in the production process will have an increasing impact on the costs of production causing the profits, ceteris paribus once more, to decrease and thus adversely affecting the

supply. Hence, the overall influence of depreciation on export performance of the country depends on the net effect of these two sides of the coin, i.e. domestic price vs. domestic cost[5].

Literature holds studies with contradictory findings of export sensitivity to prices mostly defined as inclusive of exchange rate and foreign incomes for the Turkish economy. While Senhadji and Montenegro (1999) find the income elasticity of Turkish exports to be insignificant over the 1963-1990 period, Arslan and Wijnbergen (1993) discover that exports have a high responsiveness to foreign incomes in 1980s. A similar controversy applies to price elasticities as well. Compared to other developing countries, Turkish exports display a relatively high responsiveness in the former study, on the other hand, Arslan and Wijnbergen (1993) find a low sensitivity of export demand to prices. These differences in the reactions of export demand to prices and incomes presumably arises from the changes in the structure of exports and from the export incentives adopted in 1980s.

The major difference between the aforementioned studies is the approaches taken. Senhadji and Montenegro (1999) and Berumert et al. (2014) estimate only the demand function but Arslan and Wijnbergen (1993) estimate a simultaneous system of equations revealing more reliable results on the impact of exchange rate changes. In explaining the export miracle of Turkey in 1980s, they search for the roles played by export incentives, foreign income growth and relative prices or real depreciation of the Turkish Lira (TL) on exports. They find that export supply has a strong sensitivity to relative prices defined inclusive of export subsidies widely used at the time. Overall, Arslan and Wijnbergen (1993) conclude that a steady real depreciation of the exchange rate was by far the most influential factor in export growth of Turkey. Similarly, in a recent study on Turkey covering the period 1987-2000, Akbostancı (2002) finds that the depreciation of the local currency has improving effects on the trade balance both in the short- and long-run. In an empirical study by the researchers from the Central Bank of Turkey, the real exchange rate is found to be significant policy measure in curbing Turkish import demand, but insignificant in exports (Aydın *et. al.,* 2004). A study highly relevant for this paper by Faini (1994) finds a significant impact of relative prices and capacity on export supply for Turkey and Morocco. All in all, features of the Turkish economy and structure of exports determine the effectiveness of any policy instrument governments can use to overcome the prolonged problems of the Turkish economy.

[5] Most country studies that examine price elasticities of trade have taken export supply to be infinitely elastic unlike what Goldstein and Khan (1978) suggests. See Algieri (2014). Also note that the World Bank SMART simulation employs the same assumption.

3. Theoretical Framework

The theoretical model consists of three markets, which are simultaneously in interaction with each other. They are namely the export market, the labour market and the import market. The last two markets are explicitly included in the model due to their influence on the supply side of the export market. However, this expectedly raises a simultaneity problem to be taken into considereation in our empirical investigation.

The convensional policy analysis on the issue mostly relies only on the demand side of the export market and estimates it as a function of price and activity variables without considering any constraint on supply. In this single equation approach, the supply side of the market is mostly ignored and the general export demand function is written as follows:

$$x_{it}^{d} = a_0 + a_1 p_{it}^{x} + a_2 p_{it}^{*} + a_3 e_{it} + a_4 y_{it}^{*} + \mu_i^{d} + \varepsilon_t^{d} + \vartheta_{it}^{d} \qquad i = 1, \ldots . n \tag{1}$$

where x_{it}^{d} is the quantity of demand for exports of the i^{th} sector of the home country; p_{it}^{x} is the demand price of exports in the i^{th} sector in *local* currency; y_{it}^{*} is the weighted average of income over j importing countries that home exporters of sector i supply, representing foreign income level associated with that sector (Hausmann et al., 2007). p_{it}^{*} is the foreign price of exports from/by sector i in *foreign* currency and e_{it} is the sectoral nominal exchange rate.[6] Also μ_i, ε_t and ϑ_{it} are errors combined with cross-sectional unit, time and random events respectively. It is theoretically expected that $a_1 < 0, a_2 > 0, a_3 > 0$ and $a_4 > 0$ for normal goods but $a_4 < 0$ for inferior goods.

