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TRADE AND COMPETITIVENESS BETWEEN TURKEY AND THE EU: TIME SERIES EVIDENCE

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Trade and Competitiveness Between Turkey and the EU: Time Series Evidence[δ]

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Abstract

The paper basically aims to clarify the level of price competitiveness of the Turkish firms towards the EU Single Market in aggregate level. Thus it naturally examines the demand for exports and imports for Turkey in relation to the EU. In order to model the trade between Turkey and the EU, we employ a time series analysis, namely cointegration method with error correction and causality mechanisms, for the period 1963-2002. The paper also deals with the possible effects of factors such as structural breaks, integration of markets, product innovation, supply, and omitted variables as regards the significance and the magnitude of the income and price elasticities. In the light of our empirical findings, some policy implications are drawn.

Keywords*: trade, competitiveness, income and price elasticities, EU, Turkey, time series modeling, cointegration.*

JEL Clasification*: F11, F13, F14, F15*

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1. Introduction

The aim of this paper is to analyse the behaviour of the Turkish and the EU trade relationship by modelling exports and imports to understand the nature and the driving forces of the competition. In doing this, we focus on the estimation of aggregate export and import demand functions and hence on the determination of the relevant price and income elasticities, among others. It is well-known that the effectiveness of foreign trade policy is dependent on the significance and the size of the income and price elasticities of exports and imports (Goldstein and Khan, 1985). Traditionally, most researchers have assumed that foreign trade is determined by either income or price effects (or combination of both). This *orthodox view* has been influenced by traditional theories of balance of payments such as the *elasticity and absorption approaches*. These theoretical models emphasize the role of `price' and `income' effects in foreign trade. The essence of the elasticity approach is embodied in the famous *Marshall-Lerner* condition.[1]

Much of the recent debate focus on the following question. What is the driving force behind the rapid growth of the Newly Industrialised Countries (NICs) exports? The answer of this question lies in the estimated income and price elasticities which emerged from empirical studies of the demand for exports. In other words, the key point of the debate is the issue of whether this rapid export growth of some Less Developed Countries (LDCs) is to be regarded as reflecting high and statistically significant price elasticities, high and statistically significant income elasticities, or both.[2]

[1] The simple Marshall-Lerner condition states that, given a balanced current account, a devaluation will improve the balance of payments on current account, if and only if the sum of the price elasticities of domestic demand for imports plus foreign demand for exports exceeds unity (in absolute terms). Given the rather strong assumptions of the simple Marshall-Lerner condition, any result should be treated as `indicative' rather than `conclusive' unless a modified version of the simple Marshall-Lerner is implemented.

[2]The conventional explanation is that although price elasticities of demand for NIC exports are *low* (or insignificant), the world income elasticity of demand for the NICs' exports appear to be significant and *high*. One possible answer to the question of how it is that the NIC's have found themselves in a position of continuously facing highly income elastic demand curves comes from Krugman (1989) who suggests that the growth process of the NICs has been driven by a continuous process of product innovation and diversification. Krugman recognizes that the *close relation between growth rates and the relative size of income elasticities* could have two types of interpretation. On the one hand, income elasticities could determine growth by imposing a balance of payments constraint on demand. Differential growth rates could affect trade flows in such a way as to create obvious differences in income elasticities,on the other. Krugman dismisses the first explanation that growth may be demand-constrained by the balance of payments. Instead, he argues that faster growth in one country leads to a greater supply of exports. Accordingly, as a country's relative growth rate changes, its apparent income elasticities change too, maintaining the 45-degree rule. For a good discussion of it, see esp. Thirlwall (1991) and, Krugman (1989).

Trade modeling is an effective method to understand the driving forces behind the competition. However, non-price factors are not taken in to account by the orthodox trade models. Here in this paper we model the trade between Turkey and the EU by not only taking classical price and income effects but also including non-price factors such as product innovation, commodity composition effects, integration of markets and etc. This paper empirically models and investigates the EU-Turkey trade by using time series techniques. The organisation of the paper is as follows. Section 2 presents and discusses the review of the empirical literature as far as income and price effects of Turkey is concerned. Section 3 provides an evaluation of the Turkey-EU trade relations and post-liberalisation (i.e. post-1980) period of the Turkish foreign trade. A trade model is presented in Section 4. Section 5 describes the econometric methodology employed. Section 6 provides the data and reports the empirical results of the application of the theoretical model outlined to the EU-Turkey trade. The last section offers some conclusions and implications.

2. Empirical Review on Estimates of Income and Price elasticities for Turkey

Earlier Empirical Studies

As regards the income and price elasticities of demand for exports and imports for Turkey, the issue is controversial. An early study of Khan (1974), using annual data for the period 1951-1969, reports elastic export demand for income (1.62) and price (-1.41) variables. As far as the import demand equation is concerned, he provides high price elasticity (-2.72) and low income elasticity (0.55). Tansel and Togan (1987) for the period 1960-1983 and using annual data, find considerably high and significant price elasticities (-2.53) along with high and moderately significant income elasticities (2.18) for export demand for Turkey. Regarding import demand equation, they report a low price elasticity (-0.47) and high income elasticity (1.41). Uygur (1987), in line with others and as a part of his macroeconometric model of Turkey, estimates industrial exports and reports significant and quite high relative price (-2.55) and income (for OECD countries) (2.01) elasticities using annual data for the period 1960-1985. As regards import equation, he estimates significant and rather high income elasticity (2.82) and insignificant relative import price effect.

Wijnbergen *et al*. (1992) also estimate separate export demand equations (i.e. Middle East and OECD countries) for Turkey using annual data for the periods 1969-1984 (Middle East) and

1968-1984 (OECD). They report significant and extremely high price elasticity (-10.8), and significant and moderately high income elasticity (1.39) for export demand from Middle East countries. Regarding OECD countries' export demand for Turkish aggregate exports, they find significant and high price elasticity (-1.85), and significant and moderately high income elasticity (1.17). A study of Arslan and Wijnbergen (1993) estimate separate export demand equations for Turkey (i.e. export demand from oil-exporting countries (mainly Middle East countries) and from other countries (mainly OECD)] using annual data for the period 1969-1987 and 1967-1987 respectively. They report a significant and moderately high price elasticity (-1.15) and a significant and high income elasticity (1.50) for the export demand from OECD countries. On the other hand, they find a significant and moderately high income elasticity (1.36), and surprisingly high (and also significant) price elasticity (-7.73) implying the fact that the Middle East market seem extremely price competitive. Faini *et al*. (1992), using annual data for the period 1967-1983, estimates Turkish manufactured export demand equation, and report significant and extremely high relative price elasticities [(-8.89) with reference to LDCs and (-5.84, lagged one year) with reference to industrial countries (IC)]. They also report significant and rather high income elasticity (2.71). While testing if the "small country" assumption is valid or not for 23 LDCs, Faini *et al*. (1992) stress, among others, that the "small country" hypothesis could not be rejected for only Turkey, Indonesia, Kenya, Mexico, Paraguay and Singapore. Due to the reason that this result can be attributed to the lack of precision in the estimates, the authors tested for the opposite hypothesis, that export demand is totally price inelastic. As a result, only for Turkey the data lead to a clear rejection of the hypothesis of inelastic price.

In contrast to those rather significant and moderately high (in some cases very high) elasticities of price for export demand for Turkish exports, Ersel and Temel (1984) provide empirical evidence suggesting that Turkish exports are price inelastic. Their price elasticity of export demand lies between (-0.33) and (-0.66). The elasticity results mentioned above imply that both income and price factors are the significant determinants for Turkish export and import. Regarding the export demand equations, it is worth mentioning that both income and price elasticities are reported to be significant and highly or in some cases moderately elastic.[3]

[3]Compared to elasticity results of other studies in the literature, the price elasticities of export demand obtained by Ersel and Temel (1984) are quite low. This difference can stem from the fact that the authors derived their own price and quantity indices for exports.

The reliability of these earlier results is, however, questionable. Many of the empirical models are estimated in levels with lagged values of the explanatory variables. Since these variables contain unit-roots, the relationships may yield *spurious* regression results. In what follows, some recent empirical works employed rigorous time series modelling are presented.

Recent Studies

Utkulu (1995), using cointegration analysis, estimated long-run price estimates for Turkish exports and imports as –3.12 and –0.41 respectively. Low but significant income effects are also reported suggesting that both income and price effects have been the driving forces. Kotan and Saygılı (1999) estimate import demand function for Turkey by employing Engle-Granger method. Using quarterly data for the period 1987-1999, they found that import demand is price and income inelastic in the long run. The income elasticity of import demand was found 0.26, whereas exchange rate elasticity and domestic price elasticity of import was found 0.24 and 0.37 respectively. Şahinbeyoğlu and Ulaşan (1999), estimated export supply and demand function for Turkey using 1987-1998 sesional data. Their aim was to analyze the validity of historical studies as a reliable guide to the future trends in export. They considered real export demand as a function of real foreign income and real effective exchange rate. According to their model estimations, both price and income elasticities of real export demand (0.43 and 0.10 respectively) and supply function estmates are also inelastic. The estimation results indicate that in analyzing exports for the period after 1994, traditional export equations are not sufficient for forecasting and policy simulations. Variables such as uncertainty indicator, or investment have crucial roles in explaining exports. Senhadji and Montenegro (1999) estimated export demand elasticities for a large number of developing and industrial countries including Turkey. According to their results, for Turkey the long run price elasticities of demand is far greater than one (-4.72), i.e. very price elastic, whereas foreign income elasticity of demand less than one (0.51). Coşar (2002) estimated the export demand elasticities of foreign income, real exchange rate and sectoral production by using panel unit root and cointegration test for the period of 1989I-2000IV. According to the estimation results, the real exchange rate elasticity of total export demand is found to be less than one (0.42), whereas the income elasticity is found to be greater than one(4.5). The production elasticities of sectoral export demand are found greater than one for most of the manufacturing goods accept machinery.

In a very recent work, Neyaptı *et al*. (2003) estimated export and import functions of Turkey with the EU and non-EU Countries using panal data set. First they estimated income and price elastcities of exports and imports considering Turkish bileteral export. They measure income (2.0) and price elasticity (-0.66) (with respect to real exchange) of exports are both sicnificant. In accordance to their estimation, Turkish bileteral exports are income elastic but price inelastic. Similar results are obtained in the estimation of import function.While domestic income elasticity is estimated more than unity, relative price elasticity is found less than one. Then adding the customs union (CU) effect to the model, they observed that, while income elasticity of both exports and imports are lower for the EU countries (and especially in the CU priod), the effect of reel exchange rate on Turkey's exports to the EU is stronger for the CU period, (though not earlier). For imports they estimated that reel appreciation of TL has had a positive impact on imports especially from the EU countires, though not in the CU period. According to the study custom union agreement and resulting change in the tariff structure caused a significant change in the direction of trade towards the EU and away from the non-EU countries.

3. Turkey and the EU Trade Relationship

A Brief Look at the Turkish Experience

Turkey have withnessed a fundemantel change of her trade regime in 1980; Turkey started to implement trade liberalization policies, after an extended period of an inward-looking development strategy. During the 1929-1980 era, Turkish development strategies have been dominated by import-substitution with two short periods of relaxed trade controls in 1950-53 and 1970-73 (Utkulu and Özdemir, 2003). National planning years of the 1960s and the 1970s mark an intensive import-substitution drive in Turkey, which was mainly implemented through high tariff rates, effective quantitative restrictions and a deliberate policy of overvalued foreign currency regime. Import-substitution was primarily adopted by the first five-year plan (1963-67) as means of reaching the industrialisation goal, But, by the time of the second five-year plan (1968-72) the motivation for inward-looking import-substitution policies stemmed much more from balance-of-payments difficulties (Krueger, 1974). As illustrated in Table 1, exports was not very important in the Turkish economic agenda. At the beginning of the 1960's the GDP shares of Turkish exports was 4.9%, while the manufacturing share of it was only 19.8%. Export structure of the country were depending on mainly agricultural sector (77.2% in 1963).

