The link between trade liberalization and economic growth: "A case study: Turkey"

Cem Çakmaklı [1]   **Öner Günçavdı** [2]

Abstract:

This paper represents a structural analysis of international trade and its possible relationship with economic growth in Turkish economy that has undergone an extensive policy change in 1980, moving from and inward-oriented policy to an export oriented one. The paper investigates the traditonality of sectors in disaggregate level as well as the product and market diversification of the Turkey in export at aggregate level. Using several indexes and employing the median polish method non-parametric tests, we found out that Turkey experienced divergent patterns in three different sub periods, namely the period of high protectionism (1967-1979), the more liberalised period (1980-1994) and the period of Customs Union with EU (1995-2002). Despite the impressive export expansion in 1980's, the increase in product diversification in 1980 exhibits a temporal pattern with an increase in diversification replaced with decrease by late 1980's. Furthermore, beginning mid 1990's there is an increasing trend in both product and country diversification on account of the inclusion of more capital intensive sectors to export composition. Additionally, our econometric investigation revealed a positive link between export growth and econometric growth and highly significant relation between export stability and economic growth, indicating the importance of the stability in export as a possible outcome of trade liberalization.

Key Words: Product and Country Diversfication, Stability in Export, Median Polish, Panel Data, Turkey

JEL Classification: F14, F40, F41, F42, F43

---

[1] Corresponding Author: Istanbul Technical University, Department of Management Engineering   Teaching Assistant . E-mail: cakmaklic@itu.edu.tr

[2] Istanbul Technical University, Department of Management Engineering Prof. Dr. E-mail: guncavdi@itu.edu.tr

1. Introduction

If the trade liberalization and increased openness lead to a higher rate of economic growth has been one of the most controversial issues in growth and development literature for years. Trade liberalization and outward orientation may influence economic growth in several ways. From the point of export orientation, there are several conceptions about the link between export expansion and economic growth. An increase in export may promote specialization in the production of exported good, which in turn may increase the productivity level and cause the general level of efficiency to rise in the export sector. Moreover the increase in the demand enables the exploitation of the economics of scale in case of increasing returns to scale. In this context, the link between export expansion and economic growth has been intensively investigated by several economists both from theoretic and empiric point of view (Michaely (1977), Balassa (1978), Moschos (1989), Bahmani-Oskooee (1993), Esfahani (1993)). Although for a number of developing countries it appears a causality relation between economic growth and export growth, empirical results differ substantially across countries[3].

The effect of trade on growth mostly related to how openness influences technological structure of the country. There are several key mechanisms through which trade and growth are related. Most of these mechanisms based on the endogenous growth, in that, trade influenced the economic growth by means of technological advances in the economy. Firstly, international trade can affect economic growth by reallocating resources among relatively more efficient sectors and industries. For instance, an expansion in exports may lead to a reallocation of resources from the relatively inefficient non-trade sector to the higher productive export sector, which in term may boost the productivity level of the economy and this productivity change may lead to output growth. In addition to this, international trade base on the technology and knowledge transfers between any two countries. The outward oriented trade policy may give access to advanced technologies, learning by doing gains, and better management practices (Ben-David and Loewy (1998)). So the trade restrictions reduce flows of technological information across countries and this has a negative effect on long-run growth. However, the impact of these flows on economic growth may be limited if the domestic production base has deficiencies in adopting the new knowledge efficiently (Young (1991)). In addition to this, trade liberalization increase the degree of competition, thus firms and agents may increase their innovative activity and thus stimulate economic growth as a whole.

The link between trade liberalization and growth performance depends on various other factors such as country, region, policy implications and other aspects. Rodriguez and Rodrik (2000) have argued that trade plays a secondary role compared to the factors such as geographical and institutional aspects. They questioned one effect of free trade that it generates technological and other positive (institutitional) spillovers to the rest of the economy. Furthermore, Rodrik (2004) lists some of the policy side-conditions such as sustainability and credibility of the liberalization policy including monetary and fiscal policies and market conditions necessary for a trade liberalization resulting in an improvement of economic performance.

Moreover, the above mentioned effects of trade liberalization not only on exports but also on the diversification of exports have gained increasingly importance. Alongside the expectations that outward-oriented countries grow more rapidly, there is another conception that economic development is associated with structural change in exports and increased export and country diversification. In the case of developing countries, this point becomes

---

[3] For a broad review please see Edwards, 2003

more important. New questions arise whether export diversification would bring a growth in export earnings and further a stability in export pattern (Erlat and Sahin (1998)). Thus such a stability in export pattern may cause to export expansion and further economic expansion. In this content, the aim of this paper is to investigate the export pattern of the sectors and advances in export and country concentration of Turkish export. Furthermore the link between trade liberalization and growth is tested not only based on the export growth and output growth but the pattern of the export and openness are also taken into account. Section 2 briefly describes the economic performance of Turkey with a emphasis on international trade since 1960's. In section 3 and section 4 we investigated the product and country diversification of the Turkish export respectively. In section 5 we employed an econometric investigation and section 6 includes the concluding comments based on the result in preceding sections.

2. Historical Overview of Turkish Experience

During 1960's and 1970's Turkey followed an inward-oriented growth strategy in which import-substitutionist industrialization (ISI) policies were the center of this policy. During the first and second development plans between 1963 and 1973 annual import programs (liberation list, quota list, import credits, tariffs) had served as the major important policy tools. On the other hand, these tools followed an import substitution pattern that caused a restrictive structure on import. The period of first development plan (I. DP) between 1968 and 1973 was subject to the target of industrialization with the heavy emphasis of production of basic consumption goods. Differing from I. DP, the II. DP was mainly affected by the balance of payments difficulties, which constituted the roots of import substitution policies (Krueger, 1974). The role of the foreign trade policies in the dominant point of view of this era was the protection of the domestic production against the foreign competition. Moreover, the overvalued constant exchange rate regime and low real interest rates were the other tools to attain the capital and intermediate goods required for the production by means of import.

Accompanying to these inward-oriented policies, the convenient conjuncture and the trade boom in 1970's together with Structural Adjustment Program (SAP) and the following devaluation assists also to the export and GDP expansion (Celasun and Rodrik, 1989). In the same way, despite the mediocre growth of agriculture sector between 1963-1973 (%2.3 on average) the average growth of GDP was %6.7. As explicitly indicated in development plans, the priority was given to the industrial development and as a result of this the average growth of the manufacture sector was %10.1 on average (Yenturk and Kepenek, 2000). Another important point in this period is that the state owned enterprises (state economic enterprises (SEE's)) were established not only in social and service sector but also in mining and manufacture sectors as a consequence of the heavy emphasis on the self-sufficiency issue. The public was the base of the investment and production in order to reach the target of rapid industrialization via the SEE's (Metin-Ozcan et al, 2001).