On the supply side, modelling requires further attention to the existing structure of the Turkish economy. This is especially important because supply-side constraints could also be accounted for poor response of exports to conventional policy measures such as depreciations in domestic currency. First of all, the size of the domestic market is fairly large, and the performance of economic growth has recently been relying increasingly on expansions in domestic expenditure. This could evidently have made supplying to the domestic market more profitable (due to high demand) as well as attractive than exporting for domestic producers. Second, the import dependency of the Turkish economy had historically been high (see Günçavdı et al., 2003), but this has drastically increased lately due to the ease of access to international capital markets, which has made borrowing a less cumbersome option to

[6] Some of previous researches in the literature have *a priori* imposed the restriction $a_1 = -a_3$, and estimated an export demand function, similar to (1), as a function of real exchnage rate, rather than nominal one. However, this is a matter of empirical testing and we define the export demand function in a general form, which embodies an unrestricted one.

acquire foreign exchange than exporting.[7] Besides, a large surge in international liquidity in the 2000s exposed developing countries like Turkey to capital inflows, which inevitably deteriorated relative prices against domestic one, and caused an appreciation in the real exchange rate. All these structural features of the Turkish economy can be taken into account by explicitly modelling the supply-side of the export market under the assumption of the presence of an i*nfinitely* elastic supply of exports.

By assumption, the Turkish manufacturing sector is considered to operate with neoclassical production function in competitive markets. Respectively, the supply side of export market is modelled as a conventional supply expression with price of the export good, prices of factors of production (labour and imported intermediate goods) and the nominal exchange rate.

$$x_{it}^{s} = b_0 + b_1 p_{it}^{x} + b_2 p_{it}^{m} + b_3 e_{it} + b_4 y_{it}^{d} + b_5\left(w_{it} - p_{it}^{d}\right) + b_6 k_{it} + \mu_i^{s} + \varepsilon_t^{s} + \vartheta_{it}^{s} \quad i = 1, \ldots . n \tag{2}$$

where x_{it}^{s} is the supply of exports of the i^{th} sector at time t; p_{it}^{x} is the supply price of exports; p_{it}^{m} is the foreign currency price of imported intermediate goods; y_{it}^{d} is the level of domestic demand for the output of the i^{th} sector and k_{it} is the capital stock in ith sector, which is substituted by the capacity utilisation ratio. The term in brackets shows the sectoral real wage; $w_{it}$is the nominal wage and p_{it}^{d} is the domestic price level. Theoretically, it is expected that along classical textbook lines the export supply is positively related to its own price ($b_1 > 0$), negatively related with the price of intermediate goods and other cost elements, such as labour ($b_2, b_5 < 0$) and positively to the capital endowment ($b_6 > 0$). However, the signs of b_3 and b_4 should be established empirically, for the reasons below.

It is accordingly evident that the Turkish production has become highly dependent on the use of imported intermediate goods. In particular, the production for exporting requires high use of imported intermediate goods in order to become competitive in the international markets (*see* Günçavdı et.al., 2003). The nominal exchange rate can affect supply behaviour through two opposite channels, namely *profitability* and *cost* channels. The effect through the former channel influences the supply positively, whereas the latter is expected to exhibit a discouraging effect on supply. Therefore, the sign of b_3 can only be determined empirically.

The y_{it}^{d} term in (2) is included to capture the effect of domestic demand constraint on export supply, which is considered as a competing market of exports. In other words, due to

[7] See Berumert *et al*. (2014) for Turkey

the size of the domestic market in the Turkish economy which is large for most exporters; it could be hard to encourage the producers to supply output for exports market. It is mainly because the demand is readily available with a high profit margin (*see* Günçavdı and Orbay, 2002) with no extra effort being necessary to increase competitiveness. Thus, supplying foreign markets would require the presence of depressed domestic demand.

In an earlier study, questioning the impact of domestic demand pressure on export supply for Israel, Zilberfarb (1980) shows that it has "… a direct negative effect on export performance, in addition to its indirect effect (through a change in relative prices)" (p.449) and that in addition to the relative prices, export supply equation should include a domestic demand variable. Although, Faini (1994) cannot find a strong and conclusive evidence for the effectiveness of domestic demand on Turkish export supply, he suggests to further research on that issue. Following Zilberfarb (1980) and Faini (1994), we explicitly incorporate production for domestic market into our analysis as mentioned above and prefer to establish its effect empirically.