Table 1 : Some Key Trade Indicators of Turkey (1963-2002) (Billion US dollars)

	1963	1980	1985	1990	1995	1996	1997	1998	1999	2000	2001	2002
Exports	368	2.910	7.908	12.959	21.637	23.225	26.261	26.974	26.588	27.775	31.334	35.762
Imports	687	7.909	11.343	22.302	35.708	43.627	48.559	45.921	40.687	54.503	41.399	51.270
Trade Volume	1.055	10.819	19.251	35261	57.344	66.851	74.820	72.895	67.274	82.278	72.733	87.032
Tarde Deficit	-319	-4.999	-3.435	-9343	-1 4.071	-20.402	-22.298	-18.947	-14.099	-26.728	-10.065	-15.508
Exports/ Import (%)	53,5	36,8	70,2	58,1	60,6	53,2	54,1	58,7	65,3	51,0	75,7	69,8
Export/GDP(%)	4,9	4,1	11,8	8,6	12,8	12,8	13,9	13,5	14,5	13,9	21,2	19,9
Import/GDP (%)	9,2	11,2	16,9	14,8	21,1	24,1	25,7	23,0	22,1	27,3	28,0	28,5
Trexp/WORLDexp (%)	0,248	0,152	0,437	0,389	0,424	0,440	0,447	0,498	0,477	0,438	0,512	0,561
Manu.Exp/Total Export(%)	19,8	36,0	75,3	79,0	88,2	87,1	88,1	88,5	89,3	91,2	91,5	93,1

Source: State Planing Organisation (SPO), IMF Financial Statistics, several years.

A turning point in Turkish economic policy came in January, 1980. At the time, the government announced an economic reform program, after several unsuccessful attempts in 1978-1979 and several failed IMF programs. Import substitute industrialization strategy was replaced by an export-led growth strategy which is relied on more market-based economy.

The programme has imposed some radical changes to the Turkish economy. Gradual import liberalization, more flexible exchange rate regime, more effective export promotion to encourage rapid export growth were general objectives of this reform program. What distinguishes the 1980 reform program from earlier liberalisation attempts is that, "...for the first time the Turkish government demonstrated that it would use economic policies to create a more liberal market-oriented economy..." (Baysan and Blitzer, 1991)[4]. There is little doubt that the Turkish

[4] Note that in a World Bank study on foreign trade liberalisation, Baysan and Blitzer (1991) focus on developments in the Turkish foreign trade sector between 1950 and 1984. They identify four attempts of trade liberalisation, namely the years 1950, 1958, 1970 and 1980. The authors conclude that the liberalisation was not sustained in the first three cases. Only the 1980 liberalisation attempt is viewed as the start of a more fundamental and sustained liberalisation. Unlike the earlier stabilisation packages of the 1950s and the 1970s, the 1980 program marked the beginning of a committed major program of economic liberalisation and trade reform. It is also worth noting that like all Turkey's previous liberalisation episodes (i.e. 1950-53 and 1970-73), its roots lay in balance-of-payments difficulties. During the late 1970s, inflation was accelerating, unemployment was rising, shortages were common, and labour unrest had reached crisis proportions. Even worse, political violence was widespread throughout the country. All these problems were becoming increasingly severe due to the economy's inability to adjust to higher world oil prices, a lack of incentives for exports, irrationality in the import-licensing system, poor performance by the SEEs, and political instability. The series of reforms started a near 50 per cent devaluation, increase in direct export incentives, demand stabilisation measures, and a declared intention to gradually liberalise the economy (dismantling the QR system, capital account liberalisation). Besides the introduction of direct export incentives at the start of the episode, the Bank's view was that relatively little was achieved in terms of import policy until 1984. Some commodities were shifted from the more restrictive to the less restrictive list, and in 1981 some licensed imports were liberalised and the explicit import quota system was abolished. The system remained dominated by licensing, QRs and a protective tariff structure until the beginning of 1984, when about 60 per cent of previously licensed imports were liberalised. There were also changes in the administrative system; only goods explicitly listed as prohibited could not now be imported, where previously imports were banned if not explicitly listed as liberalised.

economy has achieved an impressive transformation from an inward-looking economy to an outward-oriented one.

Although there is a consensus on the *success* of the Turkish experience in the post-1980 period,[5] the driving forces behind it have remained a matter of debate. Some have stressed Turkey's liberal provision of export incentives. Others have concentrated on the macroeconomic and import liberalisation policies that caused Turkey's aggressive nominal exchange rate policy to result in sustained real depreciation[6] (see, e.g., Anand *et al*., 1990). However, Celasun and Rodrik (1989) suggest that at most 30% of the increase in exports during the 1980s can be attributed to real depreciation, and find little empirical support for any effect of export incentives. They argue that Turkey's export boom in the 1980s had only little to do with the incentive regime or exchange rate policy, but mostly as a result of Turkey's proximity to the Middle East. As Balkır (1993) puts it: "...The internal factors which contributed to this performance were export promotion policy, depressed domestic demand, exchange rate policy and the government's strong commitment to export growth...Thus the increase in exports had come mainly from increases in sales to Islamic countries in the Middle East and North Africa (p.105)...Export growth during the 1980s primarily occurred by exploiting idle capacity based on the investments realized before 1980; this was then mobilized, thanks to import liberalisation supplying inputs and export growth creating demand for its output (p.107)...". Similar points are raised by Arıcanlı and Rodrik (1990b). They argue that the impressive export performance during the 1980s appears not to have produced an increase in private investment in tradables. They also stress the fact that exports during the 1980s have relied on existing capacity from the 1970s. Arıcanlı and Rodrik (1990b) suggest that the success of Turkish exporters in OECD market has less to do with macroeconomic policies than with (p.1347): "...(a) the natural learning process of Turkish merchants set off by exports to the Middle East; and (b) diplomatic efforts to alter quota restrictions in favour of Turkish exports...".

Turkey's export performance has been impressive, especially in the first half of the 1980s. As a result of continual real depreciations, output recovery was driven mainly by exports until 1986-87.

[5]For more information and evaluation of the Post-liberalisation period, see, in addition to studies mentioned already, Anand *et al*. (1990), Aricanli and Rodrik (1990a, 1990b), Arslan and van Wijnbergen (1993), Aşıkoğlu and Uçtum (1992), Baysan and Blitzer (1990, 1991), Celasun and Rodrik (1989), Nas and Odekon (eds.)(1992), Rodrik (1990), Şenses (1989, 1990), Wijnbergen *et al*. (1992), Kazgan, (1993).

[6]Note, however, that between 1988 and 1990, there has been real appreciation instead. It is also important to note that, beginning with 1988, the economy entered a stagflationary stage, with exports hovering around 11-12 billion US dollars, raising questions about the sustainability of the high export growth.

While many of the countries with debt problems chose to run large non-interest current account (NICA) surpluses, mainly by cutting expenditures and growth, Turkey opted for a high growth strategy with less NICA surpluses known as "growth-oriented debt strategy" (see van Wijnbergen et al., 1992, p.160). This strategy sought to improve the debt-output ratio through output growth and permitted running lower external surpluses. Although this exchange rate policy raised the debt-output ratio through capital loses, it lowered the debt-exports ratio by increasing exports. Mainly due to this policy, Turkey's creditworthiness was restored, and the country was distinguished from most debtor countries whose debt-exports ratio rose in line with their debt-output ratios. During the 1980-88 period, the exchange rate strategy have been used actively for export promotion.

Between 1980 and 1990, exports grew at an average annual rate of 17.2%, while manufactured goods exports increased in current US dollars at an annual rate of 26.2%. The export growth rate of Turkey has been above the world export growth rate leading to an increase in Turkey's share in world exports (see Table 1 and Figure 1). Exports came from 2.9 billion US dollars in 1980 to 12.9 billion US dollars in 1990, and the export/GDP ratio increased. The export composition changed in favour of manufactured goods. The export boom was mainly in manufactured goods. In addition to the leading subsectors like textiles and clothing, iron and steel, several other subsectors also enjoyed remarkable expansion. Along with the manufactured sectors, many service export industries such as tourism, transportation and contracting also expanded their shares.

The policy of persistent real depreciation until late 1988 has been an essential component of the high growth strategy Turkey opted for solving its debt problem. The spectacular growth of exports and outward orientation of the Turkish economy, and expansion of production in tradables relative to nontradables are some of the achievements of the 1980 post-liberalisation period for which the exchange rate policy is to be credited for. Starting in late 1988, however, Turkish government implicitly started to use exchange rate as part of an anti-inflationary strategy, without committing themselves to an explicit plan (Aşıkoğlu and Uçtum, 1992). Some exogenous factors together with the endogenous factors worsened economic conditions in the domestic market in the second half of the 1980s (Kazgan, 1993). 1987-1989 period had witnessed relatively small increases in export.

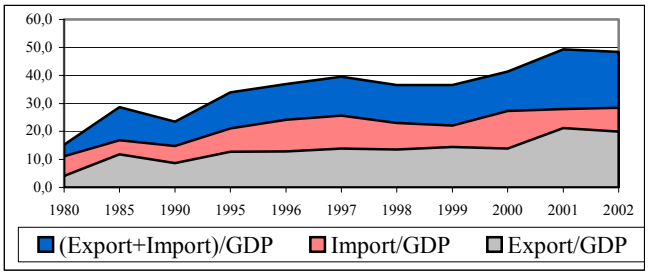
Turkey’s export performance slowed significantly especially during the 1989-1993 period due to the expansionary monetary policies and the appreciation of the Turkish lira. By the end of 1993, however, the economy was overheating. Domestic demand raised by about 12 per cent in 1993,

import volumes jumped by 36 per cent and GDP grew by 8.1 per cent. Following years of high fiscal deficits and inflation in excess of 50 per cent a year, a sharp deterioration in public sector (PSBRs are 12 per cent of GDP in 1993) and external deficits caused a loss of confidence in the Turkish lira and a financial crisis in early 1994.

A stabilization program was announced in 1994 with the aim to reduce the domestic demand and rate of inflation and to increase exports through the real depretiation of the Turkish lira. As a result of the program, exports increased in this period The growth tendency of exports continued till 1997 when the export performance decreased due to the crisis in the Southeast Asia and the Russian Federation. The earthquakes occurred in 1999 also affected the economic conditions negatively (Coşar, 2002).

In the second half of the 1990s, Turkish economy has enjoyed high growth rates although high inflation rates and structural problems have remained unresolved. The Turkish economy has witnessed a new recession recently (in 2001). The major challenge facing the new government is to put the macroeconomic balances in order, to be able get rid of the ongoing recession, also to establish a credible strategy for achieving sustainable internal and external deficits, lower inflation and sustainable economic growth in the medium term.

Figure 1: Export and Import Shares in GDP by years (%)



Source:SPO,SIS

In addition to the above developments in exports sector, Turkey liberalised its import regime substantially from 1980 onwards. In short, nominal tariff rates were reduced remarkably, quantitative restrictions were abolished, and bureaucratic controls over imports were also relaxed continuously (Kazgan, 1993) . The liberalisation of imports and the capital account were, however, approached gradually and at later phases of the 1980 adjustment programme[7], in and after 1983-84.