Following this period, the main target of the III. DP (1973-1977) was the acceleration and deepening of the industrialization. This was a period of investment boom in that the share of investments to GDP had increased to %25 in 1977 from %18.1 in 1972 mostly on account of public investment. On the other hand, despite the investment and growth boom in this period, the structural problems were still on the agenda of Turkey. The investment and growth boom were financed mostly by heavy borrowing and imports, thus as a result of these policies imports grew but exports stagnated. The heavy borrowing soon caused to high external debt in which the share of short-term debts had increased rapidly. Consequently, the widening current account deficit became a restriction after years again. This shortage of the foreign exchange restricted the inflows of the import mostly import of the capital goods required for the

production and capacity growth. The balance of payments indicators between 1973 and 1979 are summarized in table 1.

Tabel 1 Balance of Payments (Millions of U.S. Dolar)

	Export	Import	Trade Balance	Workers Remittances	Current Account Balance	Terms of Trade
1973	1799	2391	-592	1183	515	1.0
1974	2123	4183	-2060	1426	-780	
1975	2152	5219	-3067	1312	-1892	
1976	2742	5735	-2993	983	-2295	
1977	2556	6436	-3880	982	-3572	0.8
1978	3106	5059	-1953	983	-1710	
1979	3257	5699	-2442	1694	-1771	0.7

Source: World Bank, IMF and Ministry of Finance in Öniş ve Riedel (1993)

By late 1970's as the recession and the political instability increased, it was apparent that the policies of 1970's were no longer sustainable. As a result, in January 1980 a new stabilization program was introduced which was a turning point for the Turkish economy in that it was an outward and market oriented strategy first time in the recent history (Togan, 1994). This new program had increasingly export oriented regulations and liberalization reform, thus the pricing reforms were accompanied by liberalization in the trade of goods and by the export incentives. In addition to this, the domestic demand was suppressed by means of lowering of wages in real terms and the elimination of the agricultural support prices. These policies not only created an output surplus for the export but also created a convenient environment with low factor prices (labor). Also gradual liberalization of imports and a massive devaluation followed a process of continual depreciations supported the export expansion. Moreover, the far reaching export promotion schemes were one of the most important motives of this rapid growth. The introduction of the new structural adjustment program caused to an impressive export expansion in that the exports which was 2910 million $ in 1980 quadrupled till 1990. Not only the value of the export changed so rapidly but also the content of the exported goods changed drastically. As a consequence of tenfold increase of manufacturing exports, the share of it in total exports had raised from 34.6 percent in 1980 to 79 percent in 1990. Additionally, the second oil shock and the Iran-Iraq war had played a key role in this export expansion, because Middle East and North African countries (MENA) together with Turkey's already traditional trade partner European Union (EU) were the major destination of Turkish export. Especially, the increasing demand resulting from Iran-Iraq war and new opportunities in MENA countries created a convenient environment to compensate the decreasing export demand of OECD countries that were in recession on account of second oil shock.

As one of the basic export industry, textile was the leading manufacturing sector as its share raised to %31.3 of total exports in 1990 from %14.5 in 1980. On the other hand iron and steel products played also a key role mainly because of the demand of MENA countries most notably Iran and Iraq. By 1990, the share of these products in total exports was %12.4 (Taskin and Yeldan (1996)). Although not as high as the textile and iron-steel industry, hides-skins and chemicals industry also had a relatively high share in total exports.

At the beginning of the 1990's, those favorable export conditions have mostly been changed. In 1990's exports are carried out within a more competitive framework in a more normalized atmosphere. On the other hand, duty allowances on imports has continued until 1990 and preferential and subsidized export credits have become a dominant way of supporting exports (Kepenek (2000)). Furthermore, Turkey unified its customs with the EU starting from the beginning of 1996, thus the trade liberalization of Turkey extends to a higher

degree and the overall export environment has changed. In addition to the traditional sectors such as textile-clothing, iron-steel, and vegetables and fruit, some capital intensive sectors such as electric-electronics and road vehicles have also become an increasing share in total exports during this period. The share of main sectors in total export is represented in table 2 to give brief summarize of the evaluation of Turkish export.

Table.3. The Share of Main Sectors in Total Export

	Agriculture	Mining	Industry
1970	75	7	18
1980	57	7	36
1990	17	3	80
1995	10	2	88
2000	7	1	91
2001	7	1	92
2002	6	1	93
2003	5	1	94

Source: SPO, SIS

On the other hand, alongside to the developments in foreign trade, Turkey experienced a relatively volatile domestic environment during 1990's. The erratic movements in the current account after the financial liberalization in 1989, increasing trade deficit (from an average of %3.5 of GDP between 1985 and 1988, to %6 between 1991 and 1993) and heavy depreciation of the fiscal balances were the consequences of the unsustainable populist policy practices, financed mostly by the capital inflows. Thus, the economic crisis in 1994 and 2001, which resulted in deep recessions and heavy devaluations of TL were inevitable. The main characteristics of these crises was, that a decrease in imports accompanies to the economic recession. This fact stems from the heavy dependence of the Turkish production to the imports, in that, capital goods and intermediate goods have a share of around %90 of the total imports for the past three decades. This clearly indicates that Turkish firms, most notably manufacturing firms, have acquired almost all of their production technologies from abroad until very recently.

### 3. Product Diversification of Turkish Exports

Firstly, we want to analyse the international trade patterns of the Turkish Economy by means of several tools. We used two-digit export data based on the SITC Rev.3 classification from the State Institute of Statistics (SIS) for the years 1967-2004 to drive empirical measures of the "traditionality" of specific exported commodities as well as measures of the degree of export diversification and structural change in Turkish trade with the rest of the world. There also some other studies in the literature, which also measured the degree of product diversification in export in similar and different ways. Pineres and Ferrantino (1997, 1999) for Chile and Colombia, in Togan (1994), in Erlat and Sahin (1998), and in Erlat (1999) for Turkey are some of those studies. In the first step, we calculated a cumulative export experience function (CEEF) based on the calculation in Pineres and Ferrantino (1997, 1999).

$$c_{it} = \frac{\sum_{t0}^{t} e_{it}}{\sum_{t0}^{t1} e_{it}}$$

The equation below presents the values of the function, which we called export experience

index, for a specific export commodity $i = 1,2\ldots65$ (there are 65 different commodity types in two digit SITC Rev.3 classification) in a specific year t. where $t = 1967,1968\ldots2004$