The labour market in this model is specified by a reduced form of a simple wage equation representing the equilibrium between labour demand and supply.

$$w_{it} = \alpha_0 + \alpha_1 p_{it}^d + \alpha_2 y_{it}^d + \alpha_3 x_{it} + \alpha_4 k_{it} + \mu_i^l + \varepsilon_t^l + \vartheta_{it}^l \qquad (3)$$

where w_{it} is the sectoral nominal wage; x_{it} is the sectoral foreign demand. Equation (3) comprises the supply and demand side variables at the same time. The domestic sectoral prices appear in (3) due to the supply side consideration by households, in which sense the higher the domestic prices, the lower the real income will be and this would encourage households to demand higher nominal wage (i.e. $\alpha_1 > 0$). Relevance of real wage as a determinant of labour supply, analogously, can be tested by imposing the restriction $\alpha_1 = 1$. Both higher foreign and domestic demands are expected to increase nominal wages in the manufacturing industry ($\alpha_2, \alpha_2 > 0$). The higher use of capital is also expected to increase nominal wages ($\alpha_4 > 0$).

High dependence of domestic production and exports on imported intermediate goods also urges us to suspect the presence of simultaneous decisions of export supply and import demand, which are required to be tested statistically. In this regard, a factor demand approach of modelling import demand, where imports are assumed to serve inputs that minimises the cost of production), is employed (*see* Günçavdı and Ülengin, 2012). In this modelling approach, the supply of imports is assumed to be infinitely elastic and the price of imported goods is

thus to be given. The import demand, here, encompasses a classical import demand expression according to the main features of the Turkish manufacturing sector. First, in Turkey, the demand for imported intermediate goods is unconstrained by the availability of foreign currency and export earnings (*see* Kotan and Saygılı, 1999). Second, high dependency of domestic production on imported intermediate goods urges an examination of the response of import demand to changes in exchange rate. In this regard, the nominal exchange rate variable is employed in equation (4). The theoretical model of import demand under the given prices can be written as follows:

$$m_{it}^{d} = \beta_0 + \beta_1 p_{it}^{d} + \beta_2 p_{it}^{m} + \beta_3 y_{it}^{d} + \beta_4 e_{it} + \mu_i^{m} + \varepsilon_t^{m} + \vartheta_{it}^{m} \quad (4)$$

where p_{it}^{m} is the import prices. The domestic prices and income variables are expected to increase import demand whereas the price of imported goods and exchange rate are expected to reduce it. Equation (4) is the unrestricted import demand function including all price variables separately. Traditionally the homogeneity of degree zero in prices can be imposed, and tested statistically to examine whether or not the relative price of imports, rather than import prices alone are relevant in determining import demand.

In what follows, equations (1) through (4) are estimated with the data from Turkish manufacturing sector.

4. Data and Estimation Results

The above equations are estimated using the sectoral data from the Turkish manufacturing industry for the period 2000-2011. Depending on the availability of the data, the sample of this research is a panel of 13 sectors for 12 years (see the *Data Appendix* for definitions, sources and descriptive statistics of variables). In order to capture the sectoral variation in the empirical model, some of the variables required in the model must be computed from the available data, such as sectoral exchange rate, income level of foreign markets, and the price of imported intermediate goods, and their definition, and the definition and the calculations methods of these sector-specific variables can be found in the data appendix.

First, the export demand function is estimated under the assumption that the export price is endogenous. The instrumental variable method (IV) is employed for this purpose. The

column (1) of Table 1 reports the fixed-effects estimate of this instrumental variable method, which assumes that the demand for exports and its price are endogenous[8].

Here, using the estimated coefficients we test whether the local currency price of exports and the nominal exchange rate affect the export demand symmetrically or not. This test is particularly interesting due to the fact that rejection of the symmetry assumption implies the effects of nominal exchange rate and the export price in local currency on export demand rather than the foreign price of export good. As expected, test result shows that it is the foreign price that foreign consumers take into consideration rather than the TL price of exports[9]. Therefore, following the results of exogeneity and identification tests, a fixed-effects OLS regression is estimated with foreign currency price of exports. The result passes the conventional statistical test, seen in the column 2 of Table 1, and fits the data well. The third column shows the heteroscedasticity, cross-sectional dependence and panel autocorrelation adjusted statistics.

Observing that the coefficients of foreign price of exports and domestic price of similar goods are quite close, we test whether they influence export demand symmetrically or not, i.e. zero price homogeneity. The test implies that it is the real exchange rate rather than prices and nominal exchange rate that actually determine the demand for Turkey's exports, as suggested by Faini *et al*. (1992). Hence, the final estimation obtained using feasible generalised least squares (FGLS) (column 4) reveals that a one per cent increase in the relative price of Turkish goods in export markets (a decrease in competitiveness) decreases the export demand by 0.4%, approximately.