[7]Relying on the theoretical framework for policy options for reducing anti-export bias by Milner (1990b, esp. pp.92-4), one can reasonably suggest that the Turkish government, during the 1980s, has utilised the following policy options: a) raising "export subsidies", b) lowering the "effective protection of importables".

However, import liberalisation process in the late 1980s led to an increase in the imports of consumer goods. Besides, capital account liberalisation appear to have contributed to the real appreciation of the Turkish lira.

The EU and Turkey trade over time: an evaluation

There are two dimensions to Turkey and the European Union (EU) relations. The first one began with Turkey's application as an associate member to the European Economic Community (EEC) in 1959. This application forms the basis of Turkey's current Customs Union (CU) Relations. The other is the application for full membership to the EC in 1987. This study focuses particularly on the association relationship between parties to see trade relations in spesific.

Turkey's application to the EEC as an associate member was made on 31 July 1959. Following difficult and protracted negotiations, the application ultimately resulted in the signing in Ankara on 12 September 1963 of the Association Treaty. The Ankara Treaty came into force on 1 December 1964[8]. The stated objective of the Agreement was to promote the continuous and balanced strengthening of trade and economic relations between the parties, while taking full account of the need to ensure accelerated development of the Turkish economy and the need to improve the level of employment and living conditions of the Turkish people. Association Agreement was aimed establishing a customs union integration between parties (The Ankara Treaty, 1963).

The Ankara Agreement forsaw the economic association between Turkey and the EC in three stages: *a preparatory stage*, *a transition stage*, and *a final stage*, that is the CU period (WTO, 1999). During the first *preparatory stage*, which began in 1964 and lasted 5 years, The Community granted unilateral concessions to Turkey in the form of financial assistance and preferantial tariffs on Turkey's traditional agricultural exports products.Turkey on the other hand, was not obliged to modify her foreign trade policies. Turkey had followed an import subsititution strategy, coupled with high protection rates. Her exports to the EU was mainly a few traditional crops. During this stage, Turkey's only commitment was to improve her economy and prepare for the transition period . The preparatory stage was completed in five years without any

[8] Ankara Agreement is an agreement which set up association between Turkey and the EU. It does not commit full membership for Turkey. But, Article 28 of the Ankara Agreement envisages the possibility of ultimate full membership for Turkey at a future unspesified date, provided that Turkey proves to be capable of fulfilling her commitment as stipulated in the Agreement.

problems and Turkey took the necessary steps to initiate the second stage of the Assosiation Agreement.

The second stage was the *transitional stage* which was aimed at setting the timetable towards the establisment of a CU between the parties at the latest in 1995. The Additional Protocol, establishing the second stage was signed on 23 November 1970 in Brussels, but came into effect in January 1973 (The Additional Protocol, 1970) The Additional Protocol covered Turkey's and the EC's trade and financial commitments to each other.

After the Additional Protocol, the EC abolished tariffs and equivalent taxes (as of 1 September 1971) on industrial imports from Turkey in a short period, with the exception of certain sensitive products such as machine woven carpets, cotton yarn and cotton textiles (Balkır,1993). The EC also removed all quantitative restrictions on industrial imports from Turkey with the exception of restriction on imports of cocoons and raw silk. In addition, by November 1987, the EC abolished the customs duties on Common Agriculture Policy goods which were not included within the CU. However, it did continue to apply quotas and minimum import prices which were within the framework of the Common Agricultural Policy. The EU has fulfilled most of its obligations during the transition period. However, its non-tariff barriers against some of Turkey's comparitively advantegeus goods like textiles, iron and steel, raisins, fresh fruits and vegetables has been one of the main problems between Turkey and the EU. By taking and applying protectionist measures towards Turkey's exports of those products, the EU put more obstacles on Turkey's economy. Instead of quantitative restrictions, anti dumping has become an EU policy towards Turkey.

Turkey was given a longer period of adjustment to make successive reductions to the customs tariffs applied to imports from the EC within the frame of two seperate lists with different time spans (as of 1 January 1973). The twelve year list is included in the important inputs for existing industries and the products of these industrial branches which were thought to be in a position to compete in the foreign market in twelve years. Turkey promised to decrease the tariff rates on more sensitive commodities in twenty two years. Furthermore, Turkey promised to adopt Common Customs Tariffs of the Community over time.

During the first four years of the transitional period (1973-1976), the implementation of the Additional Protocol went ahead as planned. After 1976, Turkey-EC relations ran into problems.

The process of implementing the Additional Protocol came to a virtual standstill. Turkey's main failure was being unable to reduce the tariffs as planned. Turkey could not make the necessary reduction on tariffs. Tariffs on goods (on a twelve year and a twenty-two year lists) were reduced only twice, in 1973 and 1976 respectively. In January 1977, Turkey postponed the first step of her scheduled tariff alignment with the Common Customs Tariff. One year later she also postponed the third round of tariff reduction (Togan, 1995).

The period between 1976 and 1987 relations were strained. The first disappointment emerged after the first oil crisis, as stagflation and rising unemployment in Europe affected labour recruitment from Turkey, demonstrating the Community's inability to comply with the provisions concerning the free circulation of labour[9]. Another major problem sprang from the extension of concessions by the EC to many LDC's under the General System of Preferences,more importantly, under the global Mediterranean Policy which considerably eroded the preferences granted to Turkey in agriculture and industry (Balkır, 1993).

Then, the relations between the EC and Turkey were affected by the overthrow of the civilian government towards the end of 1980, and were not normalised until six years later. After the military takeover of September 1980, the Community's aid programme to Turkey was frozen[10]. With Turkey's possible exclusion from the Council of Europe, relations between Turkey and the Community became bitter.

Turkey-EC relations showed signs of normalization only towards the end of 1986. On 14 April 1987 Turkey formally applied for full EC membership. After her application to the EC, Turkey rapidly began to fulfill her obligations and started to implement tariff reductions and adoption for the common customs tariffs in the frame of the Association Agreement. In fact, these accelerated

[9] Article 36 of the Additional Protocol stated that the Turkish workforce could have the rigth to fredom of free circulation within the member countries. In addition to this, the Turkish workforce was to benefit from social rights of where ever they worked. This article was to came in to force by 1986. However the EC was reluctant on allowing the Turks to use this right . There for the Turkish workforce was not able to benefit from this article. This was later supplemented by the introduction of visa requirement for Turks visiting the EC countries (Seymen, 1998a)

[10] There were four financial signed protocols by 1980 between Turkey and the EC. These aids are partly in the form of donation and partly in the form of credit from the European Investment Bank Turkey did benefit from the first three protocols but the fourth protocol was frozen due to the Turkey's relations with Europe being weakened. After the CU Decision, another financial aids program planned for helping Turkey's adoption to the CU and cover her tariffs revenue loses from third countries (to eliminate trade divertion effect of the CU). On the other hand, Turkey has not benefited from these aids efficiently. Since Turkey is not the member of the EU, she does not use financial found of the Commision to cover her loses caused by the CU. So, those financial aids are very important for Turkey to receive the benefits of this integration.

adoption to the Community's tariffs was also due to the structural change of Turkish economy in the eighties.

After Turkey's application for the fullmembership, on 5 February 1990, the EC member states concluded on the basis of the 'Opinion' of Commission on 18 December 1989, that it would be inappropriate for the Community, which was in a state of flux, to become involved in new accession negotiations. The completion in 1995 of the CU, in accordance with the provision of the Agreement was considered by the Commision to be of prime importance for increased interdependence and integration between Turkey and the Community. At a meeting of the Association Council at ministerial level on 9 November 1992 both sides agreed to restart the implementation of the provision laid down in the Association Agreement. Until the end of the 1995, Turkey fulfilled all her tariff reductions which was mentioned in twelve and twenty two years lists in the Additonal Protocol.

On 6 March 1995, it was agreed at the Association Council meeting in Brussels, that Turkey would join the European Customs Union. The CU came in-to force in January 1996 (1/95 CU Decision,1995). As a member of the CU, Turkey, eliminated all custom duties, quantitative restrictions, all charges which have equivalent effect to quantitative restrictions for industrial product and processed components of agricultural product in trade with the EU and adopted the common external tariff against third country imports. However, the CU has developed in to a more comprehensive concept than the framework defined by the Ankara Agreement and the Additional Protocol.

The CU between Turkey and the EU goes far beyond a basic custom union with free international trade and common external tariffs and has given new impetus to the liberalizarion process in Turkey. Apart from the liberalisation of tariffs and adoption by Turkey of the EU's common external tariff for industrial products and the industrial components of processed agricultural products, the agreement also embraces a number of integration elements; these include the adoption of the Community's commercial policy towards third countries including textile quotas, the adoption of the free trade agreements with all the EU's preferantial partners including EFTA, Central and Eastern European and Mediterranean countries; co-operation on the harmonisation of agricultural policy, mutual minimisation of restriction on trade in services, harmonisation of Turkey's legislation to that of the EU in the area of competition policy, state aids, anti-dumping, intellectual and industrial

property rights, puplic procurement and technical barriers to trade.

The scope of the CU, however, excludes Turkey from some of the crucial aspects of the common market: the common agricultural policy, including the free circulation of aggricultural products: the free movement of labour and capital; and moves towards a single currency. Unlike countries in the European Economic Area, Turkey may also be subject to anti-dumping measures by the EU. The financial support originally envisaged from the EU to Turkey has not yet been made available (Hartler and Laird, 1999).

Economic relations between two parties have been strong since the early 1950s, but were intensified over recent decades. The long-standing preferences between Turkey and the EU have resulted in the EU being not only the most important market for Turkey (50,5% of Turkey's exports in 2002) but also one of the main sources for imported goods (45,1% of Turkey's imports in 2002) Table 2 presents percentage shares of Turkey's main trading partners in total exports. As it can be seen from table, the Community accounts for nearly half of Turkey's total imports and exports as compered to other partners. Since our empirical research covers six EU countries (Germany, Italy, the UK, France, Belgium&Luxemburg and Netherlands), trade datas of these countries also has shown in Figure 1. It can easily be seen that these six EU Countries have nearly 85% share of the total trade with the EU.

The CU Decision caused some changes in Turkish trade. It was undoubted that, with the CU, the amount of trade between Turkey and the EU was to increase. Expectedly, there was an increase, especialy in the amount of goods that Turkey imported from the EU. A considerable rise in Turkey's industrial exports to the EU was not expected. This was because since 1971, there were no tariffs on Turkish exports anyway. Moreover, the abolition of export incentives, state aids or bringing their level down to the EU standarts negatively affected Turkey's exports (Seymen, 1998b).

Figures from the period since the start of the Customs Union show that Turkey's imports from the EU in 1996 reached $23 billion, with an increase of 37.2%. Considering the 22.27% increase in Turkeys total import in 1996, it is clear that the Customs Union had a certain impact on the increase in imports. On the other hand, Turkey's export to the EU totalled $11.5 billion with an increase of 4.2%, below the 7.3% increase in total exports in 1996. This was also due to the

economic stagnation in continental Europe, especially in Germany. Consequently, Turkey's foreign trade deficit with the Union doubled and increased to $11.6 billon in 1996.

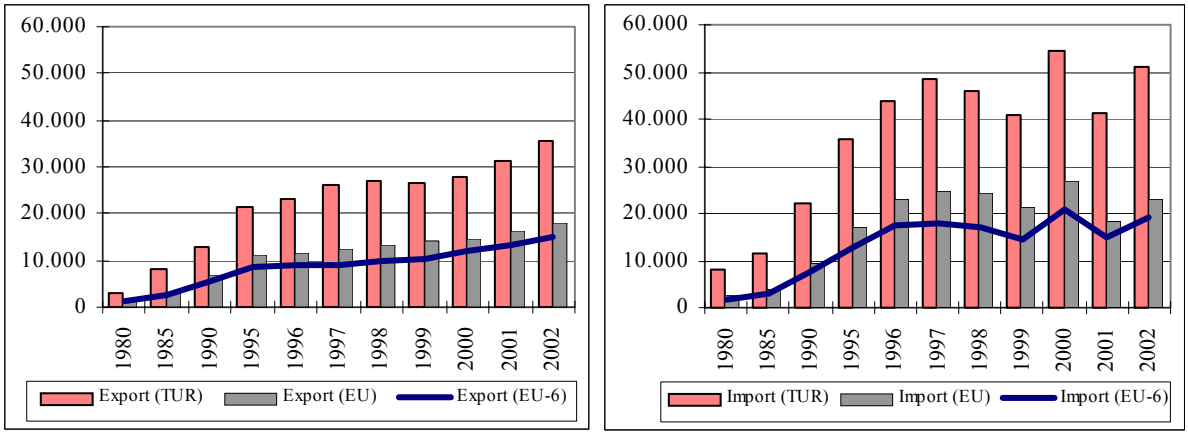
Table 2 : Turkey's Exports and Import Shares by Countries (%)

Export Shares	1995	1996	1997	1998	1999	2000	2001	2002
A. OECD Countries	61,4	62,1	59,3	62,9	67,9	68,6	65,8	64,3
1. EU Countries	51,2	49,7	46,6	50,0	54,0	52,5	51,4	50,5
2. EFTA Countries	1,4	1,4	1,6	1,3	1,4	1,2	1,0	1,1
3. Other OECD Countries	8,9	10,9	11,1	11,6	12,6	14,9	13,3	12,7
B. Non OECD Countries	38,6	37,9	40,7	34,0	29,2	28,2	31,2	29,9
1. Europe + CIS Countries	16,1	15,7	17,8	14,8	10,3	10,8	8,5	9,4
2. African Countries	4,9	5,0	4,7	6,7	6,2	4,9	4,9	4,6
3. American Countries	0,6	0,6	0,8	0,9	0,9	0,9	1,1	0,6
4. Middle East Countries	9,8	9,7	9,1	8,1	8,3	7,8	11,4	9,6
5. Other Countries	7,1	6,9	7,3	3,5	3,4	3,8	5,4	5,6

Import Shares	1995	1996	1997	1998	1999	2000	2001	2002
A. OECD Countries	66,4	71,3	71,7	72,9	69,6	65,4	62,9	63,5
1. EU Countries	47,2	53,0	51,2	52,4	52,6	48,9	44,2	45,1
2. EFTA Countries	2,5	2,5	2,7	2,5	2,3	2,1	3,6	4,7
3. Other OECD Countries	16,7	15,7	17,8	17,9	14,7	14,4	15,1	13,7
B. Non OECD Countries	33,6	28,7	28,3	26,2	29,1	33,7	36,5	34,5
1. Europe + CIS Countries	12,5	9,4	9,6	10,2	11,5	13,2	12,7	12,2
2. African Countries	3,9	4,6	4,5	3,8	4,1	5,0	6,8	5,1
3. American Countries	1,7	1,5	1,6	1,6	1,2	1,1	1,0	1,1
4. Middle East Countries	7,5	7,4	5,6	4,2	4,9	5,7	8,0	7,1
5. Other Countries	8	5,8	7,0	6,4	7,4	8,7	7,9	9,0

Source:State Planning Organisation (SPO); State Institute of Statistic (SIS)

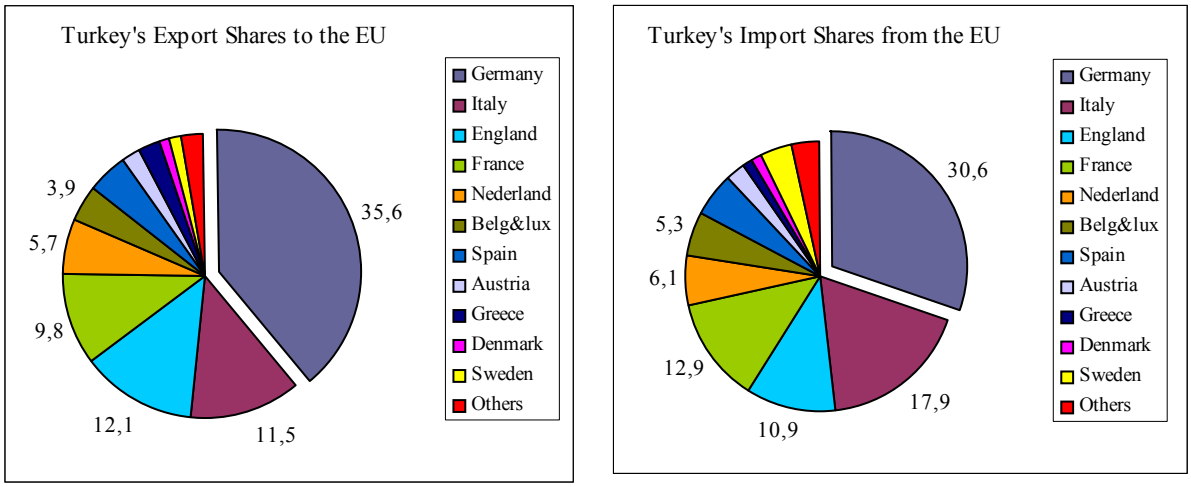
Figure 2: Turkey's total Trade, Trade with the EU and the EU-6 (billions US$) .



Source: SPO, SIS.

Germany has highest share in Turkey's imports and exports, followed by Italy, the UK and France. Their share in total exports to the EU and import from the EU presented in Figure 3.

Figure 3: Turkey's Trade Share by EU Countries (1995-2002 / in Avverage)



Source: SPO,SIS.

In 1997 Turkey maneged the shock effect of the CU and the rate of increase in imports from the EU decreased. The increase of imports from the EU is %7.5 whereas the increase of exports to the EU is %6.1. In 1999 and 2001 economic stagnation effected Turkey's trade negatively,so imports from the EU decreased as well. With the exception of periods of economic crises, increses in imports was greater than the exports increases. So resulting trade deficit was high. In 2002 Turkey's exports to the EU is $18.1 billions with the %12 increase. Turkey's import from the EU is $23.1 billions with the %26.5 increase. Turkey's trade deficit with the Union is $5.1 billions in 2002 (See Table3).

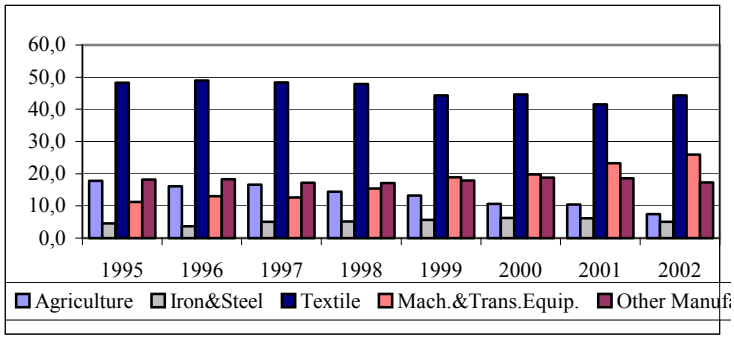
Table 3: Turkey and the EU Trade

Year	Export (TR)	Change (%)	Export (to the EU)	Change (%)	EU Share of Export	Import (TR)	Change (%)	Import (from the EU)	Change (%)	Import share from the EU	Turkey - the EU Trade Balance
1995	21,6		11,1		51,2	35,7		16,9		47,2	-5,8
1996	23,2	7,3	11,5	4,2	49,7	43,6	22,2	23,1	37,2	53,0	-11,6
1997	26,3	13,1	12,2	6,1	46,6	48,6	11,3	24,9	7,5	51,2	-12,6
1998	27,0	2,7	13,5	10,2	50,0	45,9	-5,4	24,1	-3,2	52,4	-10,6
1999	26,6	-1,4	14,3	6,3	54,0	40,7	-11,4	21,4	-11,0	52,6	-7,1
2000	27,8	4,5	14,5	1,1	52,2	54,5	34,0	26,6	24,3	48,8	-12,1
2001	31,3	12,8	16,1	11,1	51,4	41,4	-24,0	18,3	-31,3	44,2	-2,2
2002	35,8	14,1	18,1	12,0	50,5	51,3	23,8	23,1	26,5	45,1	-5,1

Source: State Planing Organisation (SPO), IMF Financial Statistics, several years.

Figure 4 gives the share of main sectors in exports with the EU for the years 1995-2002. As it can be seen from figures exports of manufactures is concentraded on several products like textile and clothing, machinery and transport equipment. Iron and steel has also a significant proportion in total export. Bearing in mind that sectors such as iron and steel, textile, clothing, foods are classified mostly as semi-prossed primary goods, it can be said that Turkish export is mainly dependend on low-technology products. But in order to obtain a sustainable export growth, the structure of export has to be changed in favour of technology-intensive products. Textile and clothing sectors together account for nearly 45 percent of total export to the EU. This shows that diversification of export has not been achieved yet. On the other hand, it is worth to note that, between 1996-2002 period, while the share of textile and clothing in export to the EU decrease from 48.3% to 44.3% respectevly, the share of machinery and transport equipment increased from 13% to 25.9%, this might be considered a graduall change of Turkish export to the EU through more value-added products (see also Harrison *et al*., 1996).

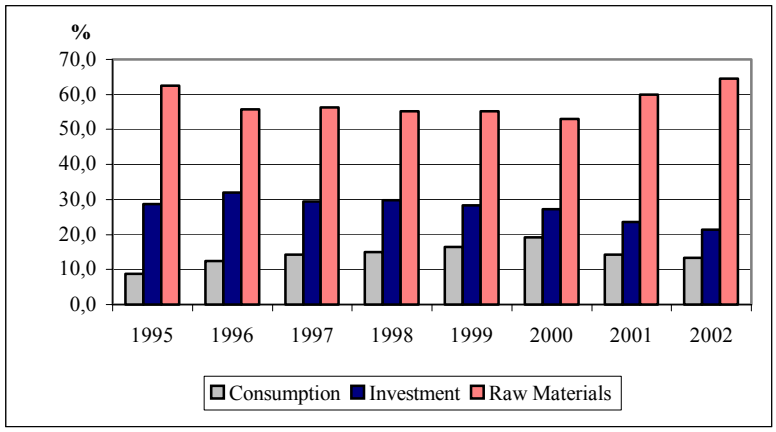
Figure 4: Sectoral Share of Turkish Export to the EU (%)



Source: SPO, SIS

Figure 5 illustrates, commodity composition of Turkey's import from the EU. Raw meterials and investment goods have important shares in import. Turkey's import from the EU are dominated mainly in automotive, machinery, equipment and cemicals sectors.Ahter the CU Decision, the abolition of tariffs increased the share of consumption goods from the EU. With the effect of recession that Turkey faced recently, consumtion share of imports decreased again as import decreased.

Figure 5: Commodity Share of Turkish Imports from the EU



Source: SPO, SIS

Empirically, it is difficult to mesure the effects of the CU (trade creation and trade divertion effects-revenue lose-sectoral effects) in such a short period of time. Instead, in our study, we employed trade modeling for the period 1963-2002, which produced relevant price and income elasticities that are crucial for policy implications for both Turkey and the EU.

4. A Simple Trade Model

We consider an imperfect substitutes model of trade, the key underlying assumption of which is that neither exports nor imports are perfect substitutes for domestic goods.[11] By definition, we have

$$TB\$_t = X\$_t - M\$_t \qquad (1)$$

where TB$, X$ and M$ are total merchandise trade balance, exports and imports in US dollars respectively. Let us now define export and import volumes as

$$XV_t = X\$_t/PX_t \qquad (2)$$

$$MV_t = M\$_t/PM_t \qquad (3)$$

where XV, MV, PX and PM are export volume, import volume, export price index and import price index in US dollar terms.

[11]For an evaluation of the imperfect substitutes model vs the perfect substitutes model, see Goldstein and Khan (1985), pp.1044-53).

It is now our aim to develop export and import demand models, and to estimate the corresponding income and price elasticities for foreign trade of Turkey. As shown by Orcutt (1950) and Prais (1962) and pointed out by Goldstein and Khan (1985), among others, price elasticities in trade equations might be biased by simultaneity between prices and quantities. More clearly, simultaneity implies correlation between the explanatory variables in an equation and the disturbance term. In these circumstances, the basic conditions under which one can proceed to estimate an export or import demand equation that would be free of simultaneity bias are either that the supply-price elasticities for exports and imports are high enough, or that the demand functions are stable while the supply functions shifts around.[12] The advantage of such an assumption is that it allows satisfactory estimation of the export and import demand equations by single-equation methods, since the prices of exports and imports can then be viewed as exogenous.

The conventional long-run export and import demand functions are as follows:[13]

$$\textit{EXPORT DEMAND: } XV = f_1 \underset{(-)\quad(+)}{[\,(PX/PW),\ YW)\,]} \qquad (4)$$

$$\textit{IMPORT DEMAND: } MV = f_2 \underset{(-)\quad(+)}{[\,(PM/PD),\ YD)\,]} \qquad (5)$$

where XV and MV represent the volumes of export and import goods respectively; (PX/PW) represents the relative export prices, i.e., the ratio of export prices of the exporting country to world

[12]For the same point, see Goldstein and Khan (1985, pp.1071-3). For a formal analysis, see e.g. Maddala (1977) and Leamer (1981). While the assumption of "high enough" price elasticity seems reasonable a priori in the case of the world supply of imports to a single country, it may seem less reasonable when applied to the supply of exports of an individual country unless idle capacity exists in the export (or domestic) sector, or more generally, unless export production is subject to constant or increasing returns to scale. That is, if the assumption is met, an increase in the world demand for a country's exports can be satisfied without an increase in the price of its exports [Goldstein and Khan (1978)].

[13]As pointed out by Goldstein and Khan (1985), when the two-country model is left for the n-country real world, the symmetry between export and import demand equations disappears. This is due to the fact that a country's total imports face competition only from domestic producers, while a country's total exports face competition not only from domestic producers in the export market but also from `third country' exporters to that market. Indeed, the traditional practice in specifying export demand equations is to assume that the major price competition occurs among exporters. Evidence by Arslan and van Wijnbergen (1993) suggests that the Turkish export firms compete with the firms from third countries exporting to the same market. We specify the variables in logarithms so that the coefficients are the relevant relative price and income elasticities. In what follows, all variables are also in logarithms unless otherwise stated. For the choice of the functional form (i.e. linear versus log-linear), see, e.g., Khan and Ross (1977). The evidence suggests that log-linear specification is preferable (see, e.g., Goldstein and Khan, 1985). We also assume that both export and import demands are homogenous of degree zero in prices (i.e. relative price restriction). For information about homogeneity postulate, see, e.g., Leamer and Stern (1970), Murray and Ginman (1976) and Goldstein *et al*. (1980), among others.

prices expressed in common currency units which we call *export price competitiveness*;[14] (PM/PD) is the relative import prices, i.e., the ratio of import prices facing the importing country to domestic prices (preferably wholesale price index) expressed in common currency units which we call *import price competitiveness*; YW is a scale variable which captures world demand conditions; and YD is the real domestic income[15]. The signs given in the parentheses are the expected ones[16].

The choice of scale variable (YW) has tended to vary in previous trade literature. Khan (1974), Goldstein and Khan (1978), and Aspe and Giavazzi (1982) used world income as a scale variable. Given that world trade growth has grown about twice as fast as world income over the sample period, this will tend to bias the estimates of the elasticity of demand obtained, as pointed out by, among others, Funke and Holly (1990), Landesmann and Snell (1993), and Muscatelli *et al*. (1991b). Muscatelli *et al*. (1991b) stress that using world income as a scale variable does tend to increase the estimated scale elasticities.

Traditional models, see eq. 4 and 5, estimate export and import demand as functions of relative prices and income but omit other factors which might be relevant and statistically significant. In line with the theory, the following can be added to the right hand side of the export demand equation as possible explanatory variables: non-price/supply-side factors such as product types and quality, product and process innovation (Muscatelli *et al*., 1991b; Landesmann and Snell, 1993), and economic integration effects (Madesen and Damania, 1994). In a similar way, the relevant variables which may be included to the import demand equation as explanatory variables are as follows: indicators of import capacity such as external debt stock, foreign exchange inflows, and non-gold international reserves.

In addition, the following theoretical issues have to be addressed as well. First, it is mentioned by Landesmann and Snell (1993) and Muscatelli *et al*. (1991b) that highly aggregated export models such as the one explained above by their nature do not address the effects regarding the transformation on the types and quality of goods produced and exported. That is why, as the composition of a country's aggregate exports change through time, one would expect structural

[14] For various measures of competitiveness, see Shone (1989).
[15]For a detailed description of the variables employed in this study and the data sources, see Appendix.
[16]Economic theory provides insight into how each variable in Equations (4) and (5) should affect exports and imports. As regards the export demand equation, the higher the level of foreign real income activity, *ceteris paribus*, the larger would be foreign demand for the country's exports. The higher the price of the country's exports relative to those of

changes in the estimated parameters. Given the relatively small sample at our disposal, rather than assume compositional change effects, we wanted to test directly for their significance using a practical proxy for commodity composition of Turkish exports goods.

Second, the fact of the matter is that non-price competition effects, namely quality, reliability, marketing strategy and etc., are generally excluded from standard export demand equations. We feel that even such a crude commodity composition index may give some clues considering non-price effects such as product innovation process.[17] Following Krugman (1989), a measure of the "range of goods" traded in export markets may be included in the foreign trade regressions to capture the supply effects. We believe that our exports commodity composition index, XCC, is a proxy for the range of goods traded in the export markets, and thus captures the supply effects in the Krugman's sense.[18]

5. Econometric Methodology

Cointegration and Granger causality between variables and the short-run dynamic adjustment towards the long-run equilibrium path is to be examined. the appeal of the cointegration analysis for economists is that it simply provides a formal framework for testing and modeling long-run economic relationships from actual time series data.

This involves the 'two-step procedure' suggested by Engle and Granger (1987) (EG hereafter). As a first step, we estimate the following cointegrating regressions by ordinary least squares (OLS):[19]

$$X_t = \alpha_0 + \beta_0 Y_t + \mu_t \qquad (6)$$

$$Y_t = \alpha_1 + \beta_1 X_t + \mu'_t \qquad (7)$$

where α_0 *and* α_1 represent the intercept terms while μ_t and μ'_t are the error terms.

First we check for the cointegrating properties of the series involved. The next step is to test which

other countries, *ceteris paribus*, the smaller would be the demand for the country's exports. The similar logic applies to the variables in the import demand equations.

[17]For the same point, see Muscatelli *et al*. (1991b).

[18]In examining the empirical relevance of Krugman's supply effects, Madesen and Damania (1994) employes the supply of manufactures as an instrument for the range of goods.

[19] As OLS is super consistent in the cointegrating regressions, asymptotically it is not relevant whether these regressions are normalised on X or Y. In finite sample, however, the normalisation may matter, and we consider both possibilities.

variable Granger causes the other one,[20] using error-correction models (ECMs) to see if the coefficient of the error-correction term is statistically significant or not.[21] Accordingly, the ECMs are formulated as follows:

$$\Delta X_t = a_0 - b_0 \mu_{t-1} + \sum_{i=1}^{m} c_i \Delta X_{t-i} + \sum_{j=1}^{n} d_i \Delta Y_{t-j} + e_t \qquad (8)$$

$$\Delta Y_t = a_1 - b_1 \mu'_{t-1} + \sum_{i=1}^{q} e_i \Delta Y_{t-i} + \sum_{j=1}^{r} f_i \Delta X_{t-j} + e'_t \qquad (9)$$

where μ_{t-1} and μ'_{t-1} are the lagged estimated residuals (i.e. error-correction terms) derived from the static cointegrating regressions (6*)* and (7*)* respectively. The term Δ represents the first differences. Statistically significant b_0 and b_1 suggest that Y Granger causes X and X Granger causes Y respectively.[22] The ECMs introduce an additional channel through which Granger-causality could be detected since if two variables are cointegrated, causality must run in, at least, one direction between them. This causal relationship between the two variables provides the short-run dynamics necessary to obtain long-run equilibrium (Granger, 1988). For instance, focusing on equation *(8), Y* is said to Granger cause X not only if the d_i 's are jointly significant, but also if b_0 is significant. Thus, in contrast to the standard Granger test for causality, the ECMs allow for the finding that Y Granger causes X, as long as the error-correction term, μ_{t-1}, carries a significant coefficient even if the d_0i's are not jointly significant (Granger, 1988). Jones and Joulfaian (1991) support the interpretation that the changes in the lagged independent variable describes the short-run causal impact, while the error-correction term introduces the long-run effect. However, if the two variables are not cointegrated, then the error-correction terms are dropped from the ECMs and the standard Granger test for causality is carried out.

We apply the integration and cointegration analyses in the EG sense; that is, a time series, say, X_t is said to be integrated of order d if, after differencing d times, it becomes stationary, denoted as $X \sim I(d)$. Moreover, two time series, X_t and Y_t are said to be cointegrated of order d, b where $d \geq b \geq 0$,

[20] In this paper, we use causality in Granger's sense. Following Granger (1969): Y 'causes' X if and only if X(t) is predicted better by using the past history of Y, together with the past history of X itself, rather than by using just the past history in the X variable.

[21] This is known as the Granger Representation Theorem (GRT). See Engle and Granger (1987). According to the GRT, if two time series are cointegrated, then there exists an error-correction representation (i.e. error-correction mechanism is well determined) and vice versa. Note that in small samples, statistically significant estimates of b in equations (8) and (9), provide further evidence that the variables in eq. (1) are indeed cointegrated.

[22] Note that joint significance of the error-correction terms b_0 and b_1 could be a matter of debate.

denoted as

$X_t, Y_t \sim CI\ (d, b)$ if:

a) both are *I(d)*, and b) their linear combination $\alpha_1 X_t + \alpha_2 Y_t$ is *I(d - b)*; that is, the residuals of the long-run regression should be stationary (i.e. integrated of order zero). The vector $[\alpha_1, \alpha_2]$ is referred to as the *'cointegrating vector'*.