The variable c_{it} is the ratio of the cumulative exports from the initial year t_0 until the year t to the cumulative exports in the whole period (in this case 1967-2004), thus it takes on values near 0 in the initial year and rises to 1 in the final year. Plotting the values of the c_{it} together makes us enable to differentiate the commodities whose export were concentrated earlier or equally in each year ("traditional" commodity in export) from the commodities whose export took place later in the period in that they would have a CEEF right (for the reader)(convex) in the figure.
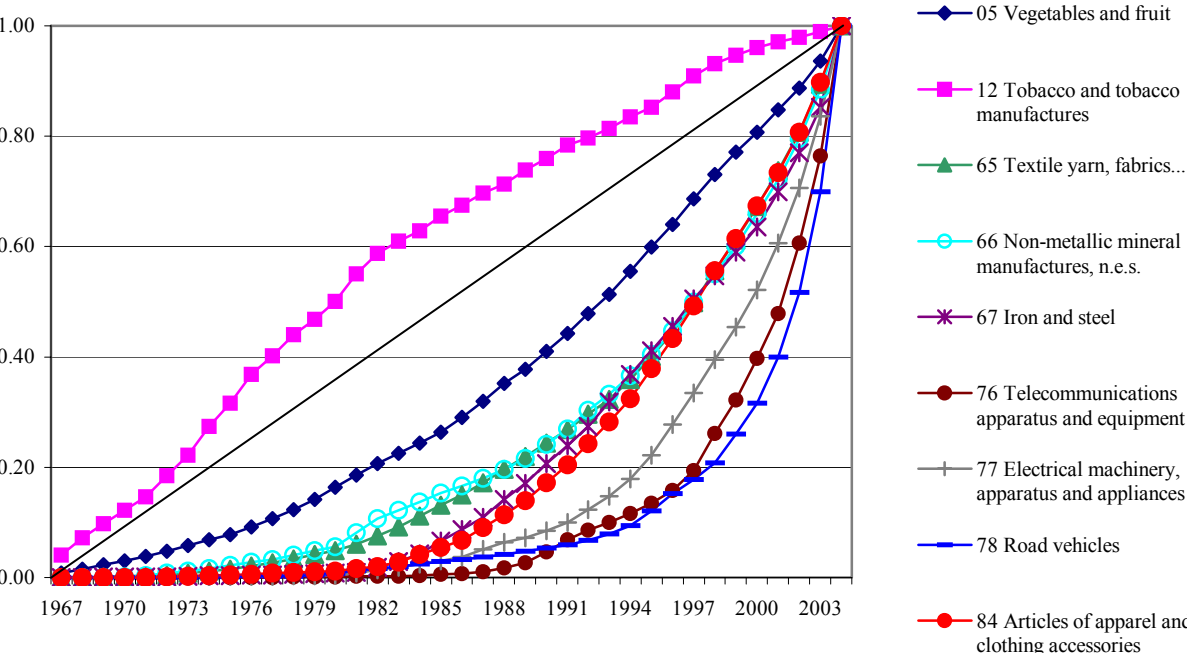
Figure 1. Cumulative Export Experience Functions

Fig. 1 illustrates CEEF's for the more important nine commodities in Turkish exports including mainly the more exported commodities in these 38 year, that being 05 vegetables and fruits, 12 tobacco and tobacco manufactures, 65 and 84 products of textile and clothing industry, 66 non-metallic manufactures, 67 iron and steel, 77 and 78 electrical machinery and electronics and 78 road vehicles. It is easy to differentiate the commodities into three sub-groups, namely first group including the most traditional commodities in export in the whole sample period mainly the agricultural primary products such as 05 vegetables and fruits and 12 tobacco and tobacco manufactures, second group including the commodities which become more traditional in the export oriented period after 1980 mainly products of labor and scale intensive manufacturing sectors (according to the definition used by OECD) such as textile and clothing, non-metallic mineral manufactures and iron and steel and finally commodities whose exports has accelerated in 1990's and 2000's mostly scale intensive (road vehicles) and differentiated commodities (electrical machinery & electronics). On a pure reading of the data, figure 1 leads us to draw such a conclusion that although the most traditional commodities in Turkish export experience are the primary products, there is a strong structural shift in the traditionality of export towards the labor intensive manufactures in 1980's and towards the more capital intensive products since the mid 1990's, reminding us the "product cycle" theory.

In addition to the figure 1, in order to be able to rank the commodities from most traditional to the least, we calculate the mean of the c_{it} 's, called traditionality index, to obtain a quantitative representation of the CEEF's of the full set of two-digit export commodities.

$$T_i = \sum_{t_0}^{n} c_{it} \Big/ t_1 - t_0 + 1$$

So the most traditional commodities in export would have a traditionality index of 0.5 or close to 0.5 (if the commodity is exported equally each year) whereas the least have close to 0.026 (1/38, if the commodity is exported only in last year and where 38 is the number of years in the whole sample period).

Table 1. Temporal Sequencing of Turkish Real Exports, 1967-2004

Commodity	Traditionality Index	Rank	Variance of traditioanlity	Cumulative Real Exports (1982)
00 Live animals	0.48753	1	0.01120	43.976
26 Textile fibres	0.48191	2	0.00189	111.690
12 Tobacco and tobacco manufactures	0.39691	10	0.00232	94.769
27 Crude fertilizers	0.37155	12	0.00130	69.119
05 Vegetables and fruit	0.36222	14	0.00055	453.777
04 Cereals and cereal preparations	0.35397	15	0.00859	63.671
33 Petroleum, petroleum products and related materials	0.31999	19	0.01979	122.859
06 Sugars, sugar preparations and honey	0.29150	24	0.01885	30.021
42 Fixed vegetable fats and oils, crude, refined or fractionated	0.28925	25	0.00320	30.433
68 Non-ferrous metals	0.26484	27	0.00507	48.642
66 Non-metallic mineral manufactures, n.e.s.	0.25532	29	0.00405	121.839
65 Textile yarn, fabrics, made-up articles	0.25109	31	0.00233	505.774
72 Machinery specialized for particular industries	0.24275	34	0.01331	35.243
67 Iron and steel	0.22615	40	0.00655	354.246
84 Articles of apparel and clothing accessories	0.22216	42	0.00658	884.319
55 Essential oils and resinoids and perfume materials...	0.20693	44	0.00431	34.574
74 General industrial machinery and equipment	0.19835	46	0.01611	41.860
69 Manufactures of metals, n.e.s.	0.19796	47	0.00568	74.207
62 Rubber manufactures, n.e.s.	0.18905	49	0.00915	49.812
77 Electrical machinery, apparatus and appliances...	0.16654	53	0.00336	143.947
89 Miscellaneous manufactured articles, n.e.s.	0.16517	54	0.00424	75.937
71 Power-generating machinery and equipment	0.15437	58	0.01047	46.001
79 Other transport equipment	0.12994	59	0.00911	43.109
76 Telecommunications and sound-recording... apparatus	0.12669	61	0.00722	104.394
78 Road vehicles	0.11807	64	0.00710	208.612

Differing from the literature, to confront the commodities that have a traditionality score higher than 0.5 (because their exports occurred early in the sample period and decreased in recent years and therefore have higher c_{it} 's in the beginning of the sample period), we subtracted their traditionality scores from 1 relying on the symmetry of the traditionality scores around 0.5. Doing such a correction enable us to compare the commodities, which were ones traditional but lose their traditional structure in recent years, with the commodities that are exported mostly in recent years and thus becoming traditional in recent years. In doing so, we regard the traditionality scores as closeness to the full traditional structure (tradionality score = 0.5). A sample of commodities with their traditionality score is represented in table 1. The underlined commodities are the commodities that have a traditionality index higher than 0.5 and therefore subtracted from 1.