According to the results in column (4), all estimated coefficients are statistically significant and different from zero. The real exchange rate appears to have negative influence as expected in the literature, and this implies that foreigners demand Turkish exported goods by comparing its price with the price of competing goods. In this regard, the nominal exchange rate seems to have a pivotal role in encouraging foreigners towards Turkish goods. Interestingly, the foreign income elasticity of Turkish exports appears to be negative and suggests that the Turkish exports are perceived as inferior products; implying that the Turkish economy produces exported goods with lower value added and mostly to meet the needs of relatively lower income countries or the lower income groups in export markets.

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[8] The instrument for the endogenous price variable is computed with the help of an auxiliary equation, and the export prices are regressed on exogenous variables such as the lag of the price of imported intermediate goods, the lag of export prices and the lag of prices of imported goods in export markets. The predicted values of the export price from this regression are then used as the instrument in the demand function of exports.

[9] The symmetry test gives a χ^2 (1) =0.07.

Having estimated the demand function, the supply function of exports is estimated next by employing the fixed effects instrumental variable method (see Table 1 column 5).[10] Close examination of the estimated regression shows that all coefficients apart from capacity are statistically significant and different from zero, and their signs are in accordance with theoretical expectations.

Nominal exchange rate, e, has expectedly negative impact on the supply price of exports, implying that deterioration in local currency decreases the price and provides an extra competitiveness to the Turkish suppliers of exports. The price of imported intermediate goods, p_{it}^{m}, acts as a cost factor and it is expected to render a discouraging effect on the suppliers in the export supply relationship. Interestingly, the presence of the domestic demand for the output of sector i possesses discouraging effect on the suppliers by increasing the price of exports. This is mainly because the Turkish economy has a large domestic market and demand by the domestic market brings about competition between exporting and supplying the domestic markets. Therefore, larger the domestic market, lower is the incentive to supply to the foreign market. According to the estimated equation in column (5), the presence of domestic market can be seen as the factor deteriorating the competitiveness of the Turkish suppliers by increasing the price of exports. This finding enables us to support the relationship between domestic demand and export supply Faini (1994) once claimed for Turkish exports and to verify the intuition explained above.

Given the fact that the main concern of the paper is to provide consistent estimates, the wage equation is estimated as an auxiliary equation to deal with the endogeneity problem in the supply function of exports. Nevertheless, the results, reported in Table 2, are both informative and interesting on their own. After conducting all the necessary tests for model specification and parameter significance, symmetry etc., we finally find that it is the real wage that is influenced from changes in exports and domestic production for domestic market.[11] All of the explanatory variables are statistically significant with the expected signs. Interestingly, the foreign and domestic demand variables seem to exhibit different impacts on the real wage,

[10]In order to deal with the endogeneity problem between the price of exports and the quantity of exports, the data on the quantity of exports is substituted by the data of an instrument derived from an auxiliary regression. In order to generate the data on the instrument, we regress the quantity of exports and real wage on the lag of the export volume, lag of real wage, the lag of the price of imported intermediate goods and the lag of capacity. The predicted values of the quantity of exports from this regression are then used as the instrument.

[11] We use the fixed-effects instrumental variable approach instrumenting export volume with the lag of price of imported substitutes in export markets, lag of foreign currency price of exports, lag of foreign income and the lag of export quantity.

and this is tested by an equality restriction. The test proves that each demand variable possesses a different impact on the dependent variable.

The exchange rate variable, either in real or nominal terms, appears to be a significant variable for Turkish exports. However, no evaluation that ignores the indirect impact of exchange rate on exports is complete due to the high dependence of Turkish exports on imported intermediate goods explained above. Therefore, the examination regarding the effectiveness of any exchange rate policy on the Turkish current account balance requires an additional empirical observation on the Turkish import demand and on its responsiveness to the variations in exchange rate. The estimation results of the import demand function are also reported in Table 2. The same process adopted in all of the previous estimations is employed here as well. Starting with the estimation of the unrestricted function and then testing for the symmetry of foreign currency price of imports and the nominal exchange rate, we prefer to use the local currency price of imported goods as the explanatory variable of import demand.[12] Respectively, the relative prices (both in local currency), domestic production for domestic market and exports appear to be detrimental factors for import demand.