The static cointegrating estimates with small samples need very cautious evaluation. Due to nonstationarity of the variables and thus nonnormal distribution, test statistics of the EG type of static cointegrating regression may be biased upward and thus no judgement on the statistical signifigance can be made using standart critical value tables. Ad regards the cointegrating EG regression estimations, as a rule, the higher the R^2 statistic, the less biased the estimated static long-run estimates are. The EG type of static cointegrating regression has become a widely applied method since 1987. One of its benefits is that the long-run equilibrium relationship can be modelled by a simple regression involving the levels of the variables. The estimates of the EG type static cointegrating regression parameters are superconsistent, i.e. it converges to the true value at a rate faster than in normal asymptotics (see Stock, 1987).

There exists, however, concerns regarding the static cointegratin regression. Some (e.g. Banerjee *et al.,* 1986) emphasise that small sample size is likely to create two main concerns regarding the static cointegrating regression: (i) possible bias in the long-run estimates, (ii) low power of cointegrating statistics. That is, although the dynamics are asymptotically irrelevant in the first step of the EG type of modelling, ignoring the lagged terms (dynamics) may lead to subtantial bias in finite samples.Others (esp. Park and Phillips, 1988) are more sceptic about the fact that the OLS estimator in the first step has an asymptotic distribution which is nonnormal and depends on nuisance parameters. This makes inference difficult, and the standart t-statistics vill not even be valid asymptotically.

Since these two groups of critics emphasize different aspects of the problem, they naturally recommend different solutions. Banerjee *et al.* (1986) and many others are in favor of estimating long-run parameters in an unrestricted error correction model (ECM) form, including all the dynamics. Stock (1987) also recommends this, describing the estimator as nonlinear least squares (NLS). Phillips and Hansen (1990) (following Park and Phillips, 1988), on the other hand, advocate

using semiparametric corrections to the OLS estimator to eliminate dependency on nuisance parameters, and also to provide an estimator which follows a normal distribution asymptotically. They refer to this as "the fully modified OLS estimator".

Inder (1993) makes the following contributions to the debate: i) it is shown that Phillips and Hansen (1990) Monte Carlo design is biased in favor of modified OLS, and when a more realistic Monte Carlo is undertaken, the unrestricted ECM estimator performs far better than OLS or modified OLS; ii) the semiparametric corrections applied to OLS can also be applied to the ECM estimator, giving a fully modified unrestricted ECM estimator which is asymptotically optimal; iii) the effects of endogeneity on the bias and distribution of the ECM estimator are minimal.

In the present paper, we empirically investigate the multivariate version of the relationship stated, i.e. single equation multivariate cointegration analysis. Here, we mainly rely on the econometric methodology of the EG outlined above with some necessary corrections / modifications to deal with the endogeneity problem, i.e. fully modified unrestricted ECM (Inder, 1993). One drawback of the EG type of single equation modelling is that it assumes uniqueness of the cointegrating vector. However, in a multivariate context the number of cointegrating vectors could be more than one (i.e. $r > 1$). If $r > 1$, there is no longer a unique long-run relationship towards which the error-correction model (ECM) is adjusting. In this case, a single equation cointegrating regression will estimate the linear combination of the existent vectors. Although the existence of multiple cointegrating vectors is seen as an identification problem, applied researchers overcome this problem by choosing the cointegrating vectors which makes 'economic sense'. This implies choosing the cointegrating vector where the estimated long-run elasticities correspond closely (in both magnitude and sign) to those predicted by economic theory.

Single equation based cointegration approaches have two main drawbacks in common: first, they all assume the unique cointegrating vector; second, explanatory variables in the cointegrating vector are assumed to be "weakly exogenous". Otherwise, long-run estimates suffer from "endogeneity" bias. Johansen (1988) and Johansen and Juselius (1990) provide a system-based VAR approach to overcome these difficulties. The main advantage of the Johansen Maximum Likelihood (ML) VAR method is that it enables one to determine the number of existing cointegrating (i.e. long-run) relationships among the variables in hand. It provides not only the direct estimates of the cointegrating vectors but also enables researchers to construct tests for the

order (or rank) of cointegration, r. It is worth noting that, in a VAR model explaining N variables, there can be at most r = N-1 cointegrating vectors. It is commonly acknowledged that the statistical properties of the Johansen procedure are generally better and the cointegration test is of higher power compared to the EG one (Charemza and Deadman, 1997). It is, however, important to point out that they are grounded within different econometric methodologies and thus can cannot be directly compared. *In this regard, the Johansen method can be used for single-equation modeling as an auxiliary tool, testing the validity of the endo-exogenous variable division. This may also be used as a confirmation test of the single-equation model.* Following Charemza and Deadman (1997), we believe that single-equation-based and systems-based methods should be seen complementaries rather than substitutes. Let us assume that the Johansen results suggest the existence of unique cointegrating vector. Then, if the estimated cointegrating coefficients have economically sensible signs and are roughly similar in size to those estimated by, say, the EG method, this could be taken some confirmation of the single-equation model to which the EG method was applied.

Despite its theoretical advantages, the Johansen estimating procedure is, in practice, also subject to some shortcomings. First, given the small sample size, the method cannot be accepted as an appropriate one since the point estimates obtained for cointegrating vector, may not be particularly meaningful. Second, some additional problems occur if we do not have a unique cointegrating vector. The problem of multiple long-run relationship is presumably best seen as an identification problem (Granger, 1986), and can be resolved in, basically, two ways: either rejecting all but one such cointegrating vectors as economically meaningless or if the model is consistent with the underlying economic theory, it should consists of not one but two or more single equations. In this respect, Phillips and Loretan (1991) favor for the use of equation-by-equation approach of the single-equation error-correction model since such a possibility is not available in complete systems-methods such as the Johansen approach.

In this study, we employ a multivariate single-equation type model[23]. The validity of conditional models relies on the exogeneity of the variables on which we condition. Alternatively, if they cannot be treated as weakly exogenous, then one should use the appropriate correction mechanism to

[23] It is important to note that the choice between system-based models and conditional (single-equation) models is not straightforward, and is also open to debate. Urbain (1993) points out that if some exogeneity conditions are satisfied, a single equation models, from a practical point of view, enjoy nice asymptotic properties.

tackle the endogeneity bias. A number of tests for weak exogeneity in cointegrated variables have been proposed in recent years (for an evaluation of these tests and definitions, see Urbain, 1993). Among them we follow the EG (1987). Within their two-step framework, EG argues that a simple way to check the weak exogeneity of, say, explanatory variable X_t for the long-run and short-run parameters of interest is to estimate an ECM for X_t and test the statistical significance of the error-correction term using a traditional t-test. If the t-test is significant, then X_t can no longer be treated as weakly exogenous[24].

6. Empirical Findings

Data

In the light of the econometric methodology developed in the earlier section, we now apply the single euation multivariate cointegration analysis and the ECMs to examine the import and export demand equations between Turkey and the EU. We use annual data for the period 1963-2002 for our our single equation multivariate cointegration analysis with ECM. The variables used in our import demand cointegrating regression are the MV, RPM, YD and D. They simply corrrespond to import volume of Turkey from the EU, relative import prices of Turkey regarding the EU, GDP volume index of Turkey, and the Turkish external debt stock respectively.

As regards the export demand cointegrating regression, the variables included are the Turkish export volume towards the EU, relative export prices (three different proxies are used) regarding the EU, GDP volume of the export market, i.e. the EU (two different proxies are used). The variables used in our export demand cointegrating regression are the XV, RPX1, RPX2, RPX3, MVEU, YEU and XCC. We also employ two dummies to capture the effects of the possible strustural breaks in the import and export demand cointegrating regressions, namely DU1977, DU1987. This is due to the fact that breaks may result in supurious roots regarding residual-based cointegration tests. We use the natural logarithm of the relevant variables, except variable XCC, (prefixed with the letter L), since their first differences reflect the rate of change of each variable. Data definitions, data sources and further information are provided in the Appendix.

[24] The standard orthogonality tests (such as the Hausman test) in the presence of cointegrated variables may well be invalid due to nonstationary nature of the variables in levels, and the null hypothesis is usually not sufficient for weak exogeneity in cointegrated models (for this point, see Urbain, 1993).

Integration (Dickey-Fuller) and cointegration (Engle-Granger) analyses: standard approach

In the light of the theory and the econometric methodology outlined, we first examine the multivariate cointegration and causality issues among the import and export demand variables considered. We are mainly interested in analysing the following classical multivariate import and export demand relationships (same with eq. 4 and 5):

$$MV = f\,(RPM, YD) \qquad (10)$$

$$XV = f\,(RPX, YEU) \qquad (11)$$

Following the methodology for multivariate analysis set up in the earlier section, we now express this longrun relationship as a regression in natural logarithms:

$$LMV_t = \alpha_0 + \alpha_1 LRPM_t + \alpha_2 LYD_t + \mu_t \qquad (12)$$

$$LXV_t = \beta_0 + \beta_1 LRPX_t + \beta_2 LYEU_t + \mu'_t \qquad (13)$$

where μ_t and μ'_t are the residuals. For the variables in (12 and 13) to be cointegrated, they need to be I(1) as a necessary condition (but not sufficient). Table 3 suggest that all variables employed in our long-run regressions are integrated of order one, i.e. their first differences are stationary.

Table 3: The ADF test for integration level

Variables	Test Statistic	
	levels	first differences
Import Demand Equation		
LMV	-1.98(0)	-6.32(0)
LRPM	-2.00(1)	-7.41(1)
LYD	-2.20(0)	-7.76(0)
LD	-1.81(1)	-4.33(0)
DU1977	-2.02(1)	-4.95(1)

Export Demand Equation		
LXV	-2.61(0)	-6.66(0)
LRPX1	-1.93(1)	-4.80(0)
LRPX2	-2.20(1)	-5.14(1)
LRPX3	-2.77(1)	-4.45(0)
LMVEU	-1.89(1)	-4.45(1)
LYEU	-2.32(1)	-4.35(0)
XCC	-2.23(2)	-3.75(1)
DU1987	-1.95(1)	-5.02(1)

Note: Intercept term included in the ADF equations. Time trend is included in the ADF equations only if statistically significant. The corresponding critical values with and without time trend (obtained from MacKinnon, 1991) for 5% signifigance level are –3.53 and –2.94 respectively. Figures in parantheses show the number of augmentation that sufficient to secure lack of autocorrelation of the error terms.

A sufficient condition for a joint cointegration among the variables now is that the error term (μ_t) of the cointegrating regression should be stationary. The residual-based ADF test statistic for μ_t suggest that we cannot reject the null of no cointegration at 5 per cent significance level (see equation 5). Following is the estimation resultsof the EG cointegrating regression (12) by OLS:[25]

Import Demand: long-run

$$\boldsymbol{LMV_t = -8.55 - 0.99LRPM_t + 2.54LYD_t + \mu_t} \qquad (14)$$

(-11.0) (-6.37) (16.4)

$R^2 = 0.94$ RSS = 1.79 CRDW = 0.78

ADF = -3.01 (corresponding critical value at 5% is –3.97)

Sample: annual data (1963-2002) t-statistics are reported in parantheses, having only a descriptive role since the variables are non stationary

Export Demand : long-run

$$\boldsymbol{LXV_t = -0.20 - 2.52LRPX1_t + 1.96LMVEU_t + \mu'_t} \qquad (15)$$

(-0.91) (-9.87) (17.8)

$R^2 = 0.96$ RSS = 1.88 CRDW = 0.66

ADF = -2.93 (corresponding critical value at 5% is –3.97)

Sample: annual data (1963-2002) t-statistics are reported in parantheses, having only a descriptive role since the variables are non stationary

Note again that the estimated t-statistics and other standard test statistics in (14) and (15) have only a descriptive role since the variables are non stationary (Banerjee *et al*., 1986). Since the

[25] It is important to note that we reestimates the long-run export regression (15) by replacing RPX1 with RPX2 and RPX3. Results with RPX3 produces similar ones. However, using RPX2 as a measure for relative export prices yields insignificant price variable in which Turkish firms are assumed to be competing with their Asian competetors in the EU market. As regards the scale varaible in export equation (15), we obtained similar estimate results when replace MVEU with YEU (available on request).

residual-based ADF test statistics –3.01 and –2.93 are smaller than the corresponding critical value –3.97 at 5% statistical signifigance level, we cannot reject the null of no joint cointegration among the variables against the alternative. Since R^2 > CRDW, the joint cointegration cannot be ensured (see Banerjee *et al*., 1986). This result may well be due to the low power of cointegrating statistics of the residual-based type. One possibility is that structural breaks/changes may rusult in spurious unit roots, i.e. failure of rejection of the null hypothesis. Another possibility is that the omission of some relevant variables in the long-run regression may have caused the above results. In what follows, we analyse the effects of breaks on the cointegration tests and the inclusion of some relevant variables in the regressions.

Unit Roots / Cointeration with break and the Supply / Product Innovation Effects

The results in Table 3 suggest that all variables appear to be stationary in first differences, i.e. I~(1). These results are validated despite some structural breaks/changes. Our Perron unit root test results are available on request (for the method see Perron 1990; Perron and Vogelsang, 1992). In order to see the effect of the structural changes and/or regime shifts on the cointegtaing regressions we take two steps. First, we include dummies for the possible break years and other relevant variables in the static import and export demand cointegrating regressions. Second, we test for cointegration with breaks using the methodology suggested by Gregory and Hansen (1996). This methodology examines the presence of cointegrated relationship under possible regime-shifts and use suggest three different models.

Import Demand: long-run

$$\underset{\quad}{LMV_t} = -9.39 - 0.37LRPM_t + 3.33LYD_t - 0.25LD_t - 0.56DU1977 + \mu_t \qquad (16)$$
(-19.6) (-2.94) (13.6) (-2.58) (-5.37)

$R^2 = 0.98$ RSS = 0.54 CRDW = 1.60

ADF = -5.14 (corresponding critical values at 5% is –4.80)

Sample: annual data (1963-2002) t-statistics are reported in parantheses, having only a descriptive role since the variables are non stationary

Export Demand : long-run

$$LXV_t = 0.70 - 1.19LRPX1_t + 0.90LMVEU_t + 3.95XCCt + 0.16DU1987 + \mu'_t \qquad (17)$$
(5.43) (-7.21) (8.39) (8.53) (2.31)

$R^2 = 0.99$ RSS = 0.38 CRDW = 1.78

ADF = -5.49 (corresponding critical value at 5% is –4.79)

Sample: annual data (1963-2002) t-statistics are reported in parantheses, having only a descriptive role since the variables are non stationary

We can now reject the null of no cointegration for cointegrating regressions (16) and (17) at 5% and/or 10% signifigance levels. As regard the long-run import demand regression (16), two new variables are included, namely LD and DU1977. They stand for the natural logarithm of external debt stock of Turkey and the dummy variable for the possible break year 1977 respectively. They both produced reasonably high t-statistics. In addition to the external debt stock variable, we used some other measures for 'import capacity' such as the indicator of foreign exchange availability (INFLOW) proxied by exports earnings and non-gol international reserves (RES). However, unlike the external debt stock variable D, the variables INFLOW and RES in natural logarithms produced very low t-statistics, and thus not included in the final model.

It is clear from eq. (16) that the inclusion of the debt variable as a measure for import capacity and the dummy for the break year worked out well. There exists a joint cointegration among the variables according to residual-based ADF cointegration tests. Banerjee *et al*. (1986) propose simple and quick rule; that is, if CRDW>R^2, the null of no cointegration is more likely to be rejected. For both eq. 16 and 17, we have CRDW>R^2. There is also strong evidence in eq. 16 that, the inclusion of variables LD and DU1977 produced even lower elasticity for relative import prices, -0.32, and higher elasticity for income varable. For both long-run regressions 16 and 17, we employed Engle-Yoo corrections (see Engle and Yoo, 1991) and all variables produced statistically significant t-statistics (available on request). Finally, we have inelastic significant relative import prices, and very elastic income varaible as regards the long-run cointegrating import demand regression.

As far as the export demand equation is concerned, the large scale and price elasticities may represent hidden structural breaks, due to substantial change in commodity composition towards high-technology products, product innovation and/or process innovation. In order to see the effects of these on export volume, we developed an index, XCC, which captures the increasing exports of manufactures of LDCs, especially those NICs, in what is regarded high-technology products, whose demand tends to be income and perhaps price elastic. Such an index may then be introduced into the export demand equation to see if allowing for commodity composition, even in such a simple way, has a significant effect on the estimated scale and price elasticities of export demand. Accordingly, one would expect export demand to be positively correlated with this commodity composition index. XCC might also be seen as a proxy for the range of goods traded in the export markets of Turkey, and thus captures the supply effects in the Krugman's sense. Krugman (1989)

suggests that the growth process of the NIC's has been driven by a continious process of product innovation and diversification.

The index, XCC, is constructed in the following way: first, export goods is divided into four commodity groups, (C_1,...C_4). These groups are selected in such a way as to include products with increasing technological content, as we move from C_1 to C_4. The second stage is to construct an index, XCC, which lies over interval [0,1]. Muscatelli *et al*. (1991b) compute a commodity composition index for both Korea and Singapore, and introduce it on the export demand equations. In the case of Korea, the index proved to be a significant determinant of demand for export volume, and led to an improvement in the model, whereas no significant commodity composition effect was detected in the case of Singapore. We follow Muscatelli *et al*. (1991b) and Utkulu (1995) in constructing the index, and in choosing a symmetric distribution for the weights [i.e. the weights chosen are: a_1=0,a_2=0.33,a_3=0.67,a_4=1, over the interval (0,1)]:[26]

$$XCC_t = \frac{\sum_{t=1}^{4} a_t C_t}{\sum_{t=1}^{4} C_t}$$

Regarding the export equation (17), as expected, inclusion of the export commodity composition index, XCC, in log terms resulted in smaller income and price elasticities. This is so because the commodity type effects are implicitly captured by the income and price effects if they are not represented in the regression. As we understand from equation (17), export commodity composition change from agricultural to manufacturing / technology intensified products can statistically explain the increase in Turkish export volume towards the EU. This also shows the significant effect of product/process innovation processes undertaken in Turkey. Equation (17) produced price and income elasticities close to unity.

We also test for cointegration with breaks using the methodology suggested by Gregory and Hansen (1996). This methodology examines the presence of cointegrated relationship under possible regime-shifts and use suggest three different models. In this paper we prefer the model 3, i.e. regime shift (C/S) (see Gregory and Hansen, 1996, 103). Using the model with regime shift (C/S) one gets some

tests statistics including ADF*. The corresponding critical values are obtained from Gregory and Hansen (1996, 109). Regarding our analysis, the ADF* test statistic provides empirical support for the presence of cointegration with possible breaks among the variables concerned (available on request).

Unique cointegrating vector (Johansen, VAR)

We now test if this is the only cointegrating vector or not by applying the Johansen ML VAR test procedure (Johansen, 1988). Our results confirm the unique cointegrating vector for both export and import models. Table 4 shows the results.

Table 4 . Johansen ML test for cointegration (Maximum Eigenvalue Test / VAR=1): Import and Export Models

Import Demand Model			
Null	Alternative	Test Statistic	Critical Value (5% sign.level)
r= 0	r=1	40.18	28.72
r≤1	r=2	14.58	22.16
r≤2	r=3	8.01	15.44
Export Demand Model			
Null	Alternative	Test Statistic	Critical Value (5% sign.level)
r= 0	r=1	59.94	31.79
r≤1	r=2	17.69	25.42
r≤2	r=3	6.29	19.22
r≤3	r=4	4.97	12.39

Note: Critical values are obtained from MacKinnon (1991).

Endogeneity bias and comparison of different approaches

However, the long-run OLS estimators are biased if the explanatory variables are not weakly exogenous. Only if they are weakly exogenous, we can assume away the 'endogeneity bias'. If not, an appropriate correction for OLS estimators will be necessary. As mentioned earlier, EG argue that a simple way to check the weak exogeneity of, say, explanatory variable X_t for the longrun and shortrun parameters of interest is to estimate an ECM for X_t and test the statistical significance of the errorcorrection term using a traditional t-test. If the t-statistics is significant, then X_t can no longer be treated as weakly exogenous.

Our calculations show that as regards the import model *LRPM* and *LD* are not weakly exogenous

[26] For details of the definition of XCC see Appendix.

while all explanatory variables are endogenous and cannot be treated weakly exogenous. Accordingly, we apply the fully modified ECM method to get the long-run estimators which are free from 'endogeneity' bias. Employing the methodology suggested by Inder (1993), we get the fully modified unrestricted ECM estimates:

Table 5 reports the long-run estimates obtained by using different approaches. Results reported in Table 5 suggest that our long-run estimates are quite robust. For better comparison, we also calculate the fully modified Phillips-Hansen estimator, free from nuisance parameter effects (Phillips and Hansen, 1990), and the asymptotically efficient dynamic OLS estimates of Saikkonen (Saikkonen, 1991).

Table 5: Estimates of our long-run relationship: a comparison of different approaches

Variable	*Static EG OLS (Engle&Granger)*	*Fully Mod. Unr. ECM (Inder)*	*Dyn.. OLS (Saikkonen)*	*Fully Mod.OLS Phillips&Hansen*
Import Demand Model				
LRPM	-0.37	-0.26	-0.56	-0.34
LYD	3.33	3.21	3.76	3.38
LD	-0.25	-0.27	-0.38	-0.26
Export Demand Model				
LRPX1	-1.19	-1.28	-0.91	-1.47
LMVEU	0.90	0.92	0.77	1.08
XCC	3.95	5.61	5.19	3.52

Note: Own estimates.

It is important to point out that long-run estimates reported in Tables 5 are free from possible endogeneity bias. Note that long-run estimates by different methods are quite robust, and well competible with the EG static estimates reported earlier.

The EU Integraion Effect in the Trade

Following Krugman (1989) it is suggested that if a measure of the range of goods traded in international markets is included in the trade regressions (which we have already done earlier in this paper by including the variable XCC in the export model), together with a proxy for the level of integration in international markets, then the income elasticity declines. This implies that the high income elasticities found in previous works may in fact result from the omission of integration and

supply effects (for an exception see Madesen and Damania, 1994).

So far we made no attempt to measure the impact of integration of markets on foreign trade regarding the integration of the markets of the EU and Turkey over the period 1963-2003. A simple way in which integration factor can be incorporated is by including a time trend in the model. This naturally presumes that the process of integration has been continuous. Thus we include a time trend in the model to allow for the possibility of continuous integration effects. It can of course be argued that the time trend may be measuring some other variables that have been omitted from the cointegrating model. We admit that in the absence of more accurate measure of integration, the precise interpretation of this variable remains ambiguous.

Our empirical results for the import demand model show that time trend is insignificant and the long-run parameter estimates change only slightly when integration effects are allowed for. However, results for export model produce high t-statistics for the time trend. It is also clear that the long-run parameter estimates for the export model change significantly when integration effects are included. This implies that Turkish export demand in the EU market has been significantly affected by the integration process. The following table presents the results for export model (T for time trend):

Export Demand with Integration Effect: long-run

$$\boldsymbol{LXV_t = 0.32 - 0.97LRPX1_t + 0.61LMVEU_t + 3.05XCCt + 0.13DU1987 + 0.03T + \mu'_t} \qquad (17)$$

(1.66) (-5.44) (4.03) (5.45) (1.88) (2.53)

$R^2 = 0.99$ RSS = 0.32 CRDW = 1.92

Sample: annual data (1963-2002) t-statistics are reported in parantheses, having only a descriptive role since the variables are non stationary

The results in equation (9) reveal that the long-run parameter estimates change remarkably when integration effects are allowed for. The long-run income elasticity is 0.61, and well below the estimates in the previous long-run versions. The parameter estimate for relative prices is 0.97 and also below the estimates in the previous parts.

Error Correction Models, ECM / Short-run and Causality

To show the multivariate causal effect, we now apply the Granger causality test. Since, after all, EG OLS estimates were shown to be robust, the estimated lagged residuals may still be used in the ECM as the error-correction term. Table 6 and 7 show the Granger causality test results from the ECMs.

Table 6: Import Demand: Error correction model/ Short-run /Granger causality: multivariate case

Dependent Variable	t-statistic for μ_{t-1}	F-Statistic for ΣΔLMV	F-Statistic for ΣΔLRPM	F-Statistic for ΣΔLGDPV	F-Statistic for ΣΔLD
ΔLMV	-0.62$^{\eta}$	6.54(2)$^{\eta}$	N.S.	29.9(1)$^{\eta}$	N.S.

Note: μ_{t-1} denotes the error correction term. Numbers in parantheses indicate the number of lags. Note that optimum number of lags are determined by applying general-to-specific methodology. Δ represent first differences.
$^{\eta}$ significant at 1% -- N.S. Not significant

Table 7: Export Demand: Error correction model/ Short-run /Granger causality: multivariate case

Dependent Variable	t-statistic for μ'_{t-1}	F-Statistic for ΣΔLXV	F-Statistic for ΣΔLRPX1	F-Statistic for ΣΔLMVEU	F-Statistic forΣΔXCC
ΔLXV	-0.71$^{\eta}$	N.S.	36.4(0)$^{\eta}$	23.7(1)$^{\eta}$	23.9(0)$^{\eta}$

Note: μ'_{t-1} denotes the error correction term. Numbers in parantheses indicate the number of lags. Note that optimum number of lags are determined by applying general-to-specific methodology. Δ represent first differences.
$^{\eta}$ significant at 1% -- N.S. Not significant

We have evidence that explanatory variables Granger cause dependent variables LXV and LMV through two channels: first, they jointly Granger cause the dependent variables through the statistically significant error correction terms and second, some variables have Granger cause effect separately (see the joint significance F-statistics in Table 6 and 7). We have the long-run causal effect via the first one while the second causal effect has a short-run character (Jones and Joulfaian, 1991).

7. Conclusion

On the basis of the cointegration analyses employed, we observe genuine long-run relationships among the statistically significant variables regarding the export and import cointegrating regressions. Our findings suggest that conventional estimates of import and export equations which estimate long-run elasticities in excess of unity may reflect omitted variable bias, and may represent hidden structural breaks. This paper deals with the possible effects of factors such as structural breaks, integration of markets, product innovation, supply, and omitted variables as regards the significance and the magnitude of the income and price elasticities.

The various long-run estimates obtained here reveal that the inclusion of a supply variable (i.e. commodity composition index, XCC), dummies for structural breaks, and a measure of economic integration with the EU significantly lowers both the long-run price and income elasticities for

Turkish exports with the EU. Regardind the import function, the inclusion of dummies for structural break and a measure of import capacity (i.e. external debt stock) lowers the price elasticity although the income elasticity remained high and significant. The corresponding short-run error correction models seem to be well specified and working well.

As regards the debate of conventional wisdom (*elasticity pessimism*) versus alternative paradigm (*elasticity optimism*) on the size and the significance of the income and price elasticities for export demand, we provide some econometric evidence suggesting that both income and price effects have been the driving forces. The Marshall-Lerner condition is moderately satisfied [(-0.37) + (-0.97) = -1.34]. However, the income elasticity for the import demand equation is significant and very elastic (3.33) so that this might have offsetting effects on the exchange rate adjustments.

Overall, estimation results support the view that the success of Turkish exports in the EU export market cannot only be attributed to high level of devaluation occurred especially during the 1980s. Non-price factors such as the exports commodity composition index, XCC, even in such a simple and crude fashion, are shown to be significant to explain the successful export drive of Turkey. When evaluated in the Krugman's sense, our XCC implies significant supply effects in assessing the success story of Turkish export performance.

As mentioned earlier, different estimates of the price and income elasticities of export demand functions lead to different implications for trade policies and different strategies for foreign debt problem of a LDC. In that sense, our evidence suggest that the liberalisation of trade and exchange rate adjustments, together with the increasing demand in the EU, have been effective to lead to a massive boosts in the export growth in Turkey. Low price elasticity for Turkish export demand may not imply price competitive EU export market for Turkey (i.e. exchange rate adjustments matter less).

It is important to note that a recession or stagflationary and protectionist policies in the export markets can easily lead to substantial reductions in export demand, *ceteris paribus*, if world income is a statistically significant factor. Our long-run Turkish export estimates for income variable yields low but statistically significant income elasticity regarding the EU.

Our empirical results suggest that the Turkish import demand from the EU is constrained by its own external indebtness. Significant external debt stock with negative sign in the import demand

regression might have following possible implications: i) the more external debt stock Turkey has, the less import demand the country will have from the EU, ii) the less import demand Turkey has, the less exports earnings the EU gains from Turkey.

Due to data availability problems, we had no choice but to use "*aggregate data*" for trade equations for Turkey. Thus, resulting elasticities need to be used with care and caution. It is important here to note that price elasticities differ across commodity groups, with price elasticities higher for manufactures than for agricultural products. The same also applies to the income elasticities of demand. It is argued that income elasticity of export demand captures all non-price factors excluded from the equation and this can explain why "traditional' estimates of income elasticity are so high. As pointed out recently by Landesman and Snell (1993), highly aggregated export models by their very nature do not effectively address the effects of transformation concerning the types and quality of goods produced and exported. Following Muscatelli *et al*. (1991b), Landesman and Snell (1993), and Utkulu (1995), however, a type of commodity composition index was derived and included in our export demand equation for Turkey. The index proved to be a statistically significant determinant of the Turkish export demand with the EU.

Following two points should be kept in mind for further research. First, it is recently suggested by Faini *et al*. (1992), Muscatelli *et al*. (1991a), among others, that focusing on the single LDC and its trade with the developed world has tended to ignore the problem of intra-LDC competition in export markets. Thus, future research can focus on which LDCs compete with Turkey in export markets to sort out the importance of intra-LDC competition for Turkey. Second, it is also argued in the literature that intra-LDC trade has some characteristics (such as larger learning by doing effects) that will lead to additional gains in productivity for the economy as a whole. Whether this is valid for Turkey or not, is an open field for further research.

Appendix

Data Sources

The data used in this study are annual for the period of 1963-2002 and are taken from the following sources: IMF, International Finacial Statistics; CBRT (Central Bank of Turkish Republic); SPO (State Planing Organization / Turkey); SIS (State Institute od Statistics / Turkey).

Definitions of the Variables

XV: Exports of goods, volume index (1980=100) constructed on the basis of the following formula:

XV = X$ / PX

where X$ and PX represent total exports to the main six traditionally trading countries within the EU, namely Germany (GER), France (FRA), Italy (ITA), UK, Nedherlands (NED) and Belgium (BEL) (which forms about 85% of the total Turkish exports to the EU) in US dollars, and export price index in US dollar terms respectively.

RPX: Relative export prices, that is the ratio of export prices of Turkey to the prices that Turkish companies face in the export market (i.e. world prices), both expressed in US dollar terms. It can also be referred to as "export price competitiveness" or "real exchange rate" of the country (for same sort of real exchange rate definition and various measures of competitiveness, see e.g. Shone, 1989). We use three different measures for RPX: RPX1, RPX2 and RPX3.

RPX1 = PX / PMEU

$RPX2_t$ = PX / PXASIA

$RPX3_t$ = PX / TUFEEU

where

PX is the US dollar-based export price index of Turkey (1980=100).

PMEU is the US dollar based-import price index of the EU countries of UK, GER, ITA, NED (average). (1980=100)

PXASIA represents the US dollar based-export price index of the Asian countries (average) (1980=100)

TUFEEU stands for the consumer price index of the EU countries of UK, FRA, GER, ITA, NED, BEL (average). (1980=100)

YEU: The real income (GDP) expressed as an index (1980=100) in the EU export market facing Turkey. GDP volume index of the EU countries of UK, FRA, GER, ITA, NED, BEL (average) (1980=100)

MVEU = MEU / PMEU

MVEU is the total real imports of the EU countries UK, GER, ITA, NED expressed as volume index (1980=100) where MEU and PMEU represent total imports of the EU countries UK, GER, ITA, NED in US dollars, and average import price index of the EU countries UK, GER, ITA, NED in US dollar terms respectively.

RPM = PM / PD

RPM is the relative import prices, that is the ratio of import prices of the EU facing Turkey **(PM)** to domestic prices (wholesale price index) **(PD),** both expressed in US dollar terms. It can also be referred to as "import price competitiveness" where

YD: GDP volume index of Turkey (1980=100).

RES: The ratio of non-gold international reserves of Turkey expressed in US dollar.

INFLOW: It represents foreign exchange inflows to Turkey. Annual earnings of total exports in US dollars.

D: External debt stock of Turkey expressed in US dollars.

DU1977: $DU1977_t = 1$ if $t > T_{1977}$ and 0 otherwise.

DU1987: $DU1987_t = 1$ if $t > T_{1987}$ and 0 otherwise.

XCC: The commodity composition index, XCC, is constructed in the following way: first, export goods is divided into four commodity groups, (C_1,...C_4). These groups are selected in such a way as to include products with increasing technological content, as we move from C_1 to C_4. The second stage is to construct an index, XCC_t, which lies over interval [0,1]. We follow Muscatelli *et al*. (1991b and Utkulu (1995) in constructing the index, and in choosing a symmetric distribution for the weights, i.e. the weights chosen are: $a_1=0, a_2=0.33, a_3=0.67, a_4=1$, over the interval [0,1]:

$$XCC_t = \frac{\sum_{t=1}^{4} a_t C_t}{\sum_{t=1}^{4} C_t}$$

Commodity Groups for the Index, XCC (the difference between the two versions of SITC, namely SITC Revised 2 and SITC Revised, has also been taken into account by converting SITC Revised into SITC Revised 2):

C_1: Total exports of agricultural products and crude materials, (SITC Revised 2 groups, 0 and 2).

C_2: Total exports of traditional manufacturing sectors, (SITC Revised 2 groups, 61, 62, 63, 64, 65, 69, 84, 85, 89).

C_3: Total exports of scale-intensive sectors, (SITC Revised 2 groups, 51, 58, 66, 67, 68, 76, 78, 79).

C_4: Total exports of specialised supply and science-based sectors, (SITC Revised 2 groups, 71, 72, 73, 74, 75, 87, 88).

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