CHANGES IN EXCHANGE RATES AND THE PERFORMANCE OF THE MANUFACTURING SECTORS IN TURKEY

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ABSTRACT

The effects of the changes in the exchange rates on the domestic prices are widely discussed during the last two decades in Turkey. These studies mainly focus on detecting the presence of or measuring the degree of exchange rate pass-through. However, this method has a limited explanatory power regarding the interaction between exchange rate and real side of the economy.   The paper scrutinizes the effects of changes in exchange rates on the production costs and on the competitiveness of the manufacturing sectors. The results confirm that the share of imported inputs in total inputs and the profits gained from Dollar-Euro parity changes are important determinants of the competitiveness of the Turkish manufacturing.

Key words: Exchange rates; production costs; competitiveness; Turkish manufacturing sector.

JEL codes: O24, O25, L60

1. Introduction

The last decade witnessed significant changes in the performance of the Turkish manufacturing industry vis-à-vis its competitors. As the Turkish economy stabilized and grew rapidly, so did the manufacturing industry. Besides, the manufacturing industry underwent a transformation from low technology driven sectors to those of higher technology. That transformation, when coupled with a real appreciation in TL called for a higher integration to the world economy, and led to a surge in both manufacturing imports and exports.

Considering the real appreciation in the TL, the effects of the changes in exchange rates on the level of manufacturing imports and exports deserves investigation from various aspects. The paper intends to scrutinize the effects of exchange rate on the production costs and competitiveness of the manufacturing sectors through imported inputs.

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The part of the literature studying the effects of exchange rate on domestic and export prices developed after the seminal papers by Krugman and Dornbush, called exchange rate pass-through (ERPT) approach. According to the exchange rate pass-through (ERPT) approach, the decrease in the Turkish inflation following 2001 crises can, at least partly, be linked to overvaluation of the Turkish Lira. On the other hand, during the same period, Turkey witnessed widening trade deficits. Appreciation of the Turkish Lira is generally shown as the barrier to strengthening the competitiveness of the Turkish manufacturing in the international markets. Nevertheless, this view may not be appropriate for all sectors of the manufacturing. The degree of the effect of the exchange rates on the competitiveness and the profitability of a manufacturing activity depends on the share of imported inputs in total inputs and rate of substitution between imported and locally produced inputs.

Studies investigating the competitiveness of the manufacturing industry point out product differentiation, wage moderation and productivity gains as channels through which the industry responded to the competitiveness pressures caused by real appreciation. These studies including OECD (2008) and Gonenc and Yilmaz (2008) point out the high effect of exchange rate on the competitiveness. Gonenc and Yilmaz (2008) found out that imported input costs act as a natural hedge against exchange rate movements and have a substantial effect on competitiveness. Similarly, Aysan and Hacihasanoglu (2007) found that real exchange depreciation does not induce a huge increase in exports. The response to the exchange rate movements differs across the industries. Labor intensive sectors bear the burden of a real appreciation, while in sectors with high import dependency negative effects are mostly balanced. Recent studies such as Kaminski and Ng (2006), Lall (2000) and Aysan and Hacihasanoglu (2007) point out the shift in technological structure of exports and verify that the competitiveness of the medium to higher technology content industries have been higher than the others.

Indeed according to a recent study by Saygili et al. (2009) which makes use of the results of a survey among big manufacturing companies, the problems confronted with the availability and quality of domestic inputs turn out to be more important than price consideration as the main reasons of importing inputs.

Almost ¾ of imports are intermediary goods and raw materials. As Turkey became part of the vertically integrated producer driven production chains, such as automobile, information and telecommunication technologies, import dependency has increased. Ratio of import dependency was argued to have risen to almost 80-90% in consumer electronics according to the findings of Saygili et al. (2009). In an industry with such a production structure, the impact of the exchange rate movements on the input costs should be analyzed as well as the impact on the pricing behavior.

The effects of the changes in the exchange rates on the local prices are widely discusses during the last two decades. The studies mainly focus on detecting the presence or measuring degree of the exchange rate pass-through using time series econometric techniques. Considering the nature of the mechanisms of pass-through, use of this approach may have some advantages in explaining the short term dynamics at the macro level, particularly the effects of the exchange rate regimes. However, by moving beyond the ad hoc approach inherited in pass-through, it is necessary to focus on the cost structure of the producers in order to understand the effects of exchange rates on the reel sectors.

The variation of import dependency of a sector over time can be seen as the outcome of the change in industrial policy and substitution between imported and domestically produced inputs. The paper aims to analyze how the effect of exchange rates movements vary across manufacturing sectors with different

net exports and technology levels. We employed the share of direct and indirect imported inputs calculated from the Turkish input-output tables.

The paper is organized as follows: In section II we discuss the ERPT approach. We will make an overview of the data and provide preliminary observations in section III. In section IV we will discuss the empirical model and econometric methodology. Section V is devoted to the results. Section VI concludes the article.