5. What's New So Far in This Research?

Our empirical results show a number of vital structural characteristics of the Turkish export market, and none of them has so far drawn any satisfactory attention in the literature. They are namely *i*) the presence of the *finitely* elastic export supply function, *ii*) *inferiority* of demand for the Turkish exports and the *perfect substitutability* between domestic and foreign demand. These structural features of the Turkish export markets are important especially in assessing the response of exports to conventional policy measures and accordingly in designing an appropriate policy to stimulate exports.

(i) Finitely elastic supply of exports

The related literature mostly suggests that the supply function is *infinitely* elastic and the export market is demand-driven one. The great extent of these studies hence contend with emphasising only the demand side factors of exports and the policy implication of these factors is expectedly restricted with their impacts which appear through the demand side only. Estimation results (column 5 of Table 1) show that the coefficient of the export variable is

[12] In that equation, we use the FGLS estimator since the Davidson-MacKinnon test pointed out the OLS as a consistent estimator and to correct for heteroscedasticity, autocorrelation and cross sectional dependence.

significantly different from zero, meaning that the price elasticity of supply is not *infinitely* elastic, and the demand factors should not be the only concern of the Turkish policy maker to take into account.[13] Respectively, the first policy implication of our results is that *the supply side factors also play detrimental roles in export earnings*, and exports become *less* responsive in quantity than expected to demand-driven policy measures, particularly due to the cost and domestic demand constraints under the given capacity of production. Intuitively, this implies that the response of exports to demand-driven measures would be weaker than expected especially with the presence of a firm expansion in domestic demand. It is now not surprising to see the export boom in the liberalisation period in the early 1980s accompanied with strong contraction in domestic demand (see Celasun and Rodrik, 1989). For policy considerations, the reliance of the Turkish policy maker only on demand measures is not to be enough to revive exports, and accordingly supply-side measures shifting the supply curve rightwards are inevitably required.

(ii) Inferiority of export goods and substitutability between domestic and foreign demand

According to our empirical investigation, there are two different demand contraints currently at work in influencing the Turkish export market (namely foreign demand and domestic demand constraints), and each exhibits its effect through different sides of the market. One of these demand factors is expectedly the foreign income level which indicates the demand condition in the export markets of Turkey. This factor is expected to affect the Turkish export market *via* its demand side. The empirical literature usually pays attention to this demand variable, and it is treated as an *exogenous* variable which is evidently out of the control of domestic policy makers. Besides, it is conventionally expected that increased income levels in exports markets increases demand for the products of the exporting country.

The second demand variable is, on the other hand, the domestic demand, and this is largely ignored in empirical studies mainly due to the assumption of *infinitely* elastic export supply. According to our empirical observation, booming domestic market constitutes a detrimental constraint on the *supply side* of the Turkish exports. This channel between two

[13] The price elasticity of supply can be estimated from the function in which the quantity variable is to be the dependent variable. On the contrary in column 5, the supply function estimates the price as the dependent variable and the quantity is independent. However, this form of the supply function allows us statistically to test the presence of infinitely elastic supply function in the case of the Turkish economy. This is done by imposing a zero restriction on the coefficient of the export variable in column 5, and it is tested that this coefficient is statistically different from zero. Simple *t-test* is enough for this purpose. Rejection of this restriction implies that the price elasticity of supply is infinitely elastic.

markets is, to some extent, set by the *substitubility* of demand in these markets (namely domestic and foregn demand). This distinctive feature of the Turkish export market indeed allows the Turkish domestic producers to shift some parts of their production capacity to export markets without incuring extra sunk cost in production.

Considering the substitubility of demand together with the effect of foriegn demand on the export demand function (column 4 of Table 1), another distinctive feature of the Turkish export become evident. Unlike similar research on the Turkish export demand, the negative sign of the foreign demand variable is, to some extent, an unexpected result, and implies the *inferior* nature of the Turkish exports in high-income export markets. This partly explains why the Turkish export market has recently moved overwhelmingly toward the MENA region where income level, on average, is relatively low and consumer preferences are, to some extent, similar to Turkey's domestic market.[14] It is clear that the substitutability of domestic demand with those in the MENA region is apparently higher than those in the high-income market like EU. This also implies that, shifting the export capacity towards high-income export markets, most likely with higher value added, requires a creation of extra production capacity in accordance with consumer preferences of these markets. Therefore, in order to remain in the high-income export markets in the future, a market-specific production is necessary for Turkey.

6. Policy Implications

A debate on appropriate policies dealing with current account deficits involves in reviving export earnings on the revenue side of the issue, and foreign exchange adjustment immediately comes in mind as a policy measure in this regard. Conventional wisdom suggests that if demand for both export and import responses, albeit in opposite directions, to depreciation in domestic currency, then current account deficits can be reduced.[15] This expectation is based only upon the demand side effect of deprecation on the exports and imports markets, and the supply side is generally neglected.

In light of empirical findings in the earlier section, depreciations in domestic currency expectedly increase exports from the demand side. However, as imports becomes expensive and declines in response to depreciation, its effect on domestic production becomes contracting and this reveals an extra production capacity which can be directed to the export

[14] As suggested by Linder (1961).
[15] This is sustained by the so-called *Marshall-Leaner condition*.

market due to the substitutability of demand.[16] This, in turn, increases the export supply along with its demand. Then, exports in quantity are to be *higher* than theoretically expected due to this supply channel. Nevertheless, high import dependency of domestic production inevitably rises the use of imported intermediate goods for higher production for exports. But this becomes possible with a higher cost due to the expensive importation. *Given the present structure of the Turkish economy, it is therefore not easy to presume that depreciation would have a correcting effect on current account deficits.*[17]

7. Conclusion

Empirical results reveal a number of important features of the Turkish export market and the structural impediments faced in achieving high growth. *First*, unlike the conventional approach, the export supply is not *infinitely* elastic, and the supply side of the market play a critical role in reviving export earnings in Turkey. *Then supply side factors must also be taken into account in policy implementation.*

Second, the *substitubility* of foreign demand for domestic one appears to have determined the market oriantation of the Turkish exporters, who are able to shift their production capacity for one market to other without creating an extra market-specific production capacity. Respectively, the Turkish policy maker must consider that any expenditure boom in the domestic market constitutes a constraint on the supply side of the export market and lowers exports. In accordance with our empirical observation, the Turkish manufacturing exports are also treated as *infarior* in the higher-income export markets. This could in fact be considered as the major reason for having lower value added content of Turkish exports. For policy consideration, high value added exports accordingly require a creation of extra production capacity specificaly for higher-income markets.

Third, export demand is expectedly responsive to foreign exchange rate; so does the supply. According to our empirical results, export supply seems to be more responsive to foreign exchange adjustment than demand. Depreciations in domestic currency appear to

[16] The marginal effects of depreciation are respectively are 0.37 for demand, 1.013 for the supply of exports. In other words, supply is more responsive than demand.

[17] The negative contracting effect of depreciation on the import market seems to be rather very limited according to the results in Table 2, together with its relatively small effect on currency account deficits. However, a higher exports volume appearing after the depreciation indirectly increases the use of imported inputs, and incurs higher cost of importation. According to our findings in Table 1 and 2, this indirect effect occurring via higher export volume is overcome by the earlier direct effect, implying a likely opposite outcome of depreciation in exchange rate than expected by the conventional wisdom.

increase export earnings. However, the same depreciations affect the export market *via* the supply side as well. That is, changes in relative prices after depreciations encourage domestic producers to supply more to the foreign markets instead of supplying to domestic one. Since the supply shifts are more responsive to exchange rate adjustments than that of the demand, *the quantity of exports in equilibrium would be higher than we expect in the single equation approach.*

Fourth, the Turkish export is highly dependent upon imported intermediate goods. Therefore, depreciations expectedly increase the foreign exchange revenues of exports but are unable to decrease expenditure of importations as expected within the Marshall-Leaner framework. In line of our empirical finding, higher demand for exports increases the quantity of exports in equilibrium, which in turn stimulates domestic producers to employ more imported intermediate goods. *This structural feature of the Turkish export market therefore undermines the effectiveness of exchange rate adjustment policies to cope with current account imbalances.*

And *finally*, Turkey is overwhelmed with her goals of high growth and sustainable trade deficit. As Goldstein and Khan (1985: 1083) insightfully emphasize "If the income elasticity of demand for a country's imports is significantly larger than that for its exports, then the country confronts an unpalatable choice: either grow at the same rate as its trading partners and accept a secular deterioration in its balance, or to opt for external balance and accept a slower growth rate than its trading partners." Comparing the income elasticities of demand for exports and imports estimated in this study, we observe that domestic income elasticity of demand for imports is 0.71 and foreign income elasticity of demand for exports is -0.25 meaning that the elasticities are neither the same in magnitude nor in sign. Since the income elasticity of demand for imports is significantly greater than for exports, by juxtaposing Goldstein and Khan's argument with our findings from the estimations, we can deduce the impediments of Turkey, *i.e. Turkey is entangled between ambition of high growth and structural impediments that overrule her trade.* As still major trading partners of Turkey, the EU countries unfortunately have relatively low growth rates so *growing at the same rate as its trading partners accompanied by a continuing deterioration in its trade balance* and *following an external balance accompanied by a slower growth rate than its trading partners* actually amount to the same result: *Turkey's attempts to increase its growth has ended up with high and ongoing current account deficits.*

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Data Appendix

Notation	*Variables*	*Definition & Source*	*Mean*	*Std. Dev.*	*Max.*	*Min.*
p_{it}^{x}	Export Price in Domestic Currency (TL)	Export unit value index (2003=100), CBT	5.245	0.660	7.379	3.947
p_{it}^{d}	Domestic Price (TL)	Producers price index (sectoral) (2003=100), CBT	4.654	0.463	5.604	3.350
p_{it}^{m}	Import Price ($, £, €)	Import unit value index (2003=100), CBT	4.768	0.233	5.708	4.329
p_{it}^{*}	Foreign Price ($, £, €)	Import unit value index of trading partners (sectoral trade-weighted average), World Bank	-0.606	0.617	0.583	-3.659
e_{it}	Nominal Exchange Rate (TL/($, £, €))	Nominal exchange rate (sectoral trade-weighted average) , CBT & oanda.com	-0.412	0.627	0.775	-2.728
x_{it}	Export Volume	Export volume index (2003=100), CBT	4.756	0.462	5.586	3.553
m_{it}^{d}	Import Volume	Import volume index (2003=100), CBT	4.827	0.470	5.966	3.604
y_{it}^{d}	Domestic Demand	Sectoral domestic demand (industrial output + imports – exports), CBT	5.145	0.389	6.098	2.407
y_{it}^{*}	Foreign Income	GDP per capita of trading partners (sectoral trade-weighted average) (2000 constant prices), World Bank & UNComtrade	8.784	0.647	9.995	5.585
q_{it}^{d}	Domestic Production for Domestic Market	Sectoral domestic production for domestic market (industrial output-exports), CBT	0.008	0.345	1.137	-0.710
w_{it}	Nominal Wage	Nominal average wages by sectors (2003=100), TUIK	4.762	0.468	5.659	3.649
k_{it}	Capacity	Capacity utilization ratio by sectors, CBT	4.326	0.106	4.500	3.777
Sources CBT: Central Bank of Turkey; TUIK: Turkish Statistical Institute						

The foreign income, real exchange rate variable and imported input prices at sectoral level are not readily available and must be derived from the existing data. The foreign income and foreign prices are calculated using trade weighted GDP per capita and import unit value indices of trading partners as follows:

$$y_{ijt}^{*} = \sum_{j=1}^{25} z_{ijt} y_{jt}^{*} \text{ and } p_{it}^{m} = \sum_{j=1}^{25} z_{ijt} p_{jt}^{m}$$

where $z_{ijj} = z_{ij}/Z_{it}$ and $Z_{it} = \sum z_{ijt}$ for all sectors $i \in [1, 13]$ and trading partners $j \in [1, 25]$ at time t. A currency dependent nominal exchange rate is generated using the export currency used in trade with partners. Most of Turkish trade is in *USD*, *Euro* and *Pound Sterling*. So a different currency exchange rate is used to calculate sector weighted nominal exchange rate with each partner. The nominal exchange rate of sector *i* is composed of the trade-weighted averages of each currency used with each partner. Hence, $e_{it} = \sum_{j=1}^{25} z_{ijt} e_{jt}$, where e_{it} represents the nominal exchange rate of sector *i* and e_{jt} is the partner specific nominal exchange rate used in trade. As in previous calculations z_{ijt} shows the share of partner *j* in total exports of sector *i*.