As a quantitative representation of the figure 1, table 1 exhibits the same information about the traditionality of the commodity groups in export that the primary goods mostly

based on agriculture and livestock are the more traditional commodities in export. Additionally the labor intensive manufactures such as textile and manufactures have the middle ranks whereas the capital intensive manufactures are mostly in the last places of the ranking according to traditionality scores. Performing pairwise comparisons using parametric tests may further enhance the information about statistically significant differences between the traditionality of commodities. Moreover, to observe the changes in traditionalities of commodities in structurally different sub-periods we calculated the traditionality indexes of commodities in three different periods regarding the different foreign trade policies of Turkey, namely the protectionist import substitution period between 1969 and 1979, the export oriented period between 1980 and 1994 and the more liberalized period between 1995 and 2004. Furthermore the last period includes the customs union treaty with EU, so that we can capture the effects of the customs union with EU on foreign trade of Turkey. Dividing the whole period to such three subperiods makes it possible to capture the differences between subperiods as well as between the commodity groups and the interactions between commodity groups and the subperiods. Table 2 represent the traditionality scores calculated regarding the subperiods with ranking of the commodities according to their traditionality index.

Table 2. The Traditionality Indexes of the Commodity Groups for three Subperiods and the Results of Median Polish Method

Commodity	T.I. (67-79)	Rank	T.I. (80-94)	Rank	T.I. (95-04)	Rank	Commodity Effects (Row Effects)
00 Live animals	0.48791	7	0.45186*	16	0.23730*	64	+
04 Cereals and cereal preparations	0.23606	59	0.47548	7	0.41757*	42	-
05 Vegetables and fruit	**0.45154**	**21**	**0.46843**	**10**	**0.47096***	**18**	**+**
06 Sugars, sugar preparations and honey	0.34994*	46	0.40137	36	0.45370*	29	-
12 Tobacco and tobacco manufactures	**0.48195***	**8**	**0.39561***	**41**	**0.35116***	**59**	**-**
26 Textile fibres	0.46322*	15	0.40756*	32	0.4051	47	+
27 Crude fertilizers	0.39752	36	0.49939	1	0.47758	14	+
33 Petroleum, petroleum products and related materials	0.49876*	1	0.48655	4	0.42304	39	+
42 Fixed vegetable fats and oils, crude, refined or fractionated	0.46173	16	0.40289	34	0.49050*	8	+
55 Essential oils and resinoids and perfume materials...	0.47182	12	0.38745	43	0.49756*	3	+
62 Rubber manufactures, n.e.s.	0.49157*	4	0.33396	54	0.44086	32	-
65 Textile yarn, fabrics, made-up articles	**0.31852**	**52**	**0.44629**	**17**	**0.47327**	**15**	**+**
66 Non-metallic mineral manufactures, n.e.s.	**0.33429**	**50**	**0.46183**	**12**	**0.45859**	**27**	**+**
67 Iron and steel	**0.42183**	**27**	**0.36681**	**46**	**0.44041**	**34**	**-**
68 Non-ferrous metals	0.41566*	30	0.4163	27	0.472	17	+
69 Manufactures of metals, n.e.s.	0.35731	45	0.42723	22	0.41611	43	-
71 Power-generating machinery and equipment	0.27788	55	0.43068	21	0.3918	51	-
72 Machinery specialized for particular industries	0.38542	41	0.49888	2	0.42467	37	-
74 General industrial machinery and equipment	0.39709	37	0.44347	18	0.41338	45	-
76 Telecommunications and sound-recording... apparatus	**0.18971**	**60**	**0.27856**	**59**	**0.35716**	**57**	**-**
77 Electrical machinery, apparatus and appliances...	**0.36322**	**44**	**0.34352**	**52**	**0.43425**	**36**	**-**
78 Road vehicles	**0.24674**	**58**	**0.41323**	**29**	**0.3212**	**60**	**-**
79 Other transport equipment	0.38756	39	0.27322*	61	0.39064	52	-
84 Articles of apparel and clothing accessories	**0.33119**	**51**	**0.35105**	**51**	**0.49569**	**4**	**-**
89 Miscellaneous manufactured articles, n.e.s.	0.46330	14	0.39053	42	0.41543	44	-
Period Effects (Column Effect)	0		-		+		

*The commodities which has traditionality index higher than 0.5 and therefore subtracted from 1
 The commodities written bold are those plotted in figure 1

As table 2 clearly indicates most of the primary goods and agricultural raw materials are the more traditional commodities in the first period whereas the capital intensive commodities are the last ones. In addition to this the traditionality gap between the commodities is relatively high in the first period in comparison with the proceeding periods. The second period, when the export oriented policies were on the agenda of Turkey can be recognized as a transition period where some of the primary goods lost their traditionality in export (00 Live animals, 12 tobacco and tobacco manufactures, 26 textile fibres), while other commodities mostly labor intensive ones (65 textile yarns…, 66 non-metalic mineral manufactures, 69 manufactures of metal) gain stability (in our context "traditionality") in export. It also should be added that the difference between the traditionality of the commodities decreased in this period in comparison with the first period indicating that most of the commodities experience an increasing pattern in export in this subperiod. In the third period when the treaty of customs union has come into force and a more liberalized market was established the labor intensive manufactures (65 textile yarns…, 84 articles of apparel…) which had a more stable pattern in the second period have become more traditional in export and furthermore some capital intensive goods (76 telecommunications and sound recording and reproducing apparatus…, 77 electrical machinery…, 84 articles of apparel and clothing..) has been added to the commodities which are traditional in export sector of Turkey. It also has to be noted although 78 road vehicles has a more traditional pattern in the last period in comparison with the first period it has a low traditionality score because of its still accelerating export which cause a less stable pattern.

In order to deepen our analysis we wanted to employ a two-way analysis of variance (ANOVA) to capture the differences between the periods and commodity groups and the interactions between them, but to get reliable inferences, at first it has to be checked the normality assumptions of the ANOVA. We performed some normality tests (Anderson-Darling and Kolmogorov-Smirnov), which based on the significance of the difference between the actual values of a distribution and the required values of a normal distribution (Castellan and Siegel, 1988). The results of the normality tests are represented in table 3.