2. Conceptual underpinnings

Economic theory suggests that prices of tradable goods are equalized across countries. However that is not justified by empirical investigation. The literature of the last two decades does not provide a full proof of the existence of a full ERPT even in the long run. Most of the studies point out that the ERPT is incomplete and there are significant country differences. Despite the existence of abundant evidence of incomplete pass through in the short run, there are indications of complete pass through in the long run. Campa, Goldberg and Mingues, (2005) shows that among the EU countries, the transmission is high but incomplete in the short-run, there is a larger transmission in the long run. Furthermore, several studies point out a declining trend in the ERPT rates both in the developed and in the emerging market economies. One of the recent studies by Vigfusson, Sheets and Gagnon (2009) verifies the decline in ERPT to import prices in a number of industrialized countries. These findings elicit questions concerning the determinants of ERPT.

Interaction of exchange rate regime and foreign trade policy may create dynamics causing incomplete ERPT. Following the developed countries which adopted flexible exchange rates in the 1970's, most emerging market countries abandoned pegged systems especially after the East Asian Crisis of 1998-99. The instability in exchange rates inherited in the pegged systems, encouraged the emerging market economies to determine their export prices in US dollars or Euros. That helped to stabilize the export prices and avoid exchange rate risk. Since exports of a country are imports of other countries, the increasing number of countries that preferred to determine their export prices in reserve currencies, indicated that import prices of countries that import those products are determined in hard currencies as well.

Marazzi and Sheets (2006) show that there are further reasons behind the trend of declining ERPT. One of the reasons is the shift in product composition from commodity intensive goods having higher ERPT towards goods whose prices are less sensitive to exchange rate movements. They also put forward that geographical composition change of imports towards larger increase in China's market share, made other emerging economies sensitive to competition from China. Even in the sectors that China doesn't exist for the time being, threat of potential competition encouraged others to determine prices according to the conditions at their export market, the situation known as local currency pricing.

As shown above, the problem with ERPT is that the results are very sensitive to differences in definitions and econometric methodologies. Most ERPT estimates make use of aggregate data. There are considerable differences in terms of the magnitude of ERPT, as well as differences of ERPT rates across the countries, sectors and years. The shortcoming from the use of aggregate data is reduced in product based analysis. Recent studies making use of micro data, such as Gaullier, Lahreche-Revil and Mejean (2006) suggest strong heterogeneity across countries and products. But there are also studies that

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disagree with the conventional wisdom that ERPT is higher in emerging rather than developed countries. Ca'Zorzi, Hahn and Sanchez (2007) show that in emerging markets with low inflation, ERPT is low and not very different from developed economies. Low levels of ERPT in East Asia are also verified by Parsons and Kiyotako (2005).

Following the ERPT line, Turkey having a high inflation history should have high EPRT transmission. High and persistent inflation created the conditions for currency substitution. We have seen increasing dollarization in the country with most of the contracts is indexed to the stable exchange rate. The correlation between inflation and ERPT is documented in Ca'Zorzi, Hahn and Sanchez (2007) which shows that countries with inflation of lower than 10% have low levels of ERPT (less than 10%). Countries having moderate inflation of 10-20% have a higher ERPT of around 40%. However, their finding on Turkey is counterintuitive. They find that Turkey stands out to be an exception together with Argentina, where inflation is above 60% but ERPT is low.

After the 2001 crisis, Turkey shifted to a floating exchange rate system and experienced a vigorous decline in the rate of inflation. The exchange rate exhibited a strong real appreciation amounting to 65% in the seven years following 2001, generating an inverse currency substitution process. One can easily conclude that changing macro economic conditions are suggesting a decline in the ERPT rates in accordance with the findings on other emerging countries. However, the ERPT studies for Turkey do not confirm this line of thought.

One of the early studies discussing the situation by Leigh and Rossi (2002) estimates ERPT to WPI and CPI. Covering the period from January 1994 to April 2002, the study finds out that pass through from the exchange rate to prices occurs mostly in the first four months, and is over in about a year. The long term ERPT rate is estimated to reach to 60% for WPI, and 45% for CPI in the 11th month. These estimates indicate faster and larger pass through rates when compared with other emerging markets but turns out to be considerably low when compared with advanced countries. Pass through to WPI is found to be stronger than CPI. Other studies that examine ERPT in Turkey also point out incomplete pass through to domestic prices.

Tekin and Yazgan (2009) estimated the ERPT into Turkish export and import prices in the period from 1989 Q1 to 2004 Q3, and found out complete pass through in export prices and incomplete pass through for import prices. The authors suggest the competitiveness of import substituting industries as an explanation to an incomplete pass through in import prices. Complete pass through in exports are suggestive of the competitiveness of Turkish exporters to dictate their locally determined prices into their exporting markets. These arguments are even less credible under the strong real appreciation experienced in the post 2001 era. These counter intuitive findings call for further investigation.

