ESSAYS ON DETERMINANTS OF EXPORT, COMPETITIVENESS AND UNIT LABOR COST

YAVUZ SELİM HACIHASANOĞLU

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ESSAYS ON DETERMINANTS OF EXPORT, COMPETITIVENESS AND UNIT LABOR COST

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Yavuz Selim Hacıhasanoğlu

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Thesis Abstract

Yavuz Selim Hacıhasanoğlu, "Essays on Determinants of Export, Competitiveness and Unit Labor Cost"

This thesis consists of three papers. In the first paper, we investigate the causes of the Turkish export-boom after 2000 in the manufacturing sector. We mainly concentrate on the cost and productivity aspects of the production in the manufacturing sector. The effects of productivity, wage and exchange rate are analyzed within the framework of the augmented unit labor cost model. Following the Edwards and Golub (2004) paper we use the dynamic panel data techniques for the analysis. In addition, the importance of the above mentioned factors is examined for the rising and declining sectors. We find that manufacturing export is negatively related to the unit labor cost (ULC). The Decomposition of ULC into its two components also shows that an improvement in productivity increases export while an increase in nominal wages decreases it. We also find that nominal wage is an important factor in the declining sectors while productivity is the stimulus in the rising sectors.

In the second paper, we examine Turkey's international cost competitiveness in manufacturing with respect to the Slovak Republic, and quantitatively investigate the relationship between Turkish cost competitiveness and the exports of manufactured goods at an industry level. The Relative Unit Labor Cost (RULC) measure and dynamic panel data techniques are employed for this analysis. We find that Turkey is not competitive with respect to Slovakia for the 1995-1999 period. The Competitiveness of Slovakia mainly depends on its relatively higher level of labor productivity.

Tez Özeti

Yavuz Selim Hacıhasanoğlu, "İhracatın Belirleyicileri Üzerine Makaleler, Uluslararası Rekabet Gücü ve Birim İşgücü Maliyeti"

Bu tez üç makaleden oluşmaktadır. Birinci makalede, Türkiye'nin imalat sanayinde 2000 yılından sonra meydana gelen patlamanın sebepleri araştırılmıştır. Makalede özellikle imalat sanayi üretimindeki maliyet ve verimlilik üzerine odaklanılmıştır. Verimlilik, ücret ve kurun etkileri geliştirilmiş birim ücret maliyeti modeli ile analiz edilmiştir. Edwards ve Golub (2004) makalesini takip ederek analiz için dinamik panel tekniği kullanılmıştır. Ek olarak, yukarıda bahsedilen faktörlerin imalat sanayinde gelişen ve sönen sektörler için önemine de bakılmıştır. Analiz sonunda, imalat sanayi ihracatı ile birim ücret maliyeti arasında negatif bir ilişki olduğu bulunmuştur. Ayrıca, birim işgücü maliyetinin iki bileşenine ayrılması göstermiştir ki verimlilikteki bir artış ihracatı arttırırken ücretlerdeki bir artış ihracatı azaltmaktadır. Bu sonuca ek olarak, nominal ücretlerin sönen sektörlerde, verimliliğin ise gelişen sektörlerde önemli bir faktör olduğu bulunmuştur.

İkinci makalede, Türkiye'nin Slovak Cumhuriyeti'ne göre imalat sanayinde maliyet açısından uluslararası rekabet gücü incelenmiştir. Ayrıca, Türkiye'nin imalat sanayindeki rekabet gücü ile ihracatı arasındaki ilişki sektörel olarak analiz edilmiştir. Bu analiz için, göreceli birim ücret maliyeti ölçütü ve dinamik panel tekniği kullanılmıştır. Analiz sonunda 1995-1999 periyodu için Türkiye'nin Slovakya'ya göre rekabet gücünün olmadığı bulunmuştur. Slovakya'nın rekabet gücü temel olarak göreceli yüksek olan işgücü verimliliğinden kaynaklanmaktadır.

ACKNOWLEDGEMENTS

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Lastly, and most importantly, I would like to thank my parents. They bore me, supported me, and loved me. I dedicate this Master's thesis of mine to them.

CONTENTS

CHAPTER 1

INVESTIGATION ON THE DETERMINANTS OF THE TURKISH EXPORT-BOOM OF THE 2000s

Introduction

Turkey's export volume increased substantially in the years between 1996 and 2006. In 1996, Turkey's total export was 23 billion dollars, whereas in 2006 it reached 85 billion dollars. Before concentrating on the export performance of Turkey in the last 11 years it is necessary to figure out the process towards the integration of the Turkish economy into the world economy. Turkey's import substitution industrialization strategy in the 1960s and 1970s shifted towards an export-oriented industrialization strategy in the 1980s. The main objectives of the new strategy were the promotion of export, liberalization of foreign trade regime, and the encouragement of private sector activities. Since that year, the main stimulus behind all governments' economic policies has been the integration of the Turkish economy into the world markets and the promotion of export. In this regard, the beginning of the 1980s constituted a turning point in the economic history of Turkey.

The reforms following trade liberalization in the early 1980s spurred private sector activity and improved the structural factors for international competitiveness which caused high export growth rates. In the period between 1981-87, export revenues increased 15% on average. Following Turkey's application for EU membership in 1987, an incomplete Customs Union (CU) between Turkey and the EU was put into force on 1 January 1996. According to the CU, except iron and steel products, manufacturing goods and processed agricultural products could circulate freely between Turkey and the EU. The CU agreement with the EU did not

encompass agriculture or the services sectors (Togan, 2005). In addition to eliminating the custom duties and charges and forbidding the quantitative restrictions, Turkey accepted the common tariff of the EU with respect to third countries. This resulted in serious competitive pressure on Turkey.

After 1996, there were certain global and domestic factors which affected the trade performance of Turkey. The crises in Asia and Russia in 1997 and 1998, the two severe earthquakes that occurred in the Marmara region in 1999, and the crises in November 2000 and February 2001 in Turkey adversely affected the economic conditions. As a result of these developments, the country witnessed substantial declines in import demand during 1999 and 2001.

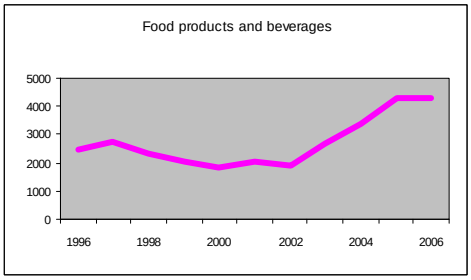
The establishment of the CU between Turkey and the EU and the events both in the domestic and the global levels which took place after 1996 have led to a transformation of the Turkish economy especially in foreign trade. During the period 1996–2006, Turkey's total export grew at an annual rate of 13 %. Only one year, in 1999, the increase in exports halted and declined at a rate of 1.4 %. The earthquakes which occurred in 1999 were the cause of this decline. In the remaining years, between 1996 and 2006, Turkey's export increased substantially. The volume of Turkey's export in 2006 was 85 billion dollars whereas it was 23 billion in 1996. Figure 1[1] shows the time path of the main manufacturing sectors for the years 1996-2006.

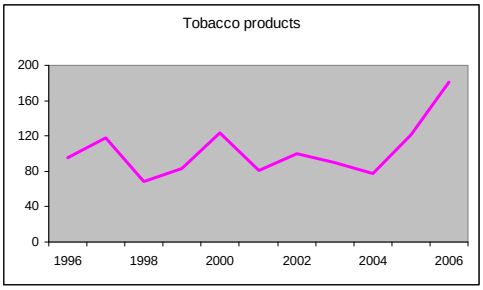
When we analyze detailed export data of Turkey it becomes apparent that the main stimulus behind the export growth is manufacturing. Manufacturing export rose from 20 billion dollars in 1996 to 79 billion dollars in 2006. Between 1996 and 2006 Turkey's annual average growth rate for manufacturing export was 14 %. As can be

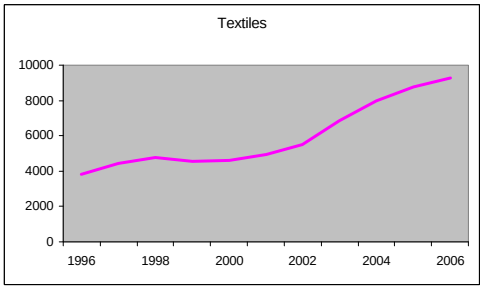
[1] See TABLE A1 in appendix for detail.

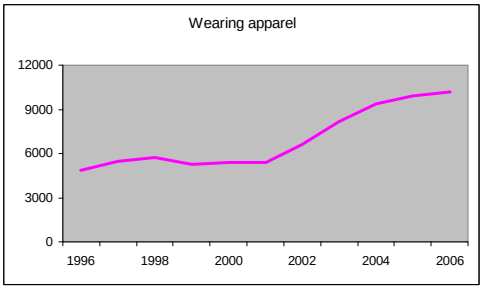
seen in Figure 2, not only the total exports increased, but also there has been a significant change in the composition of Turkish exports over time.

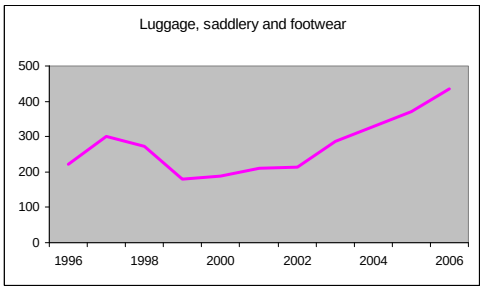
FIGURE 1
Sectoral Level Manufacturing Exports (US$ million)

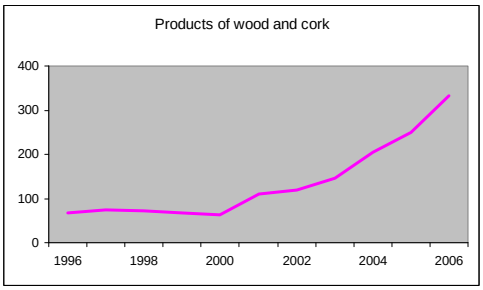


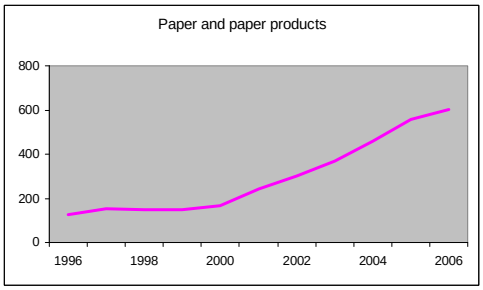


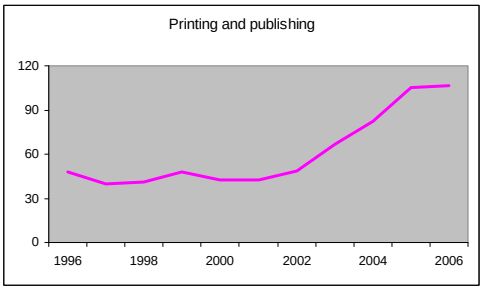


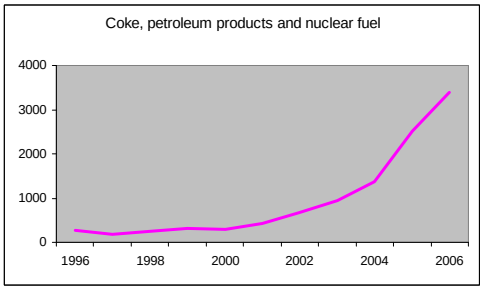


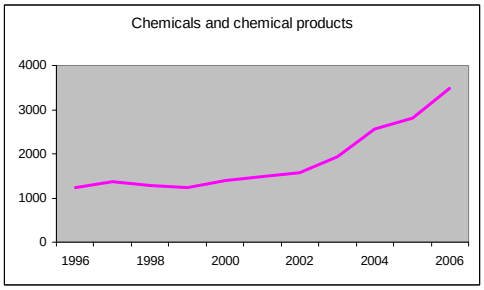












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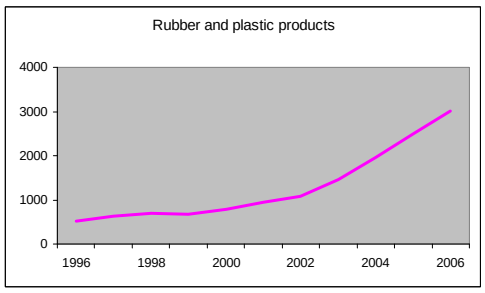