Table 3. The results of the normality tests

Tests	Period 1	Period 2	Period 3
Anderson-Darling (p value)	<0,005	0,007	<0,005
Kolmogorov-Simirnov (p value)	0,037	<0,010	<0,010

As table 3 clearly indicates none of periods have normally distributed traditionality indexes in 5 percent significance level, which leads us to perform more robust non-parametric methods exploiting the information based on the ranks of the commodities which confirms more to the traditionality index type variables. Therefore we used the median polish method, which is similar to ANOVA but uses median rather than mean of the distribution. The underlying motive of this approach is that every value in a distribution based on a common value, a raw effect (in our case commodity effect), a column effect (in our case the period effect) and the random errors that are unpredictable (Senesen, 2004). In performing the median polish method we would be able to differentiate the commodity effects and the period effects in Turkish exports. The results of the median polish are also presented in table 2. The commodities with gray colored background are the commodities, which have in general higher traditionality that means having a more stable pattern in export in comparison with the other commodities. Supporting the information inferred from table 1 and figure 1, the median polish results in table 2 indicates that the more traditional export commodities are the primary goods and the labor intensive manufactures whereas capital intensive manufactures are less traditional in export and therefore have a negative row effect (commodity effect). In addition

to this, some of the primary goods (04 cereals and cereal preparations, 12 tobacco and tobacco manufactures) have lost their traditional characteristics in export so much in the third period that in general they can be treated as less traditional commodities in comparison with others.

On the other hand, two different signed period effects can be inferred from median polish method. The period effect of the first period is zero while the other period effects are obtained via comparisons with the first period. The effect of the second period is minus indicating that most of the commodities have an increasing pattern in the second period and thus have lower traditionality index scores. Opposite to second period third period has positive column effect indicating that in general commodities have more stable patterns in export in the last period when customs union with EU has been carried out supporting our conclusions based on the traditionality index scores in the last period.

Based on the results in table 2, we also investigated statistically significance of the correlations between three subperiods in Turkish export in order to capture the effects of different foreign trade policies. Therefore we calculated the rank correlation coefficients which are more robust towards outliers and more convenient for general population distributions (Newbold, 2000). In addition to the pairwise comparisons via the rank correlation coefficients we also performed Friedman p test in order to compare the traditionalities of the commodities regarding three subperiods rather than pairwise comparisons. The underlying assumption of the Friedman p test is that if there is no significant difference between three subperiods, than a ranking of a single commodity's traditionality indexes calculated for each subperiod would yield random ranks rather than systematic pattern (Siegel and Castellan, 1988). Consequently, the sum of the ranks of the commodities would be equal for each subperiod if there is no significant difference between periods. The rank correlation coefficients with their probabilities and the results of the Friedman p test are presented in table 4 and table 5 respectively.

Table 4. Spearman Rank Correlation Coefficients

		Period 1	Period 2	Period 3
Period 1	Coefficient	1,000	0,015	0,216
	Signifcance	.	0,911	0,097
	N	60	60	60
Period 2	Coefficient	0,015	1,000	0,183
	Signifcance	0,911	.	0,145
	N	60	65	65
Period 3	Coefficient	0,216	0,183	1,000
	Signifcance	0,097	0,145	.
	N	60	65	65

Table 5. The results of Friedman p test

Period	N	Sum of the ranks
1	60	107
2	60	109
3	60	144
Total	180	
P = 14,43	S.D.=2	p=0.001

As table 4 and table 5 clearly indicates there isn't any significant correlation between the subperiods based on the ranking of the commodities according to their traditionality in export. This result support our conclusions that the ranking of the commodities differ in each period that while mostly primary products were the traditional commodities in export in the first period, in the second period when the export oriented policies were practiced, labor intensive commodities were the more traditional commodities in export. In the more liberalized third period including the treaty of customs union with EU, the ranking of the commodities differ from the first two period indicating that while the labor intensive commodities still have stable patterns in export the capital intensive differentiated products such as the products of electric-electronic industry and automotive industry become more traditional commodities in export in comparison with the prior periods.

This results lead as to investigate the diversification in Turkish export as a whole. We used two types of indexes to examine the diversification based on the literature. The first

type of the indexes is the classical Hirschman-Herfindahl index but this time based on the share of the commodity exports in total exports, which is called specialization index. The equation below represents the calculation of the SPECL (specialization index).

$$SPECL_t = \sum_{i=1}^{65} s_{it}^2$$

s_{it} is the share of the i.th commodity's exports in total exports in time t. In other words, SPECL index is the sum of the shares of commodity exports in total export weighted with theirselves. The second measure of the export diversification based on the traditionality index calculated for the 7 years subperiods, which called TRAD7. In other words, by calculating the seven yearly moving averages of c_{it}'s based on 7 years subperiods, we have values of TRAD7 for the year in the mittle of the 7 years subperiod. To give a specific example, we have values of TRAD7 for 65 commodities for the year 1972, obtained using the period 1969-1975 as a reference period. By calculating the variance of the TRAD7 index of a commodity for the whole sample period, we would able to measure the degree of structural change in this commodity, which is represented in table 1 for each commodity. Moreover, the variance of the TRAD7 indexes of the commodities for a specific year t enables us to measure the degree of diversification in that year. On the other, this kind of a calculation would give an equal weight to each sector, thus we first weight the TRAD7 index of a commodity with the share of the export of this commodity in total export and than take the variance. The movements of the SPECL and the variance of the weighted TRAD7's are represented in figure 2.
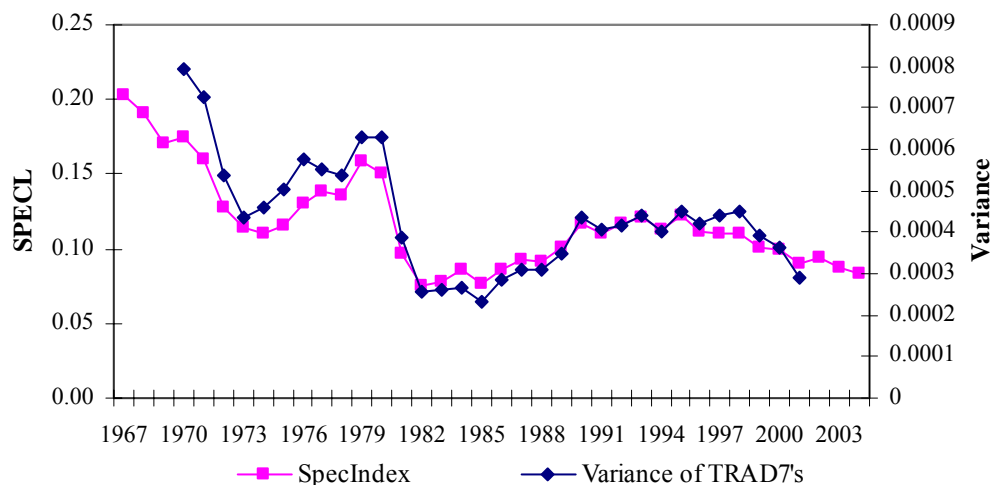