Turkcan (2005) estimated the pass through effects into imported prices by making use of a very disaggregated data set. Although the estimations are made for 5403 items, grouped under final and intermediary goods for 12 partner countries, the coverage period of 1989 Q1 to 1996 Q4, fails to capture the structural changes in the economy since then. The Customs Union with the EU in 1996 and the shift from a pegged exchange rate system to a floating exchange rate system in 2000's, might bring in substantial changes to the transmission mechanism of a change in the foreign exchange rate on import and export prices. Turkcan (2005) argues that complete pass through is more relevant for Turkey at both aggregate and disaggregate levels. Similar to Leigh and Rossi (2002), Turkcan (2005) finds out that pass through to final and intermediate goods are quite rapid. Pass through from the exchange rate to prices

is estimated to be completed in about a year but in most of the cases it is completed in the first four months. The estimations of pass through elasticities considerably vary across countries and industries, suggestive of substantially different behaviors in different sectors. Furthermore, there are differences with regard to the level of significance.

The empirical results of the studies that examine ERPT in Turkey indicate the possibility of limitations arising out of this approach. One main factor that is not captured in the ERPT approach is the structure of production. It is obvious that the pricing mechanism will differ substantially according to the degree of import dependency in the economy. Indeed as demonstrated by Izmen and Yilmaz (2009) a quick look at the data reveals that there is a transformation in the technology content of exports, with higher technology sectors' exports gaining momentum. High level of import dependency in the economy brings in close correlation between the exporting and importing sectors in the economy. Dogruel and Dogruel (2010) have argued that, the structure of production in the manufacturing sector is much more decisive in determining the level of foreign trade deficit than the foreign exchange rate policy. For that reason, the paper aims to analyze the extent and the variation of the effect of exchange rates across manufacturing sector considering the divergences in net exports and the technology levels. The details of the methodology used will be explained in section 4.

3. Trends in foreign trade and production in the Turkish economy

Quantitative studies on the effect of exchange rates on export performance of the manufacturing industries usually omit the analysis of the consequences of the import dependency because of limited available data. In this section we will try to discuss the linkages among production, imports, exports and foreign exchange movements for the manufacturing sector as a whole and for the sub sectors of manufacturing.

	Table 1: Exports, Imports and Exports to Imports Ratio	2008/2003 Import quantity Index (M)	2008/2003 Export quantity Index (X)	2008 (X)/(M)
	2003=100			
1	Food products and beverages	1,441	1,331	0,924
2	Tobacco products	1,172	2,161	1,844
3	Textiles	1,303	1,221	0,937
4	Wearing apparel; furs	2,737	0,989	0,361
5	Leather and leather products	2,032	1,305	0,642
6	Wood and products of wood and cork (except furniture)	2,609	2,262	0,867
7	Pulp, paper and paper products	1,586	2,051	1,293
8	Coke, refined petroleum products and nuclear fuels	1,515	2,516	1,661
9	Chemicals, chemical products and man-made fibres	1,608	1,656	1,030
10	Rubber and plastic products	1,635	2,069	1,265
11	Other non-metallic mineral products	2,040	1,555	0,762
12	Basic metals	1,400	2,017	1,441
13	Fabricated metal products, except machinery and equipment	2,121	1,874	0,884

14	Machinery and equipment n.e.c.	1,756	2,067	1,177
15	Electrical machinery and apparatus n.e.c.	3,607	2,062	0,572
16	Radio, television and communication equipment and apparatus	1,601	1,559	0,974
17	Motor vehicles, trailers and semi-trailers	1,879	2,574	1,370
18	Furniture; other manufactured goods n.e.c.	1,513	0,935	0,618

Source: Turkstat and authors, calculations

Table-1 shows the increase between 2008 and 2003 in exports and imports measured by quantity indices by sectors classified according to ISIC, Rev.3. In exports, there is a decrease in only two sectors, i.e. wearing apparel and furniture, while there is an increase in imports in all sectors. In some sectors the growth is spectacular. In 9 out of 18 sectors, export quantities increased more than two folds, while there are 6 sectors which more than doubled their imports. High growth in export and imports coincide only for wood products and electrical machinery. Import coverage ratio of exports has improved in 8 sectors; while there have been deterioration in the remaining.

Table-2 gives the changes in export and import price indices between 2003 and 2008 according to sectors. A quick look reveals that, export prices increased more than import prices, signaling the possibility of complete pass-through in export prices and incomplete pass-through in import prices, as was concluded by Tekin and Yazgan (2009).
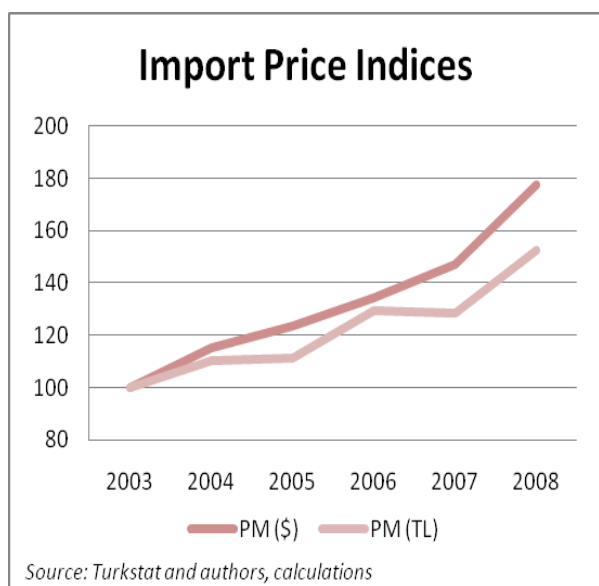
Table 2: Exports, Imports Price Indices	2008/2003	
2003=100, US Dollars	Price of Exports	Price of Imports
Food products and beverages	1,837	1,598
Tobacco products	1,426	1,531
Textiles	1,350	1,263
Wearing apparel; furs	1,426	1,545
Leather and leather products	1,627	1,558
Wood and products of wood and cork (except furniture); articles of straw and plaiting materials	1,617	1,468
Pulp, paper and paper products	1,397	1,441
Coke, refined petroleum products and nuclear fuels	3,054	3,222
Chemicals, chemical products and man-made fibres	1,589	1,494
Rubber and plastic products	1,567	1,472
Other non-metallic mineral products	1,543	1,473
Basic metals	2,880	2,591
Fabricated metal products, except machinery and equipment	1,964	1,452
Machinery and equipment n.e.c.	1,515	1,190
Electrical machinery and apparatus n.e.c.	1,976	1,002
Radio, television and communication equipment and apparatus	0,752	1,103
Motor vehicles, trailers and semi-trailers	1,381	1,288
Furniture; other manufactured goods n.e.c.	2,848	1,547
Source: Turkstat and authors, calculations		

However, the prices indices above are calculated in US Dollars and thus influenced by the US Dollar rate of the TL. TURKSTAT discloses export and import price indices based on both TL and US Dollars. The differences between these two price indices suggest an incomplete pass through both for export and import prices as shown in figure-1 and 2.

The differences between the two price indices are more striking for the manufacturing sector. The terms of trade as measured by US Dollar prices, has deteriorated in the 2003-2008 period for the economy as a whole. On the contrary, as shown in Figure-3, the terms of trade improved for the manufacturing sector. In this period, Turkey increased its imports from East Asia, a process named as Asianisation in the Turkish foreign trade by Yukseler and Turkan (2006). Cheaper imports from Asia helped Turkey to practice favorable terms of trade effect although the import dependency in the manufacturing sector is high. Recalling that the TL has appreciated in 33% between 2003 and 2008, the importers benefitted from this favorable movement. Under a simplifying assumption that, the exporter were facing costs mostly in TL and revenues in US dollars, the difference in terms of trade for the manufacturing sector as measured in US dollars and in TL has widened, as shown by figure-4.

While Turkey's imports were mainly in US Dollars, the exports were invoiced mostly in Euros, bringing in a parity effect. The parity changes between the dollar and the Euro is not captured in the ERPT approach. Since around 50% of exports went to the EU, exports were predominantly priced in Euros, while the imported inputs predominantly from Russia and East Asia were generally priced in dollars. During 2000's the euro-dollar parity changed in favor of euro, and this made a favorable effect on Turkey's competitiveness. Without taking into account that effect, estimating ERPT based on a single foreign exchange rate or a basket, will be wide of the mark.
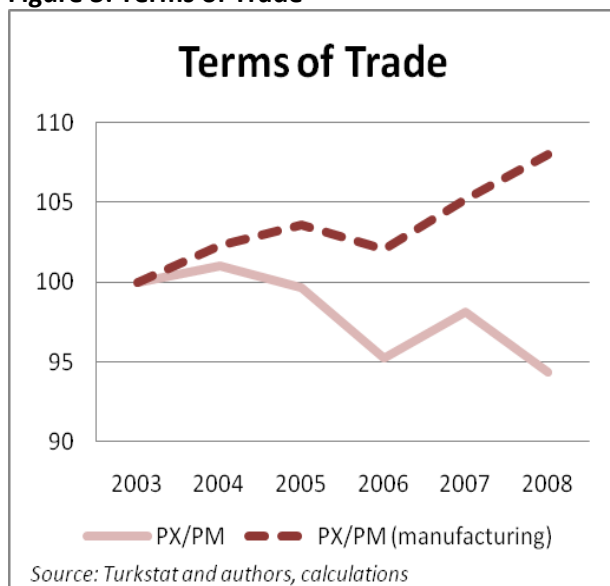
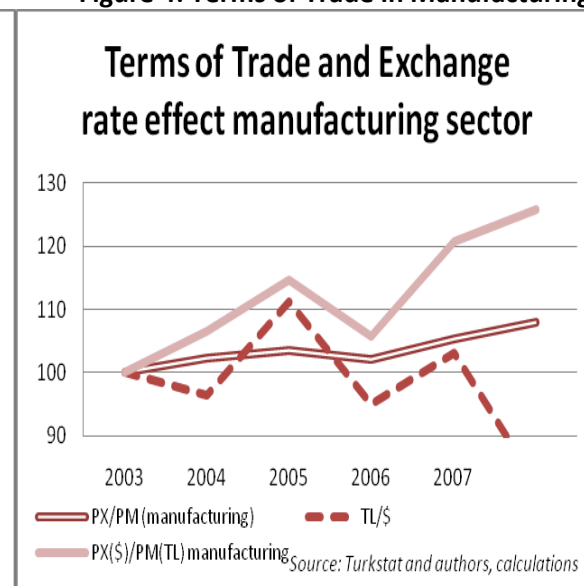**Figure 1: Import Price Indices, 2003=100**   **Figure 2: Export Price Indices, 2003=100**
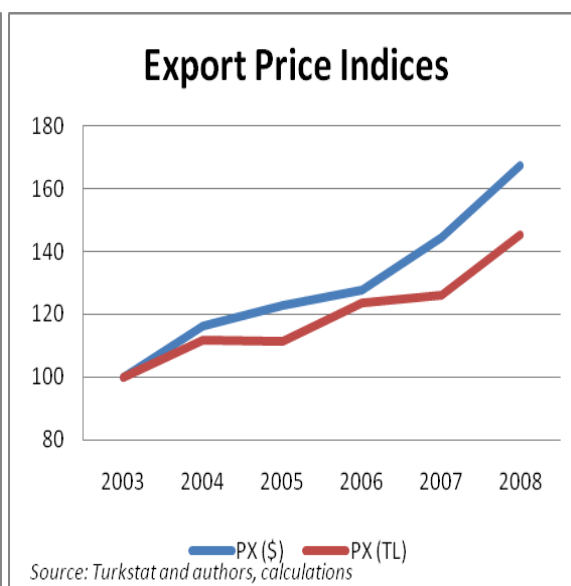
Figure 3: Terms of Trade   **Figure 4: Terms of Trade in Manufacturing**

In table-3, Trade Deficit is decomposed in US Dollar denominated and Euro denominated transactions. In line with partner countries for exports and imports, the share of US Dollar denominated transactions constituted 55%-65% of imports, while the share of Euro in exports varied between 47%-50%, suggesting that the deterioration in US Dollar against Euro, made Turkey's import costs lower and export revenues greater in TL terms. As a result, the increase in trade deficit was lower in Euros. Indeed as shown in Table 3, Euro denominated transactions contributed to around 1/5 of the trade deficit. In 2007, the

share of Euro denominated imports fell sharply as US Dollar has depreciated strongly against the Euro while exports to the EU continued their strong pace. Increase in imports in US Dollar invoiced contracts have surpassed that of imports in Euro invoiced contracts substantially. The reverse applies for exports in Euro invoiced contracts. As a result, the trade deficit in Euros has decreased substantially. In 2008, the global crisis cut down sharply Turkish exports to the EU. Total Turkish imports grew by 19% in 2008, while imports from EU grew by 9% and imports invoiced in Euros rose only by 5%. On the other hand, total exports rose by 23%, exports to EU by 5% but exports in Euros rose by a remarkable 14%. As a result the trade deficit in Euro terms decreased substantially. These figures point out that Turkish importers have gained strength to hedge themselves against abrupt foreign exchange rate movements and enjoyed the benefits of local currency pricing both within the domestic and export markets.

Table 3: Trade Deficit Decomposed in Euros and Dollars

	Total (bn $) (1)	€ denominated (bn $) (2)	$ denominated (bn $) (3)	€ denominated/Total (%) (2)/(1)
2002	-15,5	-2,2	-13,0	14,5
2003	-22,1	-4,2	-18,1	19,0
2004	-34,4	-8,2	-26,5	23,7
2005	-43,3	-9,4	-35,0	21,7
2006	-54,0	-11,0	-44,4	20,3
2007	-62,8	-7,0	-56,7	11,1
2008	-69,9	-2,7	-67,4	3,8

Source: Turkstat and authors' calculations

Of course, the above argument rests on the fact that imports are not competing with the final products in the domestic market, and most of the imports are intermediary goods and raw materials so that the exporters benefit from a decrease in the price of imported inputs. In order to understand the extent of the favorable effect of a fall in import prices on export competitiveness, we have to look at the import dependency in the economy at a disaggregated level.

Looking only at the direct imports of a sector obviously does not capture the indirect imported input content of the domestically obtained inputs. The appropriate methodology to estimate import dependency by sectors is input output tables. However, these tables are not compiled frequently. TURKSTAT has published Input-Output tables for 1998 and 2002. Yukseler and Turkan (2006) calculated import dependency from the 1998 Input-Output table. They found that the additional effect of the import content of domestic input is substantial. Indeed, the magnitude of the indirect import dependency ratio is almost half of the direct one. Their findings on intra-industry trade and marginal intra-industry trade points out a significant shift after 2002 implying the need to look at the changes in import dependencies in that period.

Ocakverdi (2008a and 2008b) calculate import dependencies of industrial sectors before and after the 2001 crisis by making use of Input-Output tables for 1998 and 2002 and for 2007 by obtaining input output coefficients estimated through the constrained optimization method. In order to eliminate the distortionary effect of relative price changes on technological relationship between sectors, Ocakverdi has adjusted the series by respective sectoral price indices. The results suggest that between 1998 and 2002, import dependency on average has increased by 40% while intersectoral dependency rose by only 7%. Between 2002 and 2007, intersectoral dependency remained almost constant; however import dependency in almost all sectors rise with a 30% increase on average.

Table 4: Import Dependency, Increases in Exports and Production

	Import dependency			production increase*** 1992-2006	export increase*** 1992-2007
	1998*	2002**	2007**		
Food products and beverages	0,11	0,12	0,15	1,30	3,55
Tobacco products	0,18	0,25	0,20	0,81	8,40
Textiles	0,20	0,25	0,34	2,38	7,06
Wearing apparel; furs	0,23	0,24	0,33	1,80	3,35
Leather and leather products	0,26	0,37	0,38	2,88	4,41
Wood and products of wood and cork	0,14	0,26	0,31	3,76	14,46
Pulp, paper and paper products	0,20	0,27	0,38	2,02	13,97
Printed matter and recorded media	0,19	0,21	0,19	2,15	4,39
Furniture; other manufactured goods n.e.c.	0,30	0,32	0,47	6,81	48,03
Low Technology	0,20	0,25	0,31	2,66	11,96
Coke, refined petroleum products and nuclear fuels	0,20	0,55	0,57	0,47	21,28
Rubber and plastic products	0,30	0,32	0,41	3,39	14,63
Other non-metallic mineral products	0,12	0,16	0,27	2,48	6,35
Basic metals	0,35	0,39	0,47	1,70	8,05
Fabricated metal products, except machinery and eq	0,26	0,31	0,30	3,16	16,63
Lower Medium Technology	0,24	0,35	0,40	2,24	13,39
Machinery and equipment n.e.c.	0,24	0,28	0,21	2,44	24,94
Chemicals, chemical products and man-made fibres	0,30	0,27	0,43	2,52	5,30
Electrical machinery and apparatus n.e.c.	0,28	0,35	0,32	5,17	13,07
Motor vehicles, trailers and semi-trailers	0,26	0,32	0,41	4,08	58,95
Upper medium Technology	0,27	0,30	0,34	3,55	25,56
Office machinery and computers	0,22	0,35	0,51	10,31	8,37
Radio, tv and communication eq and apparatus	0,29	0,45	0,57	6,89	11,64
Medical, precision and optical ins, watches, clocks	0,29	0,35	0,53	6,52	11,57
Other transport equipment	0,19	0,19	0,46		
High Technology	0,25	0,33	0,52	7,91	10,53
Average	0,23	0,30	0,37	3,48	14,69

* Ocakverdi (2008a)

** Ocakverdi (2008b)

*** Dogruel and Dogruel (2008)

Table 4 gives import dependencies and the growth in exports and production at a disaggregated level. The table suggests that import dependency has increased in every sector in the 1998-2002 period. Considering the manufacturing industry as a whole, import dependency calculated as 23% in 1998 has risen to 30% in 2002 and then further to 37% in 2007.

In the 2002-2007 period, import dependency has decreased in five sectors. The highest increase can be witnessed in the lower medium technology sectors in the first period and in the high technology sectors in the second period. When we consider the whole period from 1998 to 2007, import dependency has increased fastest among high technology sectors. Production increases have been the fastest in these sectors as well. The lowest increase in import dependency has been observed in the upper medium technology sectors which were the champions in terms of export increases. The upper medium technology sectors were also found to be the highest performers in terms of production and exports by Dogruel and Dogruel (2008). Dogruel and Dogruel (2008) have shown that the upper medium technology sectors had a production to exports ratio above average and the rate of increase of that ratio was higher than the average.

The data analysis in this section suggests that Turkey benefitted from local currency pricing in both its imports and its exports. The country has imported raw materials and intermediary goods from East Asia, denominated mostly in US Dollars and exported final products to EU in Euros. Since the import dependency is high in the manufacturing industry, the exporters benefitted both from the appreciation in the TL in terms of decreasing cost of imported inputs and the appreciation in the Euro against the US Dollar when they are selling their products in EU.

The findings of other studies suggesting a decreasing pass through effect in 2000's under macroeconomic stability and decreasing inflation, should be revised by taking into account a number of equally important developments during that time. The high level of import dependency and the changes in the structure of production as well as the appreciation of Euro against the US Dollar, the shift in Turkey's exports to Asia and to dollar invoiced transactions, the importance of Euro area for Turkey's exports should be considered as well.

4. Data and method

Our model focuses on the effects of the import dependencies of the manufacturing industries on their export performances. Export growth rates are used as an obvious sign of export performance, while import dependency rates, are considered as integrating various factors, ranging from production structure to the degree of exposition to the global currents.

Our approach can be summarized as considering the export growth rate as a function of import dependency:

Export growth rate = f (Import dependency)   (1)

Of course, this formulation should not be seen as stating a unique, straightforward causal relation. It is rather a framework for investigating the impact of structural properties of the industries on their export

performance. ERPT studies drawing on the effect of exchange rate on prices and competitiveness studies drawing on the level of labor productivity, these properties usually remain concealed and their effects underestimated. Here, we will try to show the relevancy of our approach by a panel analysis and interpret the results with a special emphasis on these structural factors.

For the panel analysis the equation (1) is rewritten as:

$$EXPCH(t) = f(IMDEP(t-1)) \tag{2}$$

where EXPCH(t) is defined as the ratio of current year's sectoral export to that of the previous year:

$$EXPCH(t) = EXPORTS(t) / EXPORTS(t-1) \tag{3}$$

IMDEP(t-1) of the equation (2) is the previous year's sectoral import dependency ratio based on the input output tables of 1998 and 2002 and on the derived estimations for the year 2007 taken from Ocakverdi (2008a and 2008b).

In order to obtain a time series for IMDEP, most recent values are used for missing values. As a result, for each sector, a bang-bang type time series for import dependency is constructed. We did not prefer to calculate yearly values of IMDEP assuming linear change and using average growth rates from 1998 to 2002 and from 2002 to 2007. For different sectors, these average growth rates are very close to each other and it is likely that the series based on them will fail unit root tests. The use of the first differences as a remedy to this problem and to obtain stationary data would yield a bang-bang type time series anyway. One period lag of IMDEP is introduced as it is economically plausible and it generated econometrically best results.

We limited our analysis period to 1995-2007. Older input-output tables exist, but their sector classification differs from the later ones. To transform these tables into a form commensurable with the ones we used is, not only difficult and problematical but also unnecessary for this study. This study intends to explore the impact of real appreciation of Turkish Lira on manufacturing industries having different production structure, and the real appreciation is essentially a post-2000 phenomenon.

The results of panel regression and estimated coefficients for our model can be found in table-5 and 6. Panel regression results confirm a significant relationship between import dependency rates of manufacturing industries and their export growth rates. Since our model excludes various economically meaningful explanatory factors that conceivably affect the export growth rates, it is not a "strong model". Hence, it is not surprising that it has a low (significant at 2.7%) F value. But still, it yields significant positive coefficient for IMDEP, meaning higher the import dependency of an industry is, higher is its export ratio. This was what we anticipated, but it is not self-evident and intuitive. Next section discusses economic implications of the estimation results.

Table 5

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Panel Regression - Estimation by Fixed Effects
Dependent Variable EXPCH
Panel(13) of Annual Data From      1//1996:01 To      21//2007:01
Usable Observations    252       Degrees of Freedom    230
 Total Observations    272       Skipped/Missing       20
Centered R**2      0.136723      R Bar **2    0.057902
Uncentered R**2   0.970726      T x R**2     244.623
Mean of Dependent Variable     1.1888142024
Std Error of Dependent Variable 0.2231692137
Standard Error of Estimate      0.2166118589
Sum of Squared Residuals       10.791760402
Regression F(21,230)                1.7346
Significance Level of F          0.02695647
Log Likelihood                   39.40891

    Variable                    Coeff        Std Error     T-Stat     Signif
****************************************************************************
1.  IMDEP{1}                 0.5390829552 0.1852633661     2.90982  0.00397124
```

Table 6

```
Panel Regression - Estimation by Random Effects
Dependent Variable EXPCH
Panel(13) of Annual Data From      1//1996:01 To      21//2007:01
Usable Observations    252       Degrees of Freedom    250
 Total Observations    272       Skipped/Missing       20
Mean of Dependent Variable     1.1888142024
Std Error of Dependent Variable 0.2231692137
Standard Error of Estimate      0.2178132441
Sum of Squared Residuals       11.860652329
Log Likelihood                   30.35985
Hausman Test(1)                   0.001201
Significance Level               0.97235681

    Variable                    Coeff        Std Error     T-Stat     Signif
****************************************************************************
1.  Constant                 1.0263567662 0.0379624755    27.03609  0.00000000
2.  IMDEP{1}                 0.5341400708 0.1175898489     4.54240  0.00000556
```

5. Estimation Results

In previous sections, we put emphasis on the importance of an integrated approach to the performance of exports in Turkey. We discussed the shortcomings of a standard ERPT approach in understanding the effects of the exchange rate on production costs and competitiveness of the manufacturing industry through imported inputs. In section 4 we employed the input output tables for various years to show the importance of import dependency in the export performance of manufacturing sectors. The results of the model confirm the relevance of our approach.

The model results at the first instance, point out the importance of import dependency in the competitiveness of the industry. Given the real appreciation of the TL, the higher the import dependency ratio, the lower the cost of the imported inputs in total production when measured in TL. The favorable impact on production costs increases the competitiveness margins for the exporters in international markets. Assuming that Turkish export adopts local currency pricing in export markets, the real appreciation of the TL lowers export revenues in terms of local currency and puts a pressure on the profitability of exporters. High import dependency lowers that negative effect, thus, leading to higher export performance in sectors where import dependency is higher.

As sectors are treated separately in the panel data analysis, results also confirm the sectoral differences. The sectors having a higher ratio of import dependency could enjoy a higher export growth rate.

The model results draw attention to changes in import dependency and export performance in time. The model shows that the rates of increase in exports have been higher in sectors where the import dependency ratios have increased in time. The sectors in which the ratio of imported inputs is limited, the real appreciation of the TL put a pressure on the level of competitiveness. Thus, these sectors found it more difficult to increase their exports in time.

The results also allude to the role of production structure in manufacturing industry. It is highly probable that sectors having a high import dependency ratio have also high external linkages and access to knowledge. The increasing share of intra industry trade as shown by Yukseler and Turkan (2006) supports that argument. The increase in intra industry trade is especially significant for higher technology sectors such as motor vehicles, machinery and equipment, and radio and TV. The increasing intra industry trade figures have favorable effects on exports and production. Vertical integration models implied by increasing intra industry trade figures can also explain how the EPRT models work. However, that analysis is beyond the scope of this paper.

The authors place the production structure and high import dependency of the manufacturing industry at the heart of the ever increasing trade and hence current account deficit. As argued in Dogruel and Dogruel (2010) only a well formulated industrial strategy supported by appropriate macroeconomic policies can lead to a lasting solution of the trade deficits.

6. Conclusion

Since 2001 vast changes took place in the macroeconomic policy setting in Turkey. The manufacturing industry underwent a transformation advancing higher technology sectors to a more prominent place. Furthermore, the performance of the Turkish manufacturing industry vis-à-vis its competitors has improved significantly. The paper intended to examine the effects of exchange rate on the production costs and competitiveness of the manufacturing sectors through imported inputs.

The effects of the changes in the exchange rates on the local prices are widely discusses during the last two decades. The studies mainly focus on detecting the presence or measuring degree of the exchange rate pass-through using time series econometric techniques. Although it may be argued that Turkey benefitted from local currency pricing in both its imports and its exports, the exchange rate pass through analysis have a limited explanatory power without taking into account factors such as the high level of import dependency, the changes in the structure of production as well as the appreciation of Euro

against the US Dollar, the shift in Turkey's exports to Asia and to dollar invoiced transactions, the importance of Euro area in total exports.

In order to overcome the shortcomings of a standard ERPT approach we employed the input output tables for various years to show the importance of import dependency in the export performance of manufacturing sectors.

The model results confirmed the importance of import dependency in the competitiveness of the industry. Given the real appreciation of the TL, high import dependency ratio works as a cushion against the cost of imported inputs in total production measured in TL. The favorable impact on production costs increases the competitiveness margins for the exporters in international markets. The model also showed that sectors having a higher ratio of import dependency could enjoy a higher export growth rate. The model also showed that the rate of increase in exports have been higher in sectors where the import dependency has increased in time. The sectors in which the ratio of imported inputs is smaller, the real appreciation of the TL put a stronger pressure on the level of competitiveness.

These results highlighted the importance of a well designed industrial policy. The authors call attention to the fact that the production structure and high import dependency of the manufacturing industry is at the heart of the ever increasing trade and hence current account deficit. As argued in Dogruel and Dogruel (2010) only a well formulated industrial strategy supported by appropriate macroeconomic policies can lead to a lasting solution of the trade deficits. As long as a restructuring implied by such a strategy is not achieved, the pass through effect of exchange rate and parity changes will have only temporary and shallow impact. As a corollary, changes in foreign exchange rate policy will not yield a lasting improvement on neither foreign trade nor current account deficit.

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