Table 1 – The Estimates of the Export Market

Demand: $x_{it}^{d} = a_0 + a_1 p_{it}^{x} + a_2 p_{it}^{*} + a_3 e_{it} + a_4 y_{it}^{*} + \mu_i^{d} + \varepsilon_t^{d} + \vartheta_{it}^{d}$

Supply: $p_{it}^{x} = b_0 + b_1 x_{it}^{s} + b_2 p_{it}^{m} + b_3 e_{it} + b_4 y_{it}^{d} + b_5\left(w_{it} - p_{it}^{d}\right) + \mu_i^{s} + \varepsilon_t^{s} + \vartheta_{it}^{s}$

	Demand (x_{it})				**Supply** (p_{it}^{x})
Variables	*Fixed-Effects IV Regression* (1)	*Fixed-Effects OLS Regression* $(a_1 = -a_3)$ (2)	*FGLS† Regression* $(a_1 = -a_3)$ (3)	*FGLS† Regression* $(a_1 = -a_2 = -a_3)$ (4)	*Fixed-Effects IV Regression* (5)
constant	17.589*** (3.397)	14.601*** (1.851)	5.383*** (0.319)	8.823*** (0.223)	-3.465** (1.486)
p_{it}^{x}	-0.267 (0.316)	---	---	---	---
e_{it}	0.336 (0.491)	---	---	---	-1.013*** (0.081)
p_{it}^{*}	1.259*** (0.366)	1.365*** (0.146)	0.673*** (0.028)	---	---
$(p_{it}^{x} - e_{it})$	---	-0.098 (0.153)	0.615*** (0.039)	---	---
$(p_{it}^{x} - e_{it} - p_{it}^{*})$	---	---	---	-0.370*** (0.016)	---
y_{it}^{*}	-1.224*** (0.219)	-0.973*** (0.1333)	-0.394*** (0.021)	-0.250*** (0.016)	---
x_{it}	---	---	---	---	0.100** (0.040)
y_{it}^{d}	---	---	---	---	0.157*** (0.035)
p_{it}^{m}	---	---	---	---	0.808*** (0.080)
$\left(w_{it} - p_{it}^{d}\right)$	---	---	---	---	0.734*** (0.272)
k_{it}	---	---	---	---	-0.060 (0.138)
R^2 *(within)*	0.61	0.62	---	---	0.767
#of obs.	143	156	156	156	143
Davidson-MacKinnon test of exogeneity	0.50	---	---	---	3.86
Identification tests					
Sargen-Hansen test	29.25	---	---	---	2.28
Anderson LM stats.	25.54	---	---	---	42.94
Cragg-Donald Wald stat.	10.11	---	---	---	15.05
Symmetry Restriction	0.07	---	0.97	---	---
Wald Test	---	---	1783.24	672.51	---
Wooldridge autocorrelation	---	193.66	---	---	---
Heteroskedasticity LR test	---	73.50	---	---	---
Cross sectional independence					
Pesaran's test	---	4.429	---	---	---
Friedman's test	---	19.994	---	---	---
Frees' test	---	1.836	---	---	---

† Heteroskedasticity and autocorrelation corrected estimates.

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

Table 2 – Estimation Results of Wage and Import Demand Function

Wage Equation

$$(w_{it} - p^d_{it}) = \underset{(0.344)}{5.828} + \underset{(0.053)}{0.141}\, q^d_{it} + \underset{(0.033)}{0.233}\, x_{it} - \underset{(0.084)}{0.519}\, k_{it}$$

R^2=0.37, # of obs.: 143; Davidson-MacKinnon test of exogeneity: 10.85; identification tests of Sargen-Hansen $\chi^2(3)$=18.63, Anderson LM statistics (under-identification)=115.80, Cragg-Donald Wald statistics (weak-identification)=252.86; Restriction test for the parameters $(w^d_{it} = p^d_{it})$, $\chi^2(1)$=1.18.

Import Demand Equation

$$m^d_{it} = \underset{(0.052)}{-0.988} + \underset{(0.008)}{0.169}\, p^d_{it} \underset{(0.004)}{-0.047}(p^m_{it} + e_{it}) + \underset{(0.010)}{0.708}\, q^d_{it} + \underset{(0.014)}{1.105}\, x_{it}$$

R^2=0.77; # of obs.: 156; Wooldridge autocorrelation test: 34.09; heteroscedasticity LR test: 122.75; cross sectional independence tests of Pesaran: 9.03, Friedman: 39.07, Frees: 1.59; Restriction test for the parameters $(p^m_{it} = e_{it})$ F (1, 38)=0.90.

All variables are in logarithm.