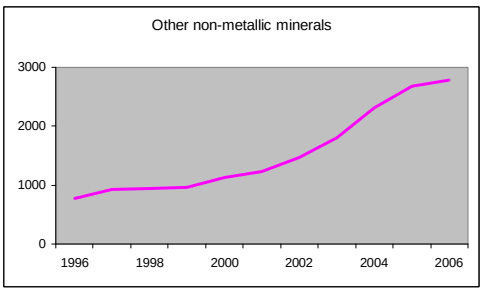

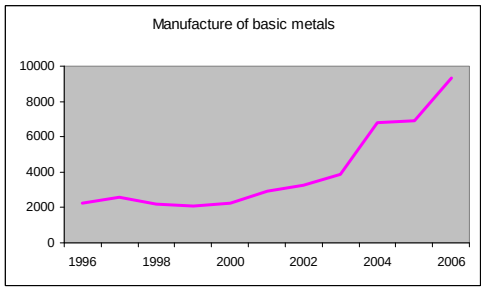

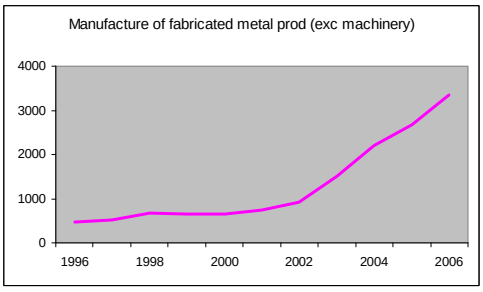

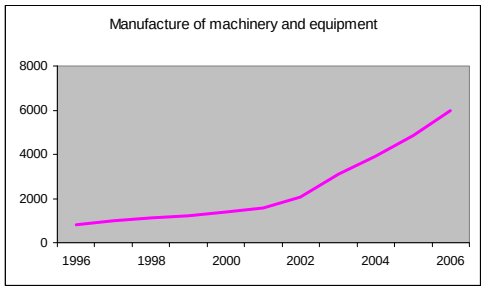

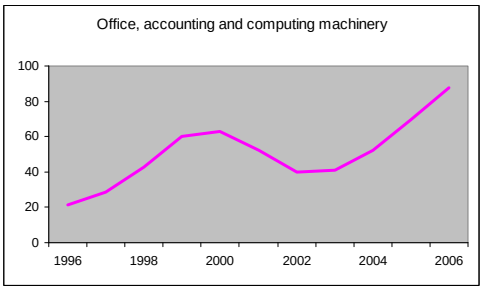

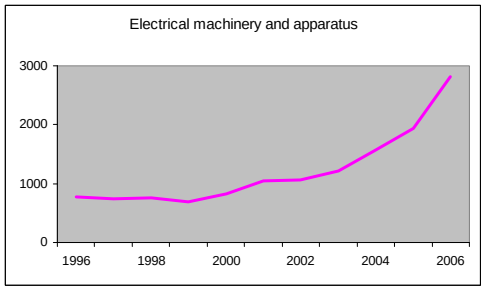

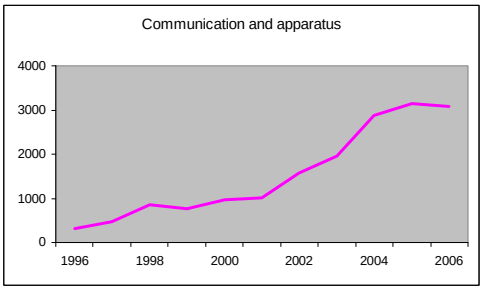

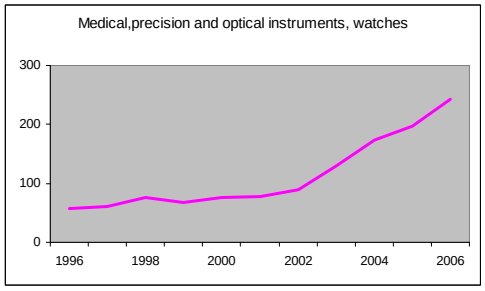

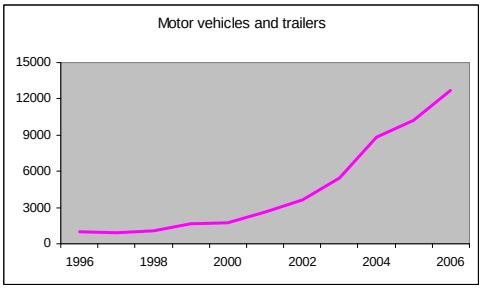

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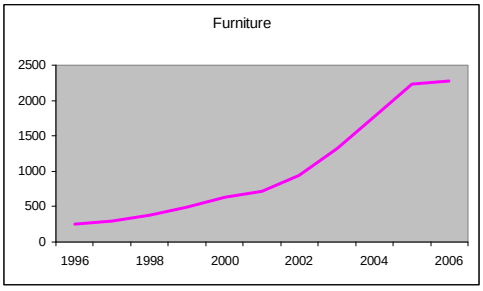
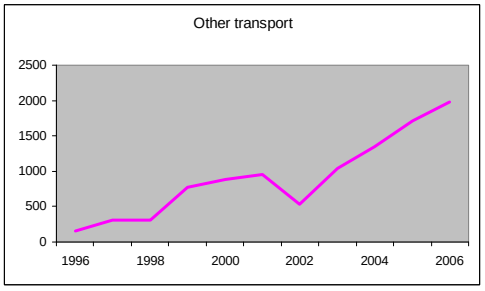
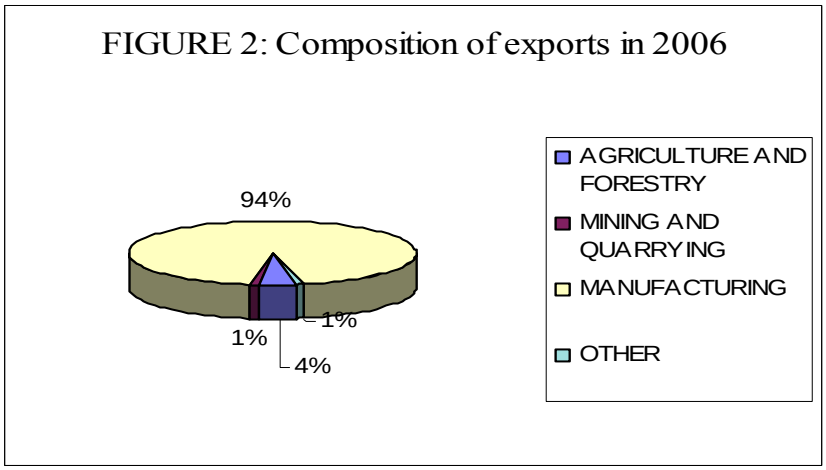




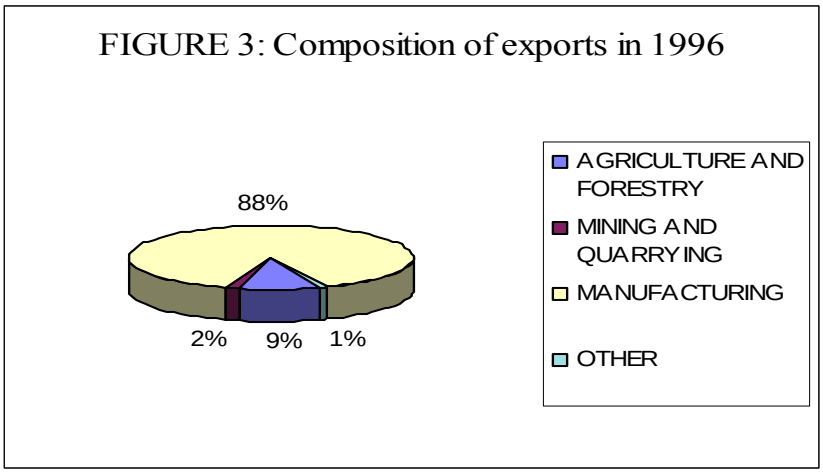
Source: TURKSTAT

Figure 2 and 3 reveal that the sectoral composition of export has changed substantially in favor of manufacturing goods, the share of manufacturing export rose from 88% in 1996 to 94% in 2006. In this period, the share of mining and agriculture in total export stagnated, which implies that a structural shift was also evident in the exported goods from the agriculture sector towards the manufactured goods. In addition, the manufacturing export increase in Turkey is more than the world average (8.1 %[1]) in this period.



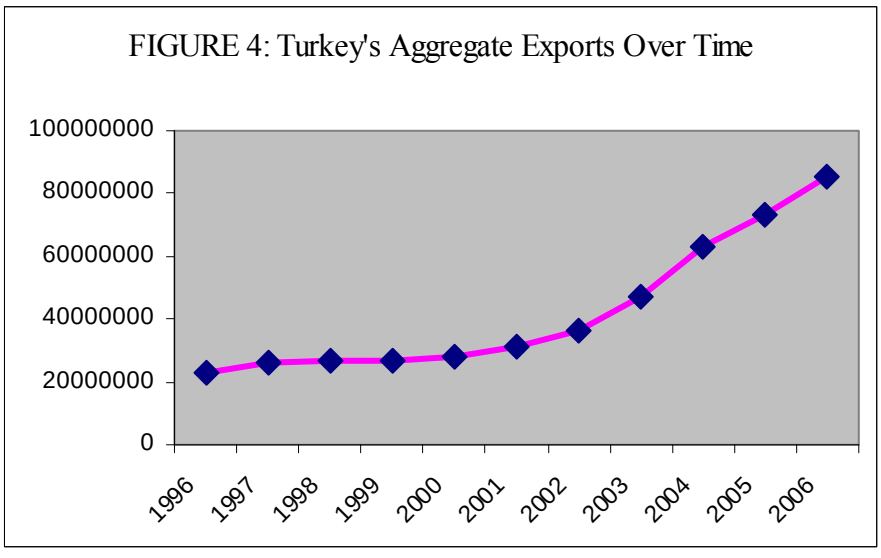
Source: TURKSTAT

[1] See Edwards and Alves (2006) for detail.



Source: TURKSTAT

Figure 4 shows the time path of the exports over the 1996-2006 period. The figure depicts two episodes of export developments: 96-00 and 01-06. After the crisis in 2001, domestic demand shrank and the government decided to abandon the crawling peg regime and floated the currency which caused the Turkish currency to devaluate. This situation has accelerated in exports.



Source: TURKSTAT

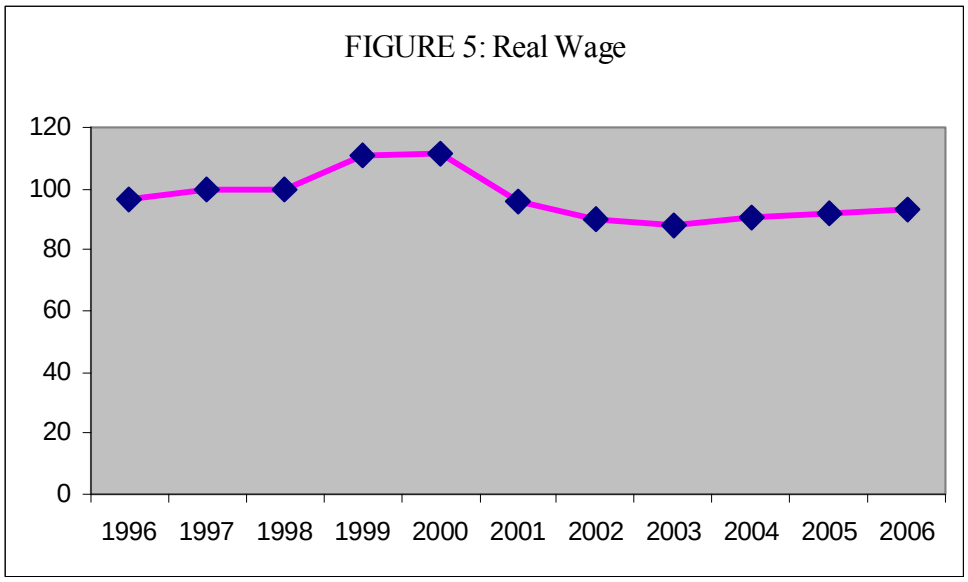
The driving factors behind the Turkish export phenomenon have constituted a matter of debate. In addition to the world's economic conditions, the overall competitiveness of the Turkish economy emerges to be the key factor at the background of the successful export growth performance of Turkey. In spite of the awareness that the stimulating export growth is central for the long term prospects of Turkey, there is no consensus on what led Turkey's exports to increase substantially. Some have pointed out the repression of wages after the 2001 crisis. Others have focused on the productivity changes. In this study, we empirically analyze the determinants of Turkey's export in order to shed some light on this ongoing debate. In addition, since each sector would be affected differently from the economic events, an aggregated trade analysis conceals the dynamics at the sectoral level. Hence, an analysis of export performance on a sectoral basis is necessary to investigate the dynamics of this export growth. There is a wide range of possible sectoral determinants that could affect exports. In our estimations, we account for as many sectoral variables as possible for which we have data so as to have more disaggregated estimates for the recent export performance of Turkey.

The main objective of this study is then to analyze the cost and productivity dimension of the production in the manufacturing sector. We analyze Turkish manufacturing exports econometrically by using a panel data of 2-digit Standard Industry Classification (ISIC) industries for the 1996-2006 period. In this context, the effects of productivity, wage and exchange rate are discussed within the framework of the augmented unit labor cost model. Following the Edwards and Golub (2004) paper we use the dynamic panel data technique for the analysis. In addition, the importance of the above mentioned factors is examined for the rising and declining sectors.

The remainder of this paper is organized as follows. The current debate on export is given in Section 2. In section 3, some recent studies regarding the Turkish export are reviewed. The data sources, models for manufacturing export and estimation results are discussed in Section 4. Finally, Section 5 concludes.

Wage, Productivity, Exchange Rate, and the Current Debate on Export

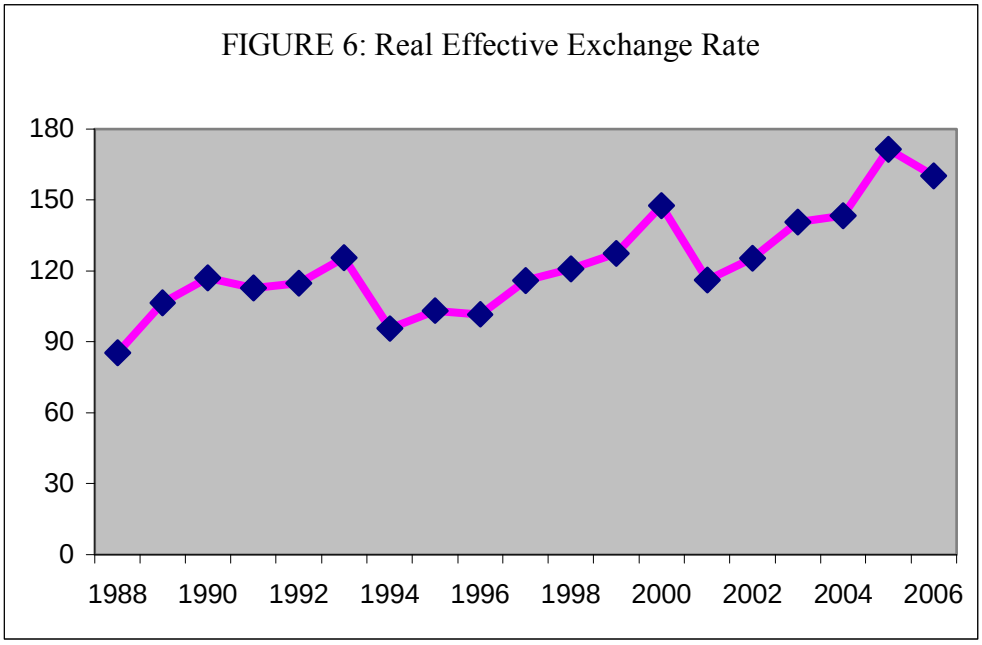
Figure 5 shows the index of real wages per production hour worked (1997 = 100) in the total manufacturing sector in terms of domestic currency. As it can be observed in the figure, before 2000 there is an increase in real wages. Real wage levels in manufacturing declined between 2000-2003 in Turkey due to severe and frequent crises in 2000 and 2001. Until 2003, wages in manufacturing were repressed. Since 2003, with the help of the appreciation of domestic currency, wages in manufacturing have been slightly increasing. In addition, there is a permanent increase in nominal wages for the whole period. Hence it is self-evident that in international markets, Turkey has shown a tendency of increasing wage level in manufacturing considering appreciating domestic currency in recent years.



Source: TURKSTAT

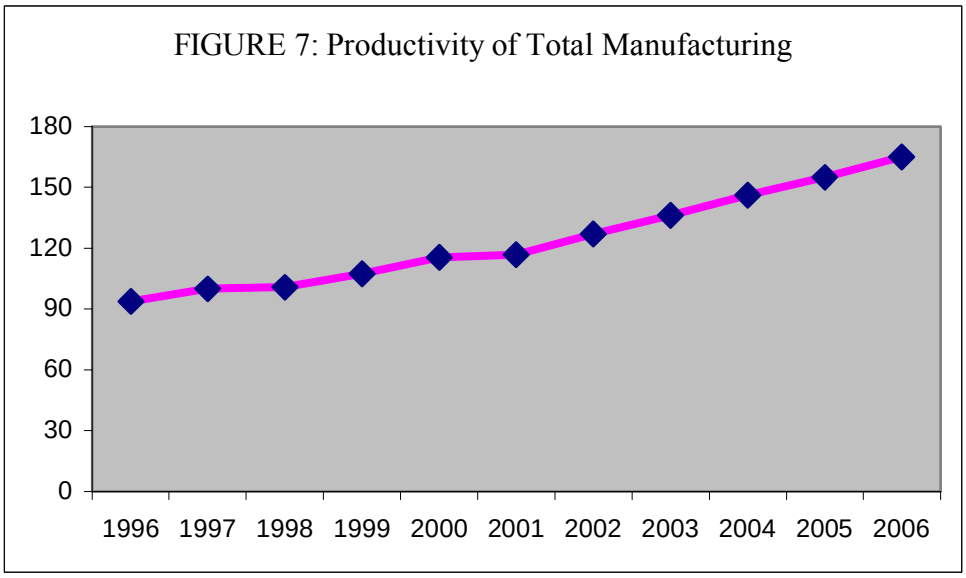
Figure 6 reveals five episodes of REER developments relying on the consumer price index (CPI) based on reel effective exchange rate (REER)[2] data from the Central Bank of the Republic of Turkey. After the 1994 crisis the REER depreciated sharply but then it started to appreciate again. The appreciation of the REER continued until 2000, when the economy faced another crisis. After the sharp depreciation of the REER from 2000 to 2001, it began to appreciate again (Togan, 2005). Today, most people believe that the appreciation of Turkish currency is negatively affecting the export performance of the manufacturing sector. However, in recent years, Turkey has had record high levels of export performance despite the overvalued currency. This shows that the current debate on the adverse effects of the acclaimed appreciation of Turkish currency on export is overly naïve, considering the other more complex determinants of export.

[2] CPI based real effective exchange rate index is calculated using the IMF weights for 19 countries (1995 = 100). An increase in the index implies an appreciation.



Source: Central Bank of the Republic of Turkey (CBRT)

Another, maybe the most important, factor is the changes in labor productivity in the manufacturing sector for the 1996-2006 period. The index of partial productivity per production hour worked (1997=100) in the total manufacturing sector can be seen in Figure 7. There is a continuous rise in labor productivity for the 1996-2006 period.



Source: TURKSTAT

Unit labor cost (ULC) which is equal to the ratio of wages to labor productivity covers all of the factors that have been explained above. ULC measure takes into account both the wage and productivity changes simultaneously. We have calculated the ULC in terms of domestic currency in order to take into account the effect of the appreciation of the Turkish currency in terms of other weighted basket of currencies by including the REER variable in our model.

Explanations on Turkish Export Performance

In this section some recent studies regarding Turkey's export performance are reviewed. Most of the studies considered focus on the relationship between growth of export and economic growth. Three examples of these studies are Bahmani-Oskooee and Domac (1995), Özmen and Furtun (1998), and Yiğidim and Köse (1997). The first paper confirms the validity of the export-led growth hypothesis for Turkey while the others reject this hypothesis.

Bahmani-Oskoode and Ltaifa (1992) analyze the effects of the exchange rate on export, and show that exchange rate adversely affects export. On the other hand, Sivri and Usta (2001) conclude that the real exchange rate does not considerably account for the changes in export. Özatay (2000) estimates total export as a function of foreign income, and real exchange rate. According to his model while real exchange rate is statistically significant foreign income is not.

Arslan and Wijnberger (1993) examine the existence and driving forces behind the Turkish export miracle for the 1980-87 period. They show that there was indeed a Turkish export miracle at this period and the export boom emanated from

the macroeconomic policies and trade reform that allowed a steady real depreciation of Turkish currency.

Nowak-Lehmann *et al.* (2005) use the extended version of the gravity model for Turkey covering the period 1988-2002 in order to investigate the trade effects of Turkey's trade integration into the EU. For this purpose, they examine sectoral trade flows to the EU based on panel data from the period 1988 to 2002, mainly concentrating on Turkey's sixteen most important export sectors. Their main emphasis is placed on the role of price competition, EU protection, and transport costs in the export trade between Turkey and the EU. According to the augmented gravity model, their findings indicate that transport costs and the real effective exchange rate are statistically significant, indicating that a rise in transport costs decreases Turkish exports while a depreciation of the real effective exchange rate increases Turkish exports.

One of the studies investigating the Turkish export position is the study of Lall (2000). He analyzes the technological structure of Turkish manufacturing export. He concludes that the structure of export is dominated by the low technology products and there is little evidence of an ability to shift to more dynamic products. In addition, much of the low technology export has been spurred by privileged access to the European market rather than due to global competitiveness. He emphasizes not having a strong advantage in low wages in low technology industry; Turkey is unlikely to sustain rapid growth once trade is fully liberalized by the year 2005. He thus claims: "As a high wage economy, Turkey has to compete with low-wage countries in simple, low technology products. As a technologically lagging economy, it has to compete against high technology European firms. Both are difficult, as there remain important structural deficiencies in Turkish competitiveness."

Özçelik and Taymaz (2002) estimated export intensity equations using TURKSTAT's firm-level Innovation Survey data for 4000 firms which covers the 1995-97 period to find out the determinants of export performance. They conclude that the innovations and R&D activities are crucial for the international competitiveness of Turkish manufacturing firms. On the other hand, technology transfers through license or know-how agreements and being a member of a business group are not significant determinants of export performance, suggesting that a rational technology policy needs to be given a priority in promoting in-house innovations. Technology transfers and own innovation activities may be seen as "complementary" processes through their effects on enhancing innovation possibilities.

The findings of Özçelik and Taymaz (2002) also indicate that the implementation of devaluation with a desire to enhance Turkey's competitiveness in international market via real cost reductions is an indispensable part of Turkey's international trade strategy. Nevertheless, Turkey must abstain from the illusion of temporary export booms achieved by devaluations and export subsidies. In contrast, Turkey needs to discern the importance of quality competition based on a comprehensive technological development policy that will generate permanent increases in productivity and competitiveness.

Özler, Taymaz, and Yılmaz (2007) empirically analyze factors that influence the export participation decision using plant level data from Turkish manufacturing industry covering the period 1990-96. Their main result supports the presence of sunk costs of entry to export markets and the full history of a plant's export experience matters for the current export decision. Aside from the past exporter status, several plant characteristics such as the plant size, the shares of female and

administrative employees in total employment, and technology which is measured by capital-labor ratio and the share of imported machinery and equipment stock affect the export decision.

There are also some reports which analyze Turkey's trade performance for the recent years. Yükseler and Türkan (2006) investigate the Turkish manufacturing industry over 1996-05. In this study, the transformation of the Turkish manufacturing industry is characterized by *importization*, *internationalization*, and *Asialization* for the last ten years. The simultaneous changes in the domestic and global perspective in 2001 are the main causes of this transformation. These trends have caused a huge increase in export volume; but this high export volume has not contributed to the value added and employment creation significantly. Appreciation of domestic currency has brought about a decline in Turkey's competitiveness in international the market. According to the authors, to compensate the negative effect of the appreciation of domestic currency firms have limited the real wage increase and stimulated productivity.

The report by Albaladejo (2006) assesses Turkey's manufacturing performance by comparing its performance to that of the EU-15, the new EU members and other newly industrialized countries. The paper does not analyze the structural factors behind Turkey's performance. Nevertheless, the paper concludes that while manufacturing export has boomed, manufacturing value added per capita has stagnated. Turkey's trade performance may be a result of the country's accession to the EU market rather than the result of the domestic technological capabilities of Turkish firms. The paper also denotes that although the share of medium- and high-technology sectors has declined, Turkish industry is still highly dependent on technologically simple products. Finally, the paper conjectures that it is difficult to

think of a more competitive Turkey unless structural factors such as technological development, specialized human capital, modern infrastructure and the whole institutional set up for innovation and learning are stimulated. As explained in the conclusion of the study, a more disaggregated analysis at the product level is necessary. Therefore, we employ a sectoral analysis in our paper.

Filiztekin (2005), Erlat and Erlat, Yılmaz (2003), and Kaya (2006) analyze the competitiveness of Turkey with respect to other countries. All of these papers employ the Revealed Comparative Advantage (RCA) index developed by Balassa (1965). Yılmaz (2003) uses Comparative Export Performance (CEP), Trade Overlap (TO), and Export Similarity (ES) approaches in addition to the RCA index. However, it is important to note two of the most important deficiencies of the RCA index. First, it does not take into account the dynamic comparative advantage suggesting that a competitive industry at a point in time does not always remain competitive. Second, the RCA index cannot measure the underlying factors behind competitiveness.

Keyder, Sağlam and Öztürk (2004) use a different index, unit labor cost (ULC) based competitiveness index, for the whole manufacturing sector so as to compare Turkey with its 15 major trading partners over the 1994-2003 period. Since the unit labor cost index estimated for Turkey remained far below those of its trading partners, the unit labor cost based competitiveness index implies a considerable cost based advantage for Turkey, especially after the February 2001 crisis. Relatively higher productivity and relatively lower dollar based wages as compared to its trading partners lead to lower unit labor costs in Turkey and provide a competitive advantage to the country. For the 1994-2003 period, the reduction in unit labor costs compensated the overvaluation of the Turkish currency. In addition to this main result, despite the relatively higher growth rates of output; employment was not

affected because of the rise in productivity. This paper, however, does not rely on any econometric models for the analysis. Instead, their findings are based on the simple percentage change in the wage, productivity and ULC for Turkey and its trading partners. Secondly, the bulk of the work has treated manufacturing as an aggregated sector. This tends to hide much of the variation at the sectoral level. However, since each sector would be affected differently by the economic events and an aggregated trade analysis conceals the dynamics at the sectoral level, an analysis of export performance on a sectoral basis is necessary to investigate the structure of the export. In order to solve these two problems we use an econometric model with a sub-sectoral manufacturing data.

Yaşar and Nelson (2004) examine the relationship between export and productivity in the Turkish apparel and motor vehicle and motor parts industries with an Error- Correction specification for plant-level panel data covering a wide time span from 1990 to 1996. Their findings bring up a bidirectional relationship between export and productivity both in the short- and long-run. However, the effect of productivity on exporting is much stronger than the effect of exporting on productivity which implies that more productive firms enter the export market.

Another paper by Yaşar and Rejesus (2005) uses unbalanced plant-level panel-data on manufacturing plants for the Turkish apparel, textile, and motor vehicles and motor parts industries over 1990–1996 in order to determine whether self-selection or learning-by-exporting is the more plausible explanation for the link between exporting status and plant performance in Turkish manufacturing plants. By using propensity score matching (PSM) techniques and difference-in-difference (DID) estimators their results suggest that learning by exporting may be the reason for the positive correlation between exporting status and firm performance in Turkey.

This paper assesses the determinants of export in Turkey's manufacturing sector, particularly with regard to labor costs, and examines the quantitative relationships between Turkey's cost competitiveness and export of manufacturing goods at an industry level. This approach is especially worthwhile in the Turkish case where labor costs are still essential for competitiveness. In addition, all studies discussed earlier use a static framework. However, we analyze the Turkish manufacturing export with a dynamic model. To the best of our knowledge, this is the first study investigating the Turkish manufacturing export with a dynamic panel data model.

Empirical Model

In order to investigate the determinants of the export performance of Turkish manufacturing sectors, this section estimates the export supply function using a panel of manufacturing industry data covering the period 1996-2006. Export performance characterized by the ability of domestic firms to compete in the international market, depends on various factors. These factors include productivity, wage, technological innovation, and exchange rate. In this study, emphasis will be placed on the role of cost competition. As argued by Turner and Golub (1997), since the most important non-tradable input is labor, the Unit Labor Cost (ULC) is the most crucial cost element determining the international competitiveness of an industry[3].

The ULC, as a fundamental measure of international competitiveness, has been broadly used for international comparisons of cost competitiveness. In the Key Indicators of the Labor Market (KILM) database, which is a multi-functional

[3] In fact, the relative unit labor cost (RULC) has been used as the measure for international competitiveness (Fagerberg, 1988).

research tool of the International Labor Organization (ILO), the ULC is defined as "the cost of labor required to produce one unit of output in a particular industry, sector or the total economy". Alternatively, and probably more clearly, the ULC is defined as the ratio of labor compensation per unit of labor (measured as the wage per employed person or per hour worked) to the productivity of labor (measured as output per employed person or per hour) as follows:

$$ULC^{D(U)} = [LCH^{DD} / ER^{DU}] / [OH^{D(D)} / PPP^{DU}] \quad (1)$$

where $ULC^{D(U)}$ is unit labor cost of country D in terms of dollars, ER^{DU} is the exchange rate between country D and the United States, PPP^{DU} is the purchasing power parity between country D and the United States, LCH^{DD} is the wage per hour in country D in prices of D and $OH^{D(D)}$ is the output per hour in country D in prices of country D.

Based on the equation (1), countries with a low level of ULC relative to other countries are evaluated as cost competitive. The ratio indicates that a country can enhance its cost competitiveness either by decreasing its wage level (the numerator) or raising the labor productivity (the denominator). Hence, changes in ULC reflect the net effect of changes in wage level and labor productivity.

The ULC indices may be calculated both in terms of the domestic currency basis as well as in US dollars (common currency). When ULC indices are directly compared between countries, wages are converted to common currency using the official exchange rate and labor productivity is converted to common currency using purchasing power parity. Note that the exchange rate is not used for the conversion

of labor productivity in equation (1); because movements in exchange rates affect relative wages but not the physical productivity of labor.

In this study, we assume that Turkey is a small price taking country. Since Turkey's manufacturing exporters are predominantly price-takers in the international market they are assumed to face an infinite demand for their products. Hence, our approach is predominantly related to the supply side of the export. This assumption has two important implications. First, the profitability of export supply determines export volumes. Second, depreciation in domestic currency has a positive effect on export performance because of the increase in the profitability of export supply, and not because of the rise in the cost competitiveness of Turkish products. On the other hand, since Turkey is a labor abundant country and the most important non-tradable input is labor, it is reasonable to emphasize the labor side of the production. Hence, our model assumes a perfectly competitive market in which labor is the only factor of production. The profitability of export supply depends on both output prices and variable costs of production. In the econometric analysis of the determinants of export supply, variable production costs are captured with ULC and producer prices (see, Edwards and Alves, 2006). Therefore, export supply is a function of the ULC and relative price variable (the real effective exchange rate). This approach is especially worthwhile in the Turkish case where labor costs are still an issue of contention.

It is often believed that export performance is related to the REER of a nation's currency (Fagerberg, 1988). However, since Turkey has had record high levels of export growth despite the overvalued Turkish currency in recent years, REER fails to gauge the export performance. Hence, the ULC also needs to be taken into account. In fact, the relative unit labor cost (RULC) has been used as the

measure for international competitiveness (Fagerberg, 1988). However, we incorporate the ULC (not RULC) as an explanatory variable in our empirical model given that our main concern is to focus on Turkey. Moreover, we do not analyze the competitiveness of Turkey vis-à-vis other countries. Hence, we omit the [PPP^{DU}/ER^{DU}] part of the equation (1) in computing the ULC. This enables us to extend the Edwards and Golub (2004) model by including the REER.

In this study, we used export, wages, and labor productivity data related to the sectoral manufacturing industry for the aim of the study. The data covers the time period of 1996 to 2006 for the Turkish manufacturing sector. We analyzed Turkish export on a two-digit level, based on the International Standard Industry Classification (ISIC). The data set related to the wages and productivity of the manufacturing sector was obtained from the Turkish Statistical Foundation (TURKSTAT)[4]. In addition, the CPI-based REER data was obtained from the Central Bank of the Republic of Turkey (CBRT).

As we have explained in part 1, the growth in manufacturing export in Turkey is more than the world average (8.1%) for the 1996-2006 period. In order to control the export growth which stems neither from productivity nor from price competitiveness but from the growth in the world economy, we include world GDP in the analysis. World GDP data from the Groningen Growth and Development Centre (GGDC) of the University of Groningen covers the total GDP of 129 countries in millions of 1990 US dollars. ULC is calculated as an index form (1997 average = 100) by dividing wage index to productivity index.

In order to analyze the factors behind Turkey's export growth, we first run the following regression as a benchmark model.

[4] It is worth emphasizing that the wage and productivity variables used are the averages of four quarter within a year and expressed in index form (1997 average = 100).

$$X_{it}=\alpha + \beta_1 X_{i,t-1} + \beta_2 ULC_{it} + \beta_3 Y_{it} + \beta_4 Crisis_{it} + \epsilon_{it} \quad (2)$$

where *i* stands for sector and *t* stands for time period. The left hand side is the log of the volume of export and on the right-hand side $X_{i,t-1}$ is the log of the lag value of export, ULC is the log of the ULC index which is obtained by dividing wage index to productivity index. Finally, crisis is the dummy variable which takes the value zero for the pre-2001 period and one otherwise. We expect the coefficient of ULC to be negative, that is to say, the lower the ULC, the higher the export, *ceteris paribus*. The sign of Y is expected to be positive. This can be interpreted as such that growth in world export volume is expected to affect Turkey's export positively. The Crisis variable is used in order to take into account the omitted factors other than wage, productivity and REER that determine the export volume after 2000. The coefficient of crisis is expected to have a positive sign. Following Edwards and Golub (2004), we use two different specifications to test the determinants of export considering the unprecedented export growth in recent years.

In the second model we decompose the ULC into its two components, wage and productivity.

$$X_{it}=\alpha + \beta_1 X_{i,t-1} + \beta_2 Wage_{it} + \beta_3 Productivity_{it} + \beta_4 Y_{it} + \beta_5 Crisis_{it} + \epsilon_{it} \quad (3)$$

where wage is the log of the wage index, and productivity is the log of the labor productivity index. The wage coefficient is expected to be negative while the productivity coefficient is expected to be positive.

Finally in the third model, the augmented ULC model, we extend the model by including the REER so as to see the impact of exchange rate on Turkish export performance and explore critically the current debate on the adverse impact of overvalued currency on Turkey's export.

$$X_{it}=\alpha + \beta_1 X_{i,t-1} + \beta_2 Wage_{it} + \beta_3 Productivity_{it} + \beta_4 REER_{it} + \beta_5 Y_{it} + \beta_6 Crisis_{it} + \epsilon_{it} \quad (4)$$

where REER is log of the CPI-based REER. Since an increase in the REER implies an appreciation of the Turkish currency a negative sign of REER is expected. Since the variables are in logs, the coefficients represent elasticities.

Each equation is estimated using the dynamic panel data technique, so that variations over both the cross section and time series dimensions are jointly considered in a dynamic manner. There are various advantages of using panel data estimation. First, panel data estimation considers variations over both the cross-section and time series dimensions jointly. This is not possible in pure cross-sections or in pure time series data. Second, panel data estimation improves coefficient estimates by increasing the power of the tests.

Following the Edwards and Golub (2004) article, the lagged value of export is used as an explanatory variable as well as others in estimations. An econometric model which contains the lag values of a dependent variable as an explanatory variable has a dynamic character in nature. In order to have unbiased estimation coefficients, these types of models require the use of generalized method of moments (GMM) dynamic panel data technique developed by Arellano and Bond (1991)[5]. The OLS estimation technique cannot be used in a dynamic model because of two

[5] See Baltagi (2001) for the details of the Arellano and Bond (2001) study and the other estimation techniques of dynamic panel data models.

reasons. First, the *strict exogeneity of the regressors* assumption does not hold in the dynamic model. Second, the right hand side of the regression equation is correlated with the disturbance term which causes the OLS estimates to be biased upward and inconsistent.

Arellano-Bond estimators have one- and two-step variants. The one-step GMM estimator is efficient when the errors are homoscedastic and not correlated over time. The two-step estimator is efficient under more general conditions, like heteroscedasticity. However, in small samples the estimated standard errors of the two-step GMM estimator tend to be too small and in practice, the asymptotic standard errors for the one-step estimator are more reliable for making inferences in small samples. Hence, Arellano and Bond recommend using one-step results for inferences on coefficients.

If the error term at time t has some feedback on the subsequent realization of an explanatory variable then this explanatory variable is a predetermined variable. Since unforecastable errors today might affect future changes in the ULC, wage, productivity, and REER, we might suspect that the log of the ULC, the log of the wage, the log of the productivity, and the log of the REER are predetermined.

In Table 1, we present the empirical findings for Turkish manufacturing exports based on equations (2), (3) and (4). The *Sargan test* shows the validity of the instruments in the sense that they are not correlated with the errors in the first-differenced equation. Based on the Sargan results we fail to reject the null hypothesis that the over-identifying restrictions are valid in all cases. *Average autocovariance in residuals of order 1 is equal to 0* shows the first order autocorrelation in residuals. *Average autocovariance in residuals of order 2 is equal to 0* shows the second order

autocorrelation in residuals[6]. The validity of the GMM estimation is based on the condition of no second-order autocorrelation. The results confirm that there is no second-order autocorrelation. The *Wald test* shows that all coefficients except the constant are zero. Based on the Wald test we reject the null hypothesis of joint non-significance in all cases at the 1-percent or 5-percent level.

In the first model, the coefficients of lagged export, ULC and the world income have the correct sign and they are significant. High coefficient of the world income implies that the manufacturing export increase in Turkey may result of an overall increase in the manufacturing export of the world. Significance of this coefficient also shows that Turkey has integrated into the world economy. We find that the manufacturing export intensity is negatively related to ULC, indicating that a high ULC hurts Turkey's manufacturing export performance. The positive and significant coefficient of world GDP can be interpreted as such that an increase in the world GDP affects Turkey's export positively and significantly. On the other hand, the crisis is insignificant.

In the second model, all variables have the expected signs and only the variable crisis is insignificant. Finally, in the third model, all variables have the expected signs and the variables other than the crisis and REER are statistically significant. This gives support for the hypothesis that the exchange rate policies may not be successful in promoting export growth. Moreover, acclaimed exchange rate appreciation may not be as significant as commonly pronounced. On the other hand, although the REER is not statistically significant the coefficient of it is high, indicating that other variables may capture the effect of REER. In addition, since the

[6] First-order autocorrelation in the differenced residuals does not imply that the estimates are inconsistent, but the second-order autocorrelation would imply that the estimates are inconsistent.

variable crisis is insignificant in all three models the factors other than wage, productivity and REER do not have a direct effect on the export volume after 2000.

TABLE 1: Dynamic Panel Data Estimations of Export Function

	Model 1	**Model 2**	**Model 3**
Dependant Variable	LNEXPORT	LNEXPORT	LNEXPORT
Estimates			
$Export_{t-1}$	0.681***	0.642***	0.644***
	(0.059)	(0.054)	(0.053)
	[0.000]	[0.000]	[0.000]
ULC	-0.153***		
	(0.031)		
	[0.000]		
Wage		-0.150***	-0.154***
		(0.042)	(0.043)
		[0.000]	[0.000]
Productivity		0.109***	0.106***
		(0.040)	(0.040)
		[0.007]	[0.009]
World income	0.444***	0.415**	0.566**
	(0.167)	(0.164)	(0.253)
	[0.008]	[0.011]	[0.025]
REER			-0.333
			(0.420)
			[0.427]
Crisis	0.016	0.003	-0.098
	(0.047)	(0.046)	(0.135)
	[0.731]	[0.948]	[0.468]
Constant	0.091***	0.100***	0.124***
	(0.015)	(0.018)	(0.036)
	[0.000]	[0.000]	[0.001]
Sargan test	chi2(97)=114.00	chi2(150)=142.62	chi2(203)=142.68
	Prob>chi2=0.1145	Prob>chi2=0.6534	Prob>chi2=0.9996
1. order autocorrelation	z = -5.24	z = -5.27	z = -5.32
	Pr>z = 0.0000	Pr>z = 0.0000	Pr>z = 0.0000
2. order autocorrelation	z = -0.16	z = -0.09	z = -0.06
	Pr>z = 0.8704	Pr>z = 0.9280	Pr>z = 0.9494
Wald test	chi2(4)=201.61	chi2(5)=231.45	chi2(6)=234.88

Note: The first parenthesis below the estimated coefficients is standard errors and the second one is the Z statistics.

***, ** indicate statistical significance at the 1 %, and 5 % levels, respectively.

To conclude it can be said that real exchange rate depreciation in the Turkish exchange rate does not induce a huge increase in export. Since the ULC is the basic determinant, for obtaining a sustainable and stabilized export growth, public and private policy measures toward inducing productivity growth need to be given priority.

In addition to an overall increase in total manufacturing exports, what a country exports is also crucial. In today's world, "it matters a great deal today whether a country specializes in the production of potato chips or micro chips" (Haque, 1995: 22). To this end, we classify sectors as rising and declining sectors based on the percentage increase in export volume in the last four years in order to analyze the technological composition of Turkish manufacturing exports.

TABLE 2: Rising and Declining Sectors

	ISIC Rev.3	relative position	ranking
15	Food products and beverages	declining	16
16	Tobacco products	rising	9
17	Textiles	declining	21
18	Wearing apparel	declining	22
19	Luggage, saddlery and footwear	declining	20
20	Products of wood and cork	rising	5
21	Paper and paper products	declining	15
22	Printing and publishing	declining	17
23	Coke, petroleum products and nuclear fuel	rising	1
24	Chemicals and chemical products	declining	13
25	Rubber and plastic products	rising	8
26	Other non-metallic minerals	declining	19
27	Manufacture of basic metals	rising	2
28	Manufacture of fabricated metal prod (exc machinery)	rising	6
29	Manufacture of machinery and equipment	rising	10
30	Office, accounting and computing machinery	rising	7
31	Electrical machinery and apparatus	rising	4
32	Communication and apparatus	declining	18
33	Medical,precision and optical instruments, watches	declining	12
34	Motor vehicles and trailers	rising	3
35	Other transport	rising	11
36	Furniture	declining	14

Source: TURKSTAT and Authors' calculations

Table 2 highlights the fact that textiles and food processing are not particularly dynamic sectors given their low growth rates within the last four years. Sectors 23 (Coke, petroleum products and nuclear fuel), 27 (Manufacture of basic metals), 34 (Motor vehicles and trailers) and 31 (Electrical machinery and apparatus) can be considered to be the most dynamic export sectors. These rising sectors have become the new leading sectors in Turkey's export. Conventional sectors, 15 (Food products and beverages), 17 (Textiles), 18 (Wearing apparel) have started to lose their importance. These findings suggest that lately Turkey has experienced a structural change and its export has shifted from conventional and unskilled labor intensive sectors to more technology intensive sectors requiring more skilled labor. This structural change has important implications for the sustainability of long run export growth.

In this section, we run our third model for both the rising and the declining sectors. Our findings in Table 3 indicate that nominal wage is an important factor in the declining sectors while productivity is important in the rising sectors. Therefore, enhancing productivity appears to be the sole driving force for sustainable export growth.

In order to determine the robustness of our analysis for different ULC calculations, we have estimated the ULC both in terms of dollars and by using real wage indexes,[7] with similar explanatory variables. Our results are robust to these alternatives. In both types of calculations ULC is statistically significant. However, since both ULC and REER variables contain dollar estimating ULC in terms of dollar may cause multicollinearity between the ULC and REER. On the other hand since REER is a CPI based index estimating ULC by using the real wage index may

[7] In this model, nominal export data is also converted to real variable by dividing the US CPI.

also cause multicollinearity between the ULC and REER. Hence, our benchmark model is the most robust to these considerations.

TABLE 3: Dynamic Panel Data Estimations of Rising and Declining Sectors

Dependant Variable	**Rising sectors** LNEXPORT	**Declining sectors** LNEXPORT
Estimates		
$Export_{t-1}$	0.653***	0.676***
	(0.076)	(0.054)
	[0.000]	[0.000]
Wage	-0.115	-0.196***
	(0.070)	(0.048)
	[0.102]	[0.000]
Productivity	0.168***	-0.043
	(0.051)	(0.089)
	[0.001]	[0.623]
World income	0.527	0.657***
	(0.456)	(0.256)
	[0.248]	[0.010]
REER	-0.561	-0.049
	(0.757)	(0.427)
	[0.459]	[0.909]
Crisis	-0.209	0.042
	(0.244)	(0.139)
	[0.392]	[0.757]
Constant	0.151***	0.092***
	(0.062)	(0.038)
	[0.016]	[0.016]
Sargan test	chi2(203) = 75.75 Prob > chi2 = 1.0000	chi2(203) = 70.44 Prob > chi2 = 1.0000
1. order autocorrelation	z = -3.98	z = -4.22
	Pr > z = 0.0001	Pr > z = 0.0000
2. order autocorrelation	z = -0.18	z = 0.93
	Pr > z = 0.8536	Pr > z = 0.3508
Wald test	chi2(6) = 127.85	chi2(6) = 280.30

Note: The first parenthesis below the estimated coefficients is standard errors and the second one is the Z statistics.
***, ** indicate statistical significance at the 1 %, and 5 % levels, respectively.

Finally, following Edwards and Golub (2004), capacity utilization is included so as to test the "vent-for-surplus" hypothesis. The hypothesis implies that the rise in

export is partly in response to declines in domestic demand and accompanied by low rates of capacity utilization. Therefore a negative sign for this variable is expected. Capacity utilization data is taken from the CBRT on a sectoral basis. However, we cannot find a significant coefficient for the capacity utilization variable, while other results remain unaltered.

Conclusion

In this study, we have employed the dynamic panel data method to measure the causes of the manufacturing export increase in Turkey at the sectoral level for the 1996-2006 period. The results indicate that the main driving force behind the Turkish export growth after 2000 is productivity. In addition to this main result, the findings of the study also indicate that the rise in nominal wages has negatively affected export. Hence, one can say that promoting productivity is required to provide a sustainable export growth in the manufacturing sector. On the other hand, overall increase in the world's manufacturing export has an important effect on the recent success of the Turkish manufacturing export.

Another interesting result obtained from the empirical analysis is that Turkey experienced a structural change and its export shifted from conventional and unskilled labor intensive sectors to more technology intensive sectors requiring more skilled labor.

Nominal wage is an important factor in the declining sectors while productivity is important in the rising sectors. Since traditional sectors such as textile are not sensitive to productivity they appear to suffer more from the rising wages due to the appreciation of exchange rate.

Finally, there are arguments that overvalued currency reduces export growth. However, we could not find a statistically significant effect of exchange rate on export. If the improvement in productivity is sustainable, export growth can be sustainable as well even in the case of appreciated Turkish currency

CHAPTER 2

THE COMPETITIVENESS OF TURKEY WITH RESPECT TO THE SLOVAK REPUBLIC FOR THE 1995-1999 PERIOD

Introduction

During the 1960s and 1970s, Turkey was a fairly closed economy and adopted an import substitution industrialization strategy. This policy provided a process of rapid but unsustainable economic growth due to high government protection. In addition, Turkey confronted several external and internal shocks mainly because of the considerable rises in oil prices in this period. This led economic growth to slow down and the inflation rate to increase. Towards the end of the 1970s a stabilization and structural adjustment program was implemented because of a balance-of-payments crisis in this period. In January 1980, the government announced a program that intended to adopt an export-oriented industrialization strategy. The promotion of export, the liberalization of foreign trade regime, and the encouragement of private sector activities were the main objectives of the new strategy.

The integration of the Turkish economy with world markets and the promotion of export have been the main stimulus behind all governments' economic policy after this date. Within this context, the beginning of the 1980s can be considered as a turning point in the economic history of Turkey. Nevertheless, the 1990's were the lost decade for Turkey in economic terms. In addition to high inflation rates (80%) and depreciation of the exchange rate (100%) in the 1990s, GDP per capita in 2001 was almost the same GDP per capita as in 1993.

The implementation of reforms after trade liberalization in the early 1980s both stimulated private sector activity and improved the structural factors for

international competitiveness. The private sector's share in manufacturing industry increased drastically and the sectoral structure of exports altered considerably in favor of manufacturing products. Moreover, the composition of manufacturing export changed from low technology products to more technology intensive products. This led to strong export growth. In this period, the Turkish economy enjoyed an export-led growth. In the 1981-87 period, export revenues increased 15% per year on average. On the other hand, real exchange rate appreciation after 1988 caused a sharp increase in the real cost of labor. Export performance slowed down because of the appreciation of the Turkish currency after this year. This trend led the economy to become less competitive.

The holding of foreign currency deposits by Turkish citizens was allowed in 1984. The process of capital account liberalization which started in 1988 was completed before the end of 1989. Although the capital account liberalization in 1989 was another step towards the integration of the Turkish economy with world markets, it had a negative effect on export performance by causing the overvaluation of Turkish currency because of excessive borrowing. Uncontrolled financial liberalization in these years prepared the basis for the 1994 crisis. In the 1989-1994 period, the real exchange rate appreciation was no less than 20%. Hence, the increasing rate of export growth showed a relative slow down in the 1990s. High interest rates in addition to the appreciation of Turkish currency have been the main reasons for the short-term capital movements into Turkey. In this regard, the 1994 crisis was a "*hot money*" crisis. After the 1994 crisis, the devaluation of Turkish currency was more than 50% against the US dollar. The Central Bank lost half of its reserves, interest rates reached 400%, and the inflation rate climbed up three digit levels.

An incomplete Customs Union (CU) between Turkey and the EU was brought into existence on 1 January 1996 after Turkey's application for EU membership in 1987. Excluding iron and steel products, unrestricted circulation of manufacturing goods and processed agricultural products were allowed between Turkey and the EU based on the CU. The CU agreement included neither the agricultural nor services sectors. Besides elimination of the custom duties and charges and prohibition of the quantitative restrictions, Turkey agreed on the establishment of the common tariff of the EU with respect to third countries. This agreement led Turkey to face a sharp increase in competitive pressures that made it possible for many people to talk about the positive effects of the CU in the 1990s. The establishment of the CU did not initially lead to a considerable rise in the trade volume between Turkey and the EU. However, the reverse is true for after 2002[8].

The crises in Asia and Russia in 1997 and 1998, the two severe earthquakes taking place in the Marmara region in 1999 were certain global and domestic factors which affected the trade performance of Turkey after 1996. In addition, the crises in November 2000 and February 2001 adversely affected the economic conditions of Turkey. Because of these developments, Turkey faced with serious declines in import demands during 1999 and 2001.

Turkey's export performance needs to be investigated with a comparative view. Analyzing the trade dynamics of new EU members with respect to Turkey is useful to understand Turkey's integration process into the EU market in terms of international trade. Since Turkey is a developing country its relative position with respect to a developed one is not an interesting case. When Turkey's performance is compared to that of Middle Eastern and North African countries Turkey has the most

[8] See Togan (2005) for the reasons of this fact.

competitive manufacturing industry[9]. On the other hand, when Turkey is to be compared with the new EU members and other newly industrialized countries the comparison becomes more interesting due to the common characteristics of these countries with Turkey.

The Czech Republic, Hungary, Poland and Slovakia became members of the EU in 2004. Turkey and these countries have almost the same characteristics. They all passed to more technological and skilled labor intensive sectors from the conventional ones. However, in addition to data availability, an interesting integration case of Slovakia in the region has stimulated us to compare Turkey with the Slovak Republic. This paper primarily employs the relative unit labor cost (RULC) comparison to assess the competitiveness of Turkey with respect to Slovakia.

The integration of Slovakia to the global economy has gathered momentum over the last decade and the economy has transformed in the post-communist era. In the last six years, due to radical economic reforms Slovakia has become one of the fastest-growing economies in Europe. A 19 % flat tax rate reform and the structural changes were made in order to make the country a viable place for FDI. In the post-communist transformation period, Slovakia has attracted a large amount of foreign investment mainly in the manufacturing industry of automotive production. The automotive industry is the single most important manufacturing sector in the economy. In 1998, slightly more than 20% of total exports consisted of automotive industry while it reached 30% in 2006.

It is important to analyze the motivations behind automotive FDI in Slovakia. First, Czechoslovakia had the strongest tradition in car manufacturing among the

[9] See Albaladejo (2006) for detail.

CEE countries in the Communist era. Skoda, whose establishment dates back to the nineteenth century, was the first manufacturer of cars in this region. Hence, Czechoslovakia's tradition in automobile manufacturing is one of the most important factors in the flow of foreign investment in automotive production to Slovakia. Cheap, productive and skilled labor in Central Europe is another factor. For example, PricewaterhouseCoopers Automotive Institute research indicates that the labor cost advantage of Slovakia in the manufacturing sector as opposed to the German wage levels will remain considerable for several decades to come (PricewaterhouseCoopers 2007: 5). In addition, the lack of a tendency of the labor force to go on strike is another crucial factor in the labor market structure of Slovakia. Because of all these reasons Slovakia is an attractive country for the investors in automotive sector.

Since labor in the automotive sector is much more productive than in the other sectors in manufacturing, the development of the automotive sector affected the economy's overall labor productivity. The relative importance of the automotive industry is another important reason of the considerable effect of the productivity growth on the whole economy. In this respect, FDI becomes the prime engine in labor productivity growth. FDI has brought its new technology and forced domestic firms to compete in a more dynamic environment. Although many development economists consider FDI as an important channel for the transfer of technology to developing countries, Turkey's FDI inflows per capita are well below that of the Slovak Republic. In addition, most of the FDI goes to the service sector rather than to the manufacturing sector in Turkey. Limited FDI in Turkey flowed mainly to the

manufacturing sector until the mid-1990s. However, the liberalization of the service sector substantially reversed this trend[10].

In this paper, the comparison of Turkey with the Slovak Republic is conducted mainly in terms of labor costs in manufacturing. When we look at the details of the Turkish export data it is obvious that the driving force behind the export growth is manufacturing. The share of manufacturing export was 89% in 1995 and 90% in 1999. Since each sector would be affected differently from the economic events an analysis of export performance on a sectoral basis is necessary to investigate the dynamics of export.

The main objective of this study is then to investigate the relative cost and relative productivity dimensions of the production in the manufacturing sector. We analyze Turkish manufacturing exports by using a panel data of 2-digit Standard Industry Classification (ISIC) industries for the 1995-1999 period. In this context, the effects of productivity, wage, FDI and capacity utilization are explored. This type of analysis provides valuable information about the comparative advantage of each sector in terms of relative labor cost by including both the cost and productivity part of labor in production. Methodologically, we use the dynamic panel data technique for the analysis.

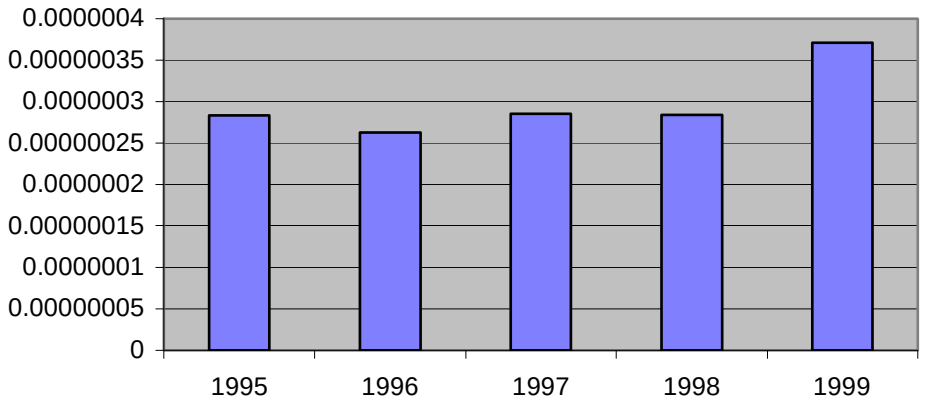
The remainder of this paper is organized as follows. The definition of RULC as a measure of international competitiveness is given in Section 2. In section 3, some recent studies regarding the competitiveness of Turkish exports are reviewed. The data sources, models for manufacturing exports and estimation results are discussed in Section 4. Finally, Section 5 concludes.

[10] See Albaladejo (2006) for detail.

Unit Labor Costs as a Measure of International Competitiveness

In this section, we look at the relative wage and relative productivity of Turkey with respect to Slovakia for the 1995-1999 period. Figure 1 shows the relative dollar-based wages per production worker in the total manufacturing industry[11]. As it can be observed in the figure, there is no permanent rise or decline in relative wages for the whole period. However, when we look at the first and last years of the period, we see that Turkey has shown a tendency of increasing wage levels in manufacturing.

FIGURE 1: Relative Wages in Turkey with respect to the Slovak Republic



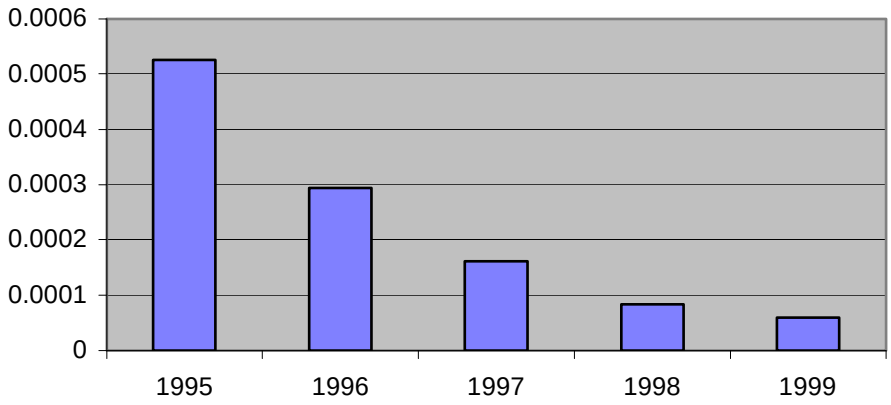
Source: Wages for Turkey are from TURKSTAT and wages for Slovakia are from OECD Stan database, exchange rates are from World Development Indicators and SIMA database of the World Bank.

Another important factor in the labor market is the changes in relative labor productivity in the manufacturing sector for the 1995-1999 period[12]. Productivity is calculated by dividing the production of each sector to number of employees in that sector. Relative productivity per worker in the total manufacturing sector can be seen

[11] Relative wage is calculated by dividing the dollar-based wage of Turkey to that of Slovakia.
[12] Relative productivity is calculated by dividing the PPP-adjusted productivity of Turkey to that of Slovakia.

in Figure 2. It is obvious that there is a continuous decline in relative labor productivity for Turkey in this period

FIGURE 2: Relative Productivity in Turkey with respect to the Slovak Republic



Source: Productivity for Turkey is from TURKSTAT and productivity for Slovakia is from OECD Stan database, PPPs are from World Development Indicators and SIMA database of the World Bank.

Comparing wages per worker in the manufacturing industry is not an appropriate criterion to conduct a labor cost competitiveness determination between Turkey and Slovakia. While nominal wage levels incorporate exchange rate effects they exclude the purchasing power parity (PPP) factor. However, this is a crucial consideration when comparing the competitiveness of a country in an international context. Moreover, unit labor cost (ULC) which is equal to the ratio of wages to labor productivity covers both of the factors stated above. The ULC measure takes both the wage and productivity changes into consideration simultaneously.

In this paper, we calculate relative unit labor cost (RULC) rather than wage rates in each manufacturing sector for two countries. Turner and Van't Duck (1993) and Turner and Golub's (1997) survey of the literature reach the conclusion that the RULC is the best single indicator of competitiveness in the manufacturing sector. In

addition, as argued by Turner and Golub (1997), "in a world where capital is mobile and production is footloose between countries, it is the relative price of non-tradable *inputs*, notably labor, rather than *outputs* that matters." Because of the lack of labor mobility in the international context, the RULC is the most important cost element determining the international competitiveness of an industry. Moreover, since both Turkey and Slovakia are labor abundant countries it is reasonable to emphasize the labor side of the production. This approach is especially worthwhile in our case where labor costs are still an issue of contention.

As the most important measurement of international competitiveness, the ULC has been widely used for international comparisons of cost competitiveness. In the Key Indicators of the Labor Market (KILM) database, which is a multi-functional research tool of the International Labor Organization (ILO), the ULC is defined as "the cost of labor required to produce one unit of output in a particular industry, sector or the total economy". In addition to its clear intuitive appeal, the ULC is defined as the ratio of labor compensation per unit of labor (measured as the wage per employed person or per hour worked) to the productivity of labor (measured as output per employed person or per hour) as follows:

$$ULC^{D(U)} = [LCH^{DD} / ER^{DU}] / [OH^{D(D)} / PPP^{DU}] \quad (1)$$

where $ULC^{D(U)}$ is unit labor cost of country D in terms of dollars, ER^{DU} is the exchange rate between country D and the United States, PPP^{DU} is the purchasing power parity between country D and the United States, LCH^{DD} is the wage per hour in country D in prices of D and $OH^{D(D)}$ is the output per hour in country D in prices of country D.

Equation (1) states that countries with a low level of ULC relative to other countries are considered as cost competitive. The ratio shows that a country can stimulate its cost competitiveness either by decreasing its wage level (the numerator) or by raising the labor productivity (the denominator). In this respect, changes in ULC reflect the net effect of changes in wage level and labor productivity.

Calculation of the ULC indices is possible both in terms of the domestic currency basis and in US dollars (common currency). Since we are comparing Turkey with Slovakia we convert wages to common currency by using the official exchange rate and labor productivity to common currency by using purchasing power parity. Note then that by construction, exchange rate is not used for the conversion of labor productivity in equation (1); because exchange rate fluctuations affect labor costs in a common currency but not the physical productivity of labor.

The RULC indicator for Turkey is calculated as ratio of ULC of Turkey and ULC of Slovakia:

$$RULC = ULC_{TR} / ULC_{SR} \qquad (2)$$

where ULC_{TR} is the ULC of Turkey and ULC_{SR} is the ULC of Slovakia.

Relative unit labor cost (RULC) is the key relative price in the Ricardian model. A rise in RULC is interpreted as a decrease in the competitiveness of Turkey and a decrease of relative labor costs is interpreted as an increase of the competitiveness of Turkey compared to Slovakia. It is worth emphasizing that the equation can also be reversed with the ULC of Slovakia in the numerator and the ULC of Turkey in the denominator. In this case the rise and decline in RULC is interpreted oppositely.

Turkey's competitiveness with respect to Slovakia could improve if one of the following conditions holds: 1) Turkey's labor productivity increases relative to

Slovakia, 2) wages in Turkey decline or 3) the Turkish currency depreciates. When the cost competitiveness of Turkey improves we expect exports to increase and import to decline for the relevant sectors. It is also worth remembering that while the competitiveness of each individual sector depends on the wages and productivity in that sector with respect to Slovakia, the exchange rate simultaneously affects all the sectors.

A Survey of Export Studies

In this section some recent studies regarding the competitiveness of Turkey and the export structure of the Slovak Republic are reviewed. Analyses of the international competitiveness of Turkey are unfortunately not widely available. Two types of competitiveness measures are used for Turkey. The first one is the revealed comparative advantage (RCA) measure (Yılmaz, 2003; Erlat and Erlat; Filiztekin, 2005; Kaya, 2006), and the second one is the unit labor cost (ULC) measure (Keyder, Sağlam and Öztürk, 2004; Aysan and Dinçsoy, 2006).

Yılmaz (2003) analyzes the competitiveness of Turkey with respect to Bulgaria, the Czech Republic, Hungary, Poland and Romania and the EU15 for the period between 1996 and 1999. He mainly employs the RCA index developed by Balassa (1965) for his analysis. The main emphasis is placed on the technological characteristics of the manufacturing sectors. He uses the Comparative Export Performance (CEP), Trade Overlap (TO), and Export Similarity (ES) approaches in addition to the RCA index. He concludes that Turkey and the five transition countries have a comparative advantage in exporting raw material intensive products. Within these six countries only Hungary has a comparative advantage in exporting

easily imitable research-oriented products. Bulgaria and the Czech Republic are competitive in capital-intensive products. Only the Czech Republic and Hungary in comparison to the other four countries are trying to close the industrialization gap with the EU15. Turkey's export structure is similar to Romania, Poland and partly Bulgaria, indicating that Turkey has a comparative advantage in raw material and labor intensive products and has comparative disadvantages in the difficultly imitable research oriented products and in the easily imitable research- oriented products.

Erlat and Erlat examine the comparative advantage of Turkish export with respect to the European Union market for the 1990-2000 period. In their study, they analyze the RCA performance of Turkey's 3-digit exporting sector with regard to EU15. They use two different classifications of sectors. The first classification of data depends on the *traditionality index*. This index discriminates sectors that exhibit a high export accomplishment at the beginning of a given period (traditional sectors) and those that show such an accomplishment towards the end of the period (non-traditional sectors). The second classification is based on the technological nature of the sectors. This classification includes *Raw material-intensive goods, Labor intensive goods, Capital-intensive goods, Easy-to-imitate research-intensive goods, and Difficult-to-imitate research-intensive goods.* Their findings indicate that when the technological categories of the sectors are taken into account; five countries (Belgium, Denmark, Finland, Greece and Spain) show a similar pattern with Turkey. However, when the shares in actual exports are concerned, only Belgium shows a similar pattern with Turkey. Another conclusion is that when the traditionality dimension is introduced, the traditional sectors are dominant. Nevertheless, shares of the traditional sector are decreasing while the shares of non-traditional sectors are rising. In addition, Raw Material Intensive Goods is the dominant category for the

traditional sectors and Labor Intensive Goods is the dominant category for nontraditional sectors. Labor Intensive Goods is the dominant category in both cases if export shares are considered.

Filiztekin (2005) analyzes the changes in the comparative advantage of industries in the Middle Eastern and North African (MENA) countries relative to the EU members and selects developing countries covering the period 1991-2003. This paper uses RCA across industries for this analysis and shows that MENA countries have a comparative advantage mostly in lower technology sectors, agriculture, raw material and traditional industries. In contrast to MENA countries Turkey has a lower specialization. In this respect Turkey's structure is similar to that of non-EU countries. His findings also indicate that the evidence partly supports endogenous growth and new economic geography models.

The purpose of Kaya (2006) is to determine the Turkish manufacturing sectors that have a comparative advantage in export with respect to EU15 and EU10 and the countries such as Bulgaria and Romania. First, Turkish export specialization value is calculated in SITC Rev 3 classification by using the Balassa index over the period 1991-2003. Then, Turkish industries that have a comparative advantage are determined in accordance with SITC classification. His findings show that Turkey is specialized in labor intensive goods, and easy-to-imitate research-intensive goods.

There are two important deficiencies of the RCA index. First, since an industry which is competitive at a point in time does not always remain competitive, the RCA index does not take the dynamic comparative advantage into consideration. Second, the RCA index cannot measure the deriving factors behind competitiveness.

Keyder, Sağlam and Öztürk (2004) employ the unit labor cost (ULC) based competitiveness index rather than the RCA index for the whole manufacturing sector

in order to compare Turkey with its 15 main trading partner countries covering the 1994-2003 period. While the unit labor cost index calculated for Turkey is lower than those of its trading partners, the ULC based competitiveness index indicates a significant cost based advantage for Turkey, particularly after the February 2001 crisis. Higher relative productivity and lower relative dollar based wages with respect to its trading partners lead to lower unit labor costs in Turkey. This provides a competitive advantage to Turkey. For the relevant period, the overvaluation of the Turkish currency is compensated by the reduction in ULC. Another important finding is that higher growth rates of output did not affect employment because of the rise in productivity. One of the most important deficiencies of the paper is that instead of using an econometric model for the analysis, their findings depend on the simple percentage change in the wage, productivity and ULC for Turkey and its trading partners. Second, their analysis is not a sectoral one. This tends to hide much of the variation at the sectoral level. However, since the economic events affect each sector differently and an aggregate trade analysis hides the dynamics at the sectoral level, a sectoral analysis of export performance is required to examine the structure of the export. Hence, we use an econometric model with a sub-sectoral manufacturing data.

Finally, Aysan and Dinçsoy (2006) investigate the competitiveness of Turkey in the manufacturing sector by using the ULC comparison with respect to the transition countries including Poland, Hungary, the Czech Republic and Slovakia. In contrast to the pure wage rate comparison, Turkey exhibits a better performance from the countries in the sample with regard to ULC. In addition to this main result, the paper also examines the ULC for the rising and declining sectors in the

manufacturing sector. The most important drawback of this paper is that it does not employ any econometric model for the analysis.

A report by Jakubiak and Kolesar investigates the recent investment in the automotive industry and analyzes how the economy's overall productivity and growth has been influenced by the developments in the automotive sector in Slovakia. Since the country has changed its position from a relatively backward one to the transition frontrunners, the case of Slovakia is interesting. The authors conclude that reforms and liberalization are the two crucial factors in attracting automotive investments to Slovakia. Factor endowments and current industrial policies have also played a role. After the initiation of the investment projects they had a significant impact on the growth of exports and employment. It is estimated that the automotive industry is to increase its production three times in the next two years.

It has been argued in the 2005 Economic Survey of the Slovak Republic that "sound macroeconomic policy, assertive product, capital and labour market liberalisation, and fundamental tax and welfare reform have transformed the Slovak business environment in recent years." In addition, FDI became the driving force behind capacity and productivity growth. This causes the economy to follow a strong and well-balanced growth path. On the other hand, unemployment is still high and economic activities in the non-tradable sector are underdeveloped and less productive.

Altzinger (1998) assesses Austria's investment activities in the Central and Eastern European Countries (CEECs). Since 1989 Austria's investment in these countries (Hungary, the Czech Republic, Slovakia, Slovenia) has intensified. In 1995, 91.1% of Austria's overall FDI went to its four adjacent countries, Hungary,

the Czech Republic, Slovenia and Slovakia. Geographical proximity and close historical and cultural ties are the two important reasons why even small and medium-sized Austrian companies invest in these countries. Particularly, in the core industrial sectors (metal products, mechanical products, electrical and electronic equipment), the main objective of these investments is the low labor cost. Although Austria's international financial capabilities are not very large its FDI-stock-share is 23.6% in Slovenia, 21.4% in Slovakia and 19.6% in Hungary. Based on these shares Austria is the first in Slovenia and Slovakia and second in Hungary (UN/ECE, 1996).

The purpose of Vagac, Palenik, Kvetan, and Krivanska's (2001) paper is to examine the effect of EU accession[13] on the foreign trade performance of four Central and Eastern European (CEE) transition countries. These are the Slovak Republic, Hungary, Poland and the Czech Republic. Their simulation analysis concludes that the Slovak economy will become even more open indicating that domestic enterprises face additional pressure to cope with competition. Therefore, it is important to constitute a motivating business environment which will stimulate domestic production and enhance the competitiveness of Slovak exports in the pre-accession period. This should be done by not only through direct support to exporters in the form of loans and credits, but also by realizing the structural reforms to improve the business environment in Slovakia. Their analysis also indicates that accession to the EU will not considerably change the trade balance of the Slovak Republic. They expect an additional increase of FDI inflow especially in the manufacturing industry after EU accession.

Based on the above mentioned studies and others the automobile industry is becoming a driving force of economic development in the Czech Republic, Hungary,

[13] Slovakia was a candidate country in 2001. It became an EU-member in 2004.

Poland, and the Slovak Republic. This paper examines Turkey's international cost competitiveness in manufacturing, particularly with respect to labor costs, and investigates the quantitative relationships between Turkish cost competitiveness and exports of manufactured goods at an industry level. The key question is whether Turkey is competitive with respect to the Slovak Republic. The paper extends the ULC papers on the competitiveness of Turkey in two dimensions. First, to the best of our knowledge, an econometric analysis of ULC in Turkey at the sectoral level has not been employed before. Second, this is the first study investigating the competitiveness of Turkish manufacturing exports with a dynamic panel data model.

Empirical Model

In this section we investigate the evolution of the comparative advantage of industries in Turkey in comparison to the Slovak Republic for the 1995-1999 period. Export performance is measured by the ability of domestic firms to compete in the international market. Various factors such as productivity, wages, technological innovation, foreign direct investment (FDI) and exchange rates affect the export performance of an industry. In this study, emphasis will be placed on the cost competition particularly with respect to labor costs. As argued by Turner and Golub (1997), "in a world where capital is mobile and production is footloose between countries, it is the relative price of non-tradable *inputs*, notably labor, rather than *outputs* that matters." Because of the lack of labor mobility in the international context, the RULC is the most important cost element determining the international competitiveness of an industry. In addition, since both Turkey and the Slovak Republic are labor abundant countries it is reasonable to emphasize the labor side of

the production. This approach is especially worthwhile in our case where labor costs are still an issue of contention.

In this study, we use sectoral export, wages, labor productivity[14] and capacity utilization data for the manufacturing industry. The data covers the time period of 1995 to 1999. We analyzed the competitiveness of Turkish exports on a two-digit level, based on the International Standard Industry Classification (ISIC). The data set related to the exports, wages, productivity and capacity utilization of the manufacturing sector for Turkey was obtained from the Turkish Statistical Foundation (TURKSTAT). On the other hand, the wage and productivity data for the Slovak Republic was obtained from the OECD Stan database. The exchange rate and PPPs for both countries are from the World Development Indicators and SIMA database of the World Bank.

We include world GDP in our model so as to measure the export growth that arises neither from productivity nor from price competitiveness but from the growth in the world economy. World GDP data is obtained from the Groningen Growth and Development Centre (GGDC) of the University of Groningen covering the total GDP of 129 countries in millions of 1990 US dollars.

In order to analyze the competitiveness of Turkish exports with respect to the Slovak Republic, we first run the following regression as a benchmark model.

$$X_{it}=\alpha + \beta_1 X_{i,t-1} + \beta_2 RULC_{it} + \beta_3 Y_{it} + \beta_4 CU + \epsilon_{it} \quad (3)$$

where *i* stands for sector and *t* stands for time period. The left hand side is the log of the volume of export. On the right-hand side $X_{i,t-1}$ is the log of the lag value of

[14] Productivity is calculated by dividing the production of each sector to the number of employees in that sector.

export, RULC is the log of the RULC which is obtained by dividing the ULC of Turkey to the ULC of Slovakia, Y is the log of the world GDP, and CU is the log of the capacity utilization. We expect the coefficient of RULC to be negative if Turkey is competitive with respect to Slovakia, and positive if the opposite is true. The expected sign of Y is positive. This means that growth in world GDP is expected to affect Turkey's export positively. The CU coefficient is expected to be negative.

In the second model we extend the first model by including the FDI. FDI data is taken from the Turkish Republic Prime Ministry Undersecretariat of Treasury.

$$X_{it}=\alpha + \beta_1 X_{i,t-1} + \beta_2 RULC_{it} + \beta_3 Y_{it} + \beta_4 CU + \beta_5 FDI + \epsilon \quad (4)$$

where FDI is the log of the foreign direct investment. The FDI coefficient is expected to be positive.

Finally in the third model, we decompose the RULC into its two components, relative wage and relative productivity.

$$X_{it}=\alpha + \beta_1 X_{i,t-1} + \beta_2 RelWage_{it} + \beta_3 RelProd_{it} + \beta_4 Y_{it} + \beta_5 CU + \beta_6 FDI + \epsilon_{it} \quad (5)$$

where RelWage is the log of the relative wage, and RelProd is the log of the relative labor productivity. The relative wage coefficient is expected to be negative while the relative productivity coefficient is expected to be positive if Turkey is more competitive with respect to Slovakia. Since the variables are in logs, the coefficients represent elasticities.

We estimated each equation using the dynamic panel data technique. This enables us to jointly consider variations over both the cross section and time series

dimensions in a dynamic manner. One of the advantages of using panel data estimation is that it considers variations over both the cross-section and time series dimensions jointly. Secondly, panel data estimation improves coefficient estimates by increasing the power of the tests.

Following the Edwards and Golub (2004) paper, we included the lagged value of export as an explanatory variable as well as other explanatory variables in our estimations. If an econometric model contains the lag values of dependent variables as explanatory variable, then it has a dynamic character in nature. The OLS estimation technique cannot be used in a dynamic model. The first reason is that the *strict exogeneity of the regressors* assumption does not hold in this type of model. Second, the correlation between the right hand side of the regression equation and the disturbance term causes the OLS estimates to be biased upward and inconsistent. To solve these problems, dynamic panel data models require the use of the generalized method of moments (GMM) dynamic panel data technique developed by Arellano and Bond (1991)[15].

Two variants of the Arellano-Bond estimators are one- and two-step GMM estimators. The one-step GMM estimator is efficient if the errors are homoscedastic and not correlated over time. The two-step estimator is efficient under more general conditions such as heteroscedasticity. Since the estimated standard errors of the two-step GMM estimator tend to be too small in small samples, Arellano and Bond recommend using one-step results for inference on coefficients. Hence, in practice, the asymptotic standard errors for the one-step estimator are more reliable for making inference in small samples.

[15] See Baltagi (2001) for the details of the Arellano and Bond (2001) study and the other estimation techniques of dynamic panel data models.

When the error term at time t has some feedback on the subsequent realization of an explanatory variable then this explanatory variable is called predetermined variable. Since unforecastable errors today might affect future changes in the RULC, relative wage, relative productivity, capacity utilization, and FDI, we might suspect that these variables are predetermined.

Table 1 shows that the empirical findings of our models depend on equations (3), (4) and (5). The *Sargan test*[16] denotes the validity of the instruments in the sense that there is no correlation between the instruments and the errors in the first-differenced equation. In our models, the Sargan test fails to reject the null hypothesis that the over-identifying restrictions are valid in all cases. *Average autocovariance in residuals of order 1 is equal to 0* points out the first order autocorrelation in residuals while a*verage autocovariance in residuals of order 2*[17] *is equal to 0* points out the second order autocorrelation in residuals[18]. The condition of no second-order autocorrelation is necessary for the validity of the GMM estimation. Our results verify that there is no second-order autocorrelation. Finally, the *Wald test* shows that all coefficients except the constant are zero. Based on the Wald test we reject the null hypothesis of joint non-significance in all cases at the 5-percent or 10-percent level.

In the first model, the coefficient of lagged export has the correct sign and it is significant. The RULC variable is significant and its coefficient has a positive sign indicating that the Slovak Republic is more competitive with respect to Turkey. The coefficients for world GDP and CU have the expected sign but they are both insignificant. The positive and insignificant coefficient of world GDP can be

[16] The Sargan test is valid when T≥4.
[17] First and second order autocorrelations is valid when T≥5.
[18] First-order autocorrelation in the differenced residuals does not imply that the estimates are inconsistent, but the second-order autocorrelation would imply that the estimates are inconsistent.

interpreted as such that Turkey's integration into the world economy is not complete yet.

In the second model, all variables have the expected signs and the new variable, FDI, has an expected sign but it is insignificant. Most of the FDI goes to the service sector in Turkey. The insignificance of this variable may stem from this phenomenon. Although many development economists consider FDI as an important channel for the transfer of technology to developing countries, our model indicates that Turkey cannot benefit from this process. Finally, in the third model, all variables have the expected signs and the lag value of export and the relative productivity is statistically significant at 5%. This means that the competitiveness of Slovakia comes from the success of its relative productivity with respect to Turkey. Finally, the capacity utilization variable is significant at 10% in this model. This variable is included in order to test the "vent-for-surplus" hypothesis. We find a negative and significant coefficient for this variable indicating that the rise in exports is partly in response to declines in domestic demand and accompanied by low rates of capacity utilization.

TABLE 1: Labor Cost Competitiveness of Turkey with respect to the Slovak Republic

Dependant Variable Estimates	**Model 1** LNEXPORT	**Model 2** LNEXPORT	**Model 3** LNEXPORT
$Export_{t-1}$	0.475*** (0.151) [0.002]	0.491*** (0.152) [0.001]	0.514*** (0.164) [0.002]
RULC	0.535*** (0.172) [0.002]	0.530*** (0.173) [0.002]	
Relative Wage			3722.484 (3065.772) [0.225]
Relative Productivity			-0.549*** (0.151) [0.000]
World income	0.605 (1.446) [0.676]	1.279 (1.757) [0.467]	2.326 (1.750) [0.184]
Capacity Utilization	-0.351 (0.399) [0.379]	-0.536 (0.505) [0.289]	-0.887* (0.457) [0.052]
Foreign Direct Investment		0.231 (0.344) [0.501]	0.135 (0.356) [0.704]
Constant	-0.330*** (0.118) [0.005]	-0.348*** (0.121) [0.004]	-0.324*** (0.088) [0.000]
Sargan test	chi2(21)=27.30 Prob>chi2=0.1613	chi2(29)=28.54 Prob>chi2=0.4893	chi2(37)=28.59 Prob>chi2=0.8377
1. order autocorrelation	z = -2.74 Pr > z = 0.0061	z = -2.70 Pr > z = 0.0069	z = -2.56 Pr > z = 0.0104
2. order autocorrelation	z = 0.10 Pr > z = 0.9202	z = 0.12 Pr > z = 0.9018	z = -0.11 Pr > z = 0.9153
Wald test	chi2(4)=16.35	chi2(5)=17.30	chi2(6)=27.79

Note: The first parenthesis below the estimated coefficients is standard errors and the second one is the Z statistics.
***, **, * indicate statistical significance at the 1 %, 5 % and 10% levels, respectively.

In order to determine the robustness of our analysis for different RULC calculations, we have estimated the RULC by excluding the PPP part with similar explanatory variables. Our results are robust to this alternative specification.

Conclusion

In this study, we have employed the dynamic panel data method to measure the competitiveness of Turkey with respect to the Slovak Republic in the manufacturing sector for the time period 1995-1999. The results indicate that Turkey is not competitive with respect to Slovakia and the relatively high performance of Slovakia is the result of its high relative productivity. In addition to this main result, the findings of the study also indicate that Turkey's integration into the world economy has not been completed yet.

Another interesting result obtained from our empirical analysis is that contraction in domestic demand after the 1994 crisis has partly had a positive effect on export growth. Finally, although many development economists consider FDI as an important channel for the transfer of technology to developing countries, our model indicates that FDI is not an important factor for the Turkish manufacturing industry for the relevant period. Since most of the FDI goes to service sector it does not have a significant effect on the manufacturing sector.

Although there are various problems such as low R&D activities, lack of specialized human capital, and lack of modern infrastructure in the manufacturing sector, this study shows that eventually low relative productivity is the most important factor in the poor performance of Turkey's competitiveness.

In spite of this gloomy picture, Turkey's potential for rising industrial competitiveness cannot be underestimated. It has a strategic location. Turkey is geographically close to the EU market, Central and Eastern European Countries, and Middle Eastern countries. It has a cheap and abundant labor and rich natural

resources. However, unless the necessary reforms are implemented it is impossible to have a competitive manufacturing sector in Turkey.

To conclude, it can be said that RULC is the basic determinant of export and in order to obtain a sustainable and stabilized export growth public and private policy measures to induce productivity growth must be given priority.

APPENDIX

TABLE A1

Detailed Turkish Export

	Exports by ISIC, Rev.3											
	Value 000 $											
	ISIC Rev.3	2006	2005	2004	2003	2002	2001	2000	1999	1998	1997	1996
	TOTAL	85141517	73476408	63167153	47252836	36059089	31334216	27774906	26587225	26973952	26261072	23224465
A	**AGRICULTURE AND FORESTRY**	3447710	3328814	2541777	2120690	1754287	1976410	1659092	2057511	2357425	2353848	2152577
01	Agriculture and farming of animals	3433842	3314031	2525828	2104662	1743890	1967606	1651912	2049297	2350866	2348640	2147424
02	Forestry and logging	13868	14784	15949	16028	10398	8804	7180	8214	6558	5208	5153
B	**FISHING**	130061	139500	103118	80746	51419	29745	24506	37896	17182	33171	26507
05	Fishing	130061	139500	103118	80746	51419	29745	24506	37896	17182	33171	26507
C	**MINING AND QUARRYING**	1142035	810241	649237	469089	387193	348652	400269	384993	363652	404261	368625
10	Mining of coal, lignite and peat	1182	2600	2317	1340	1453	3833	1640	801	294	337	694
11	Crude petroleum and natural gas	1131	12170	0	2773	3219	2929	4650	5137	2597	489	1
12	Uranium and torium ores	0								2		
13	Metal ores	467324	247949	186657	101048	101503	80950	127505	112059	110722	147766	117963
14	Other mining and quarrying	672399	547522	460263	363929	281018	260940	266473	266996	250036	255669	249968
D	**MANUFACTURING**	79886588	68813408	59579116	44378429	33701646	28826014	25517540	23957813	24064586	23312800	20525761
15	Food products and beverages	4315063	4271660	3349424	2649558	1880733	2016235	1835504	2039929	2356634	2734175	2455094
16	Tobacco products	181241	121787	78045	89833	99719	81052	123056	83331	68388	118231	95111
17	Textiles	9260744	8742704	7998061	6841165	5532758	4943497	4614078	4557626	4794000	4450117	3817823
18	Wearing apparel	10169116	9924749	9340151	8153895	6615232	5397509	5417141	5270104	5715620	5442138	4829702
19	Luggage, saddlery and footwear	435813	370192	327960	285836	214188	211786	189515	180893	271494	299168	220876
20	Products of wood and cork	331777	249941	203728	145984	118478	109402	63049	68496	71015	75108	68537
21	Paper and paper products	600206	559167	457442	367209	302575	241729	164294	148674	150018	154163	125667

TABLE A1 *Continued*

	ISIC Rev.3	2006	2005	2004	2003	2002	2001	2000	1999	1998	1997	1996
22	Printing and publishing	106852	105048	82146	66989	48737	42737	42645	47624	40819	40112	47725
23	Coke, petroleum products and nuclear fuel	3401368	2518943	1364348	953544	670126	416421	300716	315195	240626	179059	259199
24	Chemicals and chemical products	3475219	2818310	2556412	1926341	1580672	1480503	1397489	1234778	1277470	1362510	1244289
25	Rubber and plastic products	3010086	2485789	1958873	1464382	1084530	940519	781451	667851	685440	621233	510218
26	Other non-metallic minerals	2786214	2686826	2317150	1800400	1467603	1231260	1121223	957312	944522	931944	780908
27	Manufacture of basic metals	9318471	6887671	6815628	3884446	3239350	2921211	2247065	2063810	2197973	2597253	2233719
28	Manufac of fabricated metal prod(exc machinery)	3342349	2684603	2199705	1503095	932339	733472	660770	647923	664303	522021	461909
29	Manufacture of machinery and equipment	5990779	4865027	3913354	3118511	2077511	1564386	1375956	1211737	1107452	1000337	828739
30	Office, accounting and computing machinery	87652	69500	52137	40822	39665	52468	63096	60038	42619	28863	21287
31	Electrical machinery and apparatus	2811511	1932751	1575589	1220629	1057077	1038402	825248	692201	755875	743381	771656
32	Communication and apparatus	3084874	3150196	2883024	1947749	1574973	1002269	961870	770693	862119	469534	316493
33	Medical,precision and optical instruments, watches	242725	197504	173412	129203	88978	77352	75201	66834	75284	60997	56633
34	Motor vehicles and trailers	12673851	10226102	8812615	5436950	3602800	2656691	1745046	1614792	1049170	879948	975877
35	Other transport	1980224	1706833	1348708	1037310	528738	948202	882097	770888	315022	302558	155051
36	Furniture	2280453	2238104	1771206	1314580	944864	718910	631033	487083	378723	299949	249247
E	**ELECTRICITY, GAS AND WATER SUPPLY**	128202	103449	60173	20093	15841	20487	20386	14265	14911	11101	15488
40	Electricity, gas and steam	128202	103449	60173	20093	15841	20487	20386	14265	14911	11101	15488
G	**WHOLESALE AND RETAIL TRADE**	405146	279812	230758	182738	147246	127495	136408	133714	151160	144486	134515
51	Waste and scrap	405146	279812	230758	182738	147246	127495	136408	133714	151160	144486	134515
K	**OTHER BUSINESS ACTIVITIES**	425	258	1354	81	55	1276	403	156	491	975	23
74	Other business activities	425	258	1354	81	55	1276	403	156	491	975	23
O	**SOCIAL AND PERSONAL ACTIVITIES**	1350	926	1619	970	1400	4137	16302	881	4545	429	969
92	Recreational, cultural and sporting activities	1350	0	1619	970	1333	4099	16231	758	4224	214	848
93	Other service activities	0	926	0	0	68	38	71	123	322	214	121

Source: TURKSTAT

TABLE A2						
Summary Statistics						
Variable		**Mean**	**Std. Dev.**	**Min**	**Max**	**Observations**
Export	overall	1787453	2319151	21286.68	1.27e+07	N = 242
	between		1946108	50740.5	6934123	n = 22
	within		1322224	1848402	9945500	T = 11
Wage	overall	812.6433	619.2874	46.36995	2545.215	N = 242
	between		155.4722	550.0121	1165.765	n = 22
	within		600.2901	301.656	2224.096	T = 11
Productivity	overall	119.2263	35.16267	7.62432	241.5668	N = 242
	between		20.558	56.31561	160.2996	n = 22
	within		28.83259	35.74768	252.5671	T = 11
REER	overall	1.336.818	19.97734	101.7	4.66e+07	N = 242
	between		0	133.6818	3.88e+07	n = 22
	within		19.97734	101.7	4.66e+07	T = 11
World GDP	overall	3.88e+07	3901518	3.44e+07	171.4	N = 242
	between		0	3.88e+07	133.6818	n = 22
	within		3901518	3.44e+07	171.4	T = 11

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