Figure 2. SPECL Index and the Variance of the weighted TRAD7's

The high scores of the variance indicate that the commodities subject to export experienced relatively divergent patterns whereas lower values lead us to conclude that the commodities have similar patterns in export in that time period. As figure 2 shows, two measures of diversification pursue similar paths that in mid 1970's, in the beginning of 1980's and after the mid 1990's both indexes exhibit a declining pattern which means the diversification of Turkish export increases. The export oriented policies at the beginning of 1980's caused to diversification in export but not a long lasting one because especially after 1985 the increasing trend of export diversification tends to a decreasing trend till it reaches to a new equilibrium in 1990's. This reminds us the general verdict that the export oriented period didn't cause to establishment of new capacities of production and probably didn't cause to spillovers between sectors, but rather the expansion in export at the beginning of 1980's is a

result of exploiting of the already established capacities in 1970's. It should be also noted that both periods of increasing diversification proceeds economic crisis and massive devaluations of Turkish Lira (TL) as Pineres and Ferrantino (1997) and Erlat (1999) indicated too respectively for Chile and Turkey. But different from this two periods we can not have the same conclusion for the period after mid 1990's when a new trend of increasing diversification has began although the overvalued TL, which leads us to such a conclusion that the dependency of export to the relative value of TL decreased, thus the competitive characteristics of export sector have increased after the mid 1990's especially based on the results of the pattern of SPECL index which is calculated until 2004.

In addition to this, it can be inferred from figure 2 that during the years of crisis, the commodities subject to export exhibit divergent patterns as in the later 1970's and at the beginning of 1990's. But supporting our conclusion above, in the 2001 crisis there is only a negligible decrease in diversification (increase in index values) which doesn't affect the increasing trend in diversification. The inclusion of the new commodities, mostly the capital intensive ones such as the products of electric-electronic industry and the automotive industry, on the already traditionally exported commodities such as products of textile and clothing industry and iron and steel industry has increased both the diversification and the stability of the Turkish exports which cause to the negligible effect of the 2001 crisis on export in comparison with other crisis.

4. Country Diversification of Turkish Exports

In addition to the product diversification of exports, we also investigated the country concentration of export to perform a comprehensive analysis international trade of Turkey. Although there are several discrete and concrete indexes to measure the country concentration of the export and import, we employed the most popular Hirschman-Herfindahl index (HH) and the weighted HH index (wHH) which we generated based on HH index. Most of the indexes used in the literature differ simply according to their weights of the share of the correspondent country's export's share in total export, thus using the appropriate index for the measurement is more likely a problem of choosing appropriate weights. The HH index is represented with the equation below.

$$HH_t = \sum_{i=1}^{m} p_{it}^2 \qquad i = 1,2,\ldots m$$

where p_{it} is the share of exports to i.th country in total export at time t. HH index is simply sum of the shares of exports to the specific countries in total export weighted with their own magnitude which seems the most fair weight in comparison with other indexes. On the other hand the wHH index is constructed to emphasize the most important commodities in Turkish export. It is simply the calculation of the HH index for each commodity, weighting these HH indexes with the share of the commodity's export in total export and finally adding up the weighted HH indexes. The calculation of the wHH index is represented in the equation below.

$$wHH_t = \sum_{i=1}^{n} p_{nt}(HH_{nt})$$

where n is the number of the commodities namely 65. Both indexes have the maximum value 1 if the trade partner is only a single country and if only one type of commodity is exported to a single country respectively for HH and wHH that means the highest degree of country concentration. On the other hand the minimum value of the both indexes is 1/m where m is the number of correspondent countries that means the highest degree of country diversification. The pattern of both indexes is presented in figure 3.
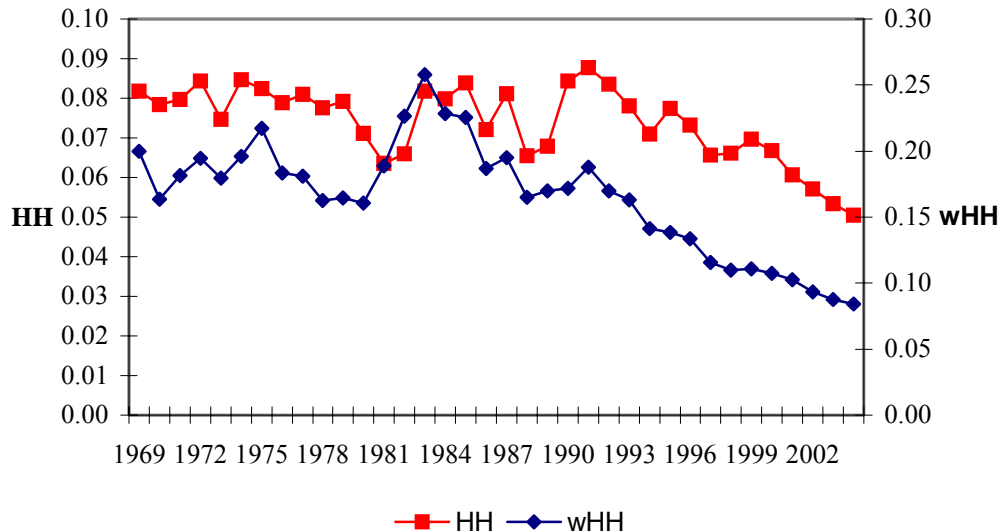
Figure 3. HH and wHH Indexes

Both indexes exhibit a straight pattern till 1990's except the cycles in 1980's during the export oriented policies. It should be noted that in 1980's the indexes differ in their patterns. While the HH index exhibits a cycling pattern, which includes an increasing country diversification in export at the beginning of the 1980's with introduction of the export oriented policies and at the end of the 1980's. Opposite to HH index, the wHH index exhibits an increasing pattern in country concentration indicating that the leading commodities in export have higher country concentration in comparison with the other commodities. A close look to this period brings this issue to light that the leading commodities in export in this period such as 67 iron and steel, 66 nonmetallic mineral manufactures, 26 textile fibres and 12 tobacco and tobacco manufactures have higher HH index values thus higher country concentration in comparison with other commodities. The main reason of this is the increase in demand of MENA countries especially the Iran-Iraq war (except tobacco and tobacco manufactures, because the main reason of the high HH index value of this commodity is the increasing share of the U.S.A. (from %31 in 1980 to %62 of the total tobacco and tobacco manufactures export in 1984)). The effects of the recession in the OECD countries due to second oil shock on the export of Turkey were compensated via the Iran-Iraq war and the expansion to the MENA market (Celasun and Rodrik, 1989; Krueger and Aktan, 1992).

What both indexes shows in figure 3 is that the country diversification of Turkish export have increasing pattern beginning from 1990's supporting the results of the product diversification analysis. With the increasing product diversity and competitive characteristics of the sectors in the economy, the country diversification of the export increases too. Although there is a short decrease in diversification in the 1994 crisis and in 1996 and preceding two years, the increasing trend in the country diversification (decreasing trends in the index values) is still clearly distinguished. The main reason of the short increase in 1996 and preceding years is the treaty of the customs union with EU which leads an increase in export to EU countries mostly in capital intensive commodities (the share of the EU countries in the 76 Telecommunication and sound recording… apparatus's export is around %80 in the second half of the 1990's whereas it had a share of around %40 in the late 1980's, in the 77 electrical machinery…%50-60 whereas it had a share of around %20 in the late 1980's and in the 78 road vehicles %50-60 and %20-30 respectively). But the effects of the customs union were limited in the other leading commodities in export because these countries were already traditional major trade partners of Turkey.

In general, it can be concluded that the export oriented policies had limited effects on the country diversification of Turkish export. The commodities, which experienced a

structural shift in this period, are the more traditional commodities such as 05 vegetables and fruits 66 nonmetallic mineral manufactures. On the other hand, the actual structural shift in the country concentration of the specific commodities experienced mostly in 1990's that most of the commodities had lower and more stable index values in comparison with the prior periods. This progress causes also to the increasing trend in the country concentration of the total Turkish export.

5. Econometric Investigation

In this section, we want to explore if the trade liberalization has a significant effect on the growth. We used the data based on ISIC Rev.2 rather than SITC Rev.3 because the value added, investment and labor data are only available in ISIC rather than SITC classification. That's because ISIC is a sectoral classification whereas SITC is a classification based on commodities. The data are obtained from SIS (State Institute of Statistics) and the index calculations are performed by authors. Our estimating equation is as follows.

$$DVA_{it} = f(\alpha_i, TRAD7, I_{it}, DL_{it}, DX_{it}, O_{it})$$

The dependent variable DVA is the first difference of the value added of the i.th sector in time t. First differenced in logarithm terms, the variable DVA gives us the growth rate of each sector. TRAD7 is the variable that measures the stability of export of a sector. If a sector has a competitive structure and has already established an efficient production base and market channels (that may lead to the country diversification in exports of this sector), then it has a stable export performance rather than a changing pattern based on specific occasions. The control variables I and L are investment in real terms and labor (average number of worker in the i.th sector in t. year) respectively, which are the essential factors of production. Note that, real investment is the gross addition to the capital formation, thus it is the first difference of the gross capital formation. We also add the first differenced export variable and the first lag of it in real terms to capture the link between export growth and economic growth. Here, it should be noted that a significant relation between the first lag of the export growth and economic growth does not refer to the verification of the export-led growth hypothesis, in that; it doesn't supply enough information about the kind of relation[4]. Our last variable is the openness index, which is frequently used in the literature to capture the effects of the openness of a sector or the economy as a whole. It is simply the ratio of the imports plus exports to the output of the sector. The data range is the period between 1980 and 1998.

We employed the panel data estimation to exploit the advantages of sector level data. This is one of the major advantages of the panel data, in that, using the historical aggregate data it is highly probable to suffer from lack of sufficient information. Additionally, it also enables to compensate the shortcomings of the cross section estimation that ignored temporal variation. Panel data estimation uses all the information available in time-series and cross sections. The testing procedure begins by testing the null that the intercepts of individual sectors are equal (Kennedy, 2003). Such an equality means the verification of the homogeneity of the individual sectors so that there is no need to include different intercepts for each sector. In order to test the null hypothesis, we employed an F test to test this restriction (pooled model that assumes all the intercepts are equal). The results of F test indicate that less restricted model overcomes the restricted (pooled) model. The less restricted

---

[4] We also employed using the aggregate data the test of Granger causality taking into account a possible long-term relation and cannot find any evidence of causality in Granger sense between export growth and GDP growth. But taking into consideration that the data used is annual it is more probable to find a simultaneity rather than causality. The estimation results can be requested from authors.

model we tested against the pooled model is the fixed effects model (FEM), which assumes sector specific effects (α_i's) have fixed components. The FEM takes the variation from observation to observation within a single sector into account and therefore is called "within group estimator" as well. On the other hand, these sector specific effects may also have random components that leads to the usage of random effects model (REM). The advantage of REM is that it takes not only the variation within groups but also the variation between groups into consideration. Therefore, random effects estimator is the weighted average of within and between estimators. However, the REM estimators will be biased if there is a correlation between random component and the explanatory variables, that leads to a correlation between composite error (on account of random component in the composite error) and the explanatory variables. In order to find out which model is more appropriate, an F test and the Hausman chi-squared test should be employed. The test statistics in our case indicate that FEM is more convenient for our model. In employing the FEM, we are able to take the heterogeneities of the individual sectors into account, which may lead to the bias in estimators if we would employ the pooled least squares.

The estimation results of our model is given in the below equation.

$$\text{DLVA} = \alpha_i\text{'s} + 0.605\ \text{TRAD7} + 0.028\ \text{I} + 0.926\ \text{DL} + 0.041\ \text{DLX} + 0.038\ \text{DLX}_{-1} - 0.00012\ \text{O}$$
$$\qquad\qquad (0.18)\qquad\qquad (0.01)\quad (0.11)\quad (0,01)\qquad (0.01)\qquad (0.000137)$$

The values in the parenthesis are the standard errors of the coefficients. According to the results, all variables have significant coefficients in 0.05 significance level but the openness index. This indicates that the openness, measured as the ratio of the total foreign trade of a sector to the output, doesn't play any significant role in the growth of the value added produced. On the other hand, the other measures of the outcomes of the trade liberalization have significant effects, in that, the current and lagged export growth have significant coefficients. However, although significant, the magnitude of the coefficients is not as high as expected. Nevertheless, at least it is clear that there is positive relation between output growth and economic growth in the period between 1980 and 1998. The most important outcome of the model is the highly significant positive coefficient of the TRAD7 variable (which has a scale from 1 to 50, where 1 indicates the least stable pattern in export while 50 indicates the most stable pattern). The sectors, which have a competitive production base that can satisfy the requirements to compete in the international markets, would have a more stable export pattern, in that, its export does not depend on the temporary changes and unsustainable policies such as the export incentives in 1980's but rather it depends on their effective production base that leads to higher value added produced. Although the openness index seems not to have a significant effect on the sectoral growth, it is clear that the sectors that managed to establish a competitive structure and sustainable export performance such as textile-clothing and iron-steel in 1980's, and the more capital-intensive sectors such as electric-electronic and road vehicles in 1990's, are those which are the leading sectors in the Turkish economy.

6. Concluding Comments

In this paper, we investigated the structural pattern of the Turkish exports at sectoral and aggregated level. From both external and internal conditions, a new policy framework had been in process after 1980's including a strategy of outward-oriented growth which is substituted with inward-oriented protectionist growth policies during 1960's and 1970's. During the import substitutionist policies before 1980, the sectors had experienced divergent

patterns in export, in that, while mostly primary and labor intensive goods such as live animals, textile fibers, tobacco and tobacco manufactures, and vegetables and fruit were leaders, the more capital intensive sectors were the laggards. Furthermore, the country concentration of the export was relatively high compared with the following periods (especially 1990's) and the destination of the export was mainly the EU countries and MENA region.

In the 1980's, trade liberalization efforts and far reaching export intensives yielded an export boom, in that, almost all of the sectors experienced an increasing pattern in exports. Not only the value but also the composition of the exports changed at a faster rate in 1980's resulting in the dominance of manufacturing export such as textile-clothing and iron-steel in total export. In addition to the internal conditions created by suppression of the domestic demand via the decrease in real wages and export incentives, the external conditions created a convenient environment for export expansion mostly due to the new opportunities in MENA region most notably the Iran-Iraq war, that compensated the recession in OECD countries on account of the second oil shock. The impressive export expansion in 1980's was to some extent a shift from domestic demand to external demand and Turkey was unable to transfer earnings from exports into productive investments. A vast majority of Turkish import in that period was the import of intermediate goods rather than capital goods required for the capacity expansion[5]. Hence, this period can be seen as a transition period between 1970's and 1990's, in that, the product diversification of the export reached to a new equilibrium 1990's after a decrease at the beginning of 1980's. Additionally, there is no significant structural change in the country concentration of exports except some cycles during 1980's. Furthermore according to results of wHH index the leading sectors in exports n this period had a relatively higher country concentration indicating the effects of increasing demand on account of Iran-Iraq war.

At the beginning of 1990's those exceptionally favorable conditions have mostly been changed and exports are carried out within a more competitive framework or a normalized atmosphere after 1989. In 1990's Turkey's export composition experienced another structural shift in that the more capital intensive sectors such as electric-electronics and automotive included to the leading sectors in export. Despite the unsustainable weak internal performance of the Turkish economy, our calculations indicates that during the 1990's and 2000's the sectors have more stable patterns in export in comparison with the prior periods. This structural shift remains us the product cycle theory in that manufacturing exports are becoming increasingly technology intensive. Furthermore, this process coincides with the increasing product and market diversification in exports, while an increasing trend in the country diversification accompany to the product diversification especially from the mid 1990's when Turkey has enacted a customs union agreement and unified its customs with EU.

Additionally, our econometric investigation revealed that the openness of the manufacturing sectors doesn't have an explicitly significant effect on the growth of the value added. On the other hand, the current and lagged export growth seems to have significant correlation between economic growth indicating that economic growth coincides with the export growth. Moreover, the significant coefficient of the TRAD7 index revealed that with the stabilization of the export performance the growth in value added tend to be higher. This fact clearly indicates that the competitive sectors that have already built their market channels thus accomplish to have a consistent export performance without affected by internal and external disturbances.

---

[5] The calculations performed for the analysis of the export structure are also performed for the analysis of import structure but not included in this paper. The results can be requested by the authors.

References

Amin Gutierrez de Pineres, Shelia, ve Ferrantino M., "Export Diversification and Structural Dynamics in the Growth Process: A Case Study of Chile" Journal of Development Economics 52 (1997):375-91

Amin Gutierrez de Pineres, Shelia, ve Michael Ferrantino, "Export Sector Dynamics and Domestic Growth: The Case of Colombia" Review of Development Economics 3 (1999): 268-280

Bahmani-Oskooee, M. and Alse J., "Export Growth and Economic Growth: An Application of Cointegration and Error-Correction Modeling," Journal of Developing Areas, 27 (1993): 535-542.

Balassa-Bela, "Exports and Economic Growth: Further Evidence" Journal of Development Economics 5 (1978):181-9

Ben-David, D. "Equalizing Exchange: Trade Liberalization and Income Convergence," Quarterly Journal of Economics, 108 (3) (1993), 653-79

Celasun, M. ve Rodrik, D. (1989). "Debt, Adjustment and Growth: Turkey" Sachs, J. ve Collins S. M (Ed.), *Developing Country Debt And Economic Performance, Country Studies*, Chicago: University of Chicago Press.

Edwards, S., "Openness, Trade Liberalization, and Growth in Developing Countries," Journal of Economic Literature 31 (1993):1358-93

Edwards, S.,"Openness, productivity and growth: what do we really know?" Economic Journal 108 (1998): 383– 398.

Erlat, G. and Sahin, B., "Export Diversification in Turkey Over Time", METU Studies in Development, 25, (1998): 47-60.

Erlat, G., "Diversification in Turkish Foreign Trade" (in Turkish), METU Studies in Development., 26 (1999): 281-298.

Erlat, G. and Gokalp, M.: "Are Turkey's Exports Diversified Among the Middle East Countries?", Working Paper, Department of Economics, Middle East Technical University (2001)

Esfahani, H.S. "Exports, imports, and economic growth in semi-industrialized countries" Journal of Development Economics 35,(1991): 93-116.

Frankel, J.A., Romer, D., "Does trade cause growth?" American Economic Review 89 (3) (1999): 379– 399.

Grossman, G. M., and E. Helpman (1991), *Innovation and growth in the Global economy*, Cambridge, mass.: MIT Press.

Kepenek, Y., Some Technological Aspects of The Turkish Manufacturing Exports During the 1990's,
http://www.intech.unu.edu/publications/conference-workshop-reports/seville/kepenek.pdf

Kepenek, Y. ve N. Yentürk (1997): *Türkiye Ekonomisi*, Remzi Kitabevi

Michaely, M.., "Exports and Growth: An Empirical Investigation". Journal of Development Economics 9 (1977): 49-53.

Moschos, D., "Export expansion. Growth and level of economic development," Journal of Development Economics 30 (1989): 93-102.

Metin-Ozcan, K., Ebru Voyvoda, and Erinc Yeldan. "On the Patterns of Trade Liberalization, Oligipolistic Concentration and Profitabilty: Reflections from Post-1980 Turkish Manufacturing." Bilkent University Department of Economics Discussion Paper (2000): 00-12.

Rivera-Batiz, F. L., , "The economics of technological progress and endogenous growth in open economies", Mimeo. (1995)

Rodrik, D. and F. Rodriguez (2000), "Trade policy and economic growth: A skeptic's guide to the cross-national evidence", *NBER Macroeconomics Annual 2000*, eds. Ben Bernanke and Kenneth S. Rogoff, MIT Press for NBER, Cambridge, MA.

Taskin F. and Yeldan E., (1996) "Export Expansion, Capital Accumulation and Distribution in Turkish Manufacturing, 1980-92" in *The Economy of Turkey since Liberalization.* Togan, Subidey and Balasubramanyam, V.N. (eds), Macmillan Press Ltd: London, p. 155.

Togan, S. (1994) *Foreign Trade Regime and Trade Liberalization in Turkey During 1980s*. Avebury Ashgate Publishing Ltd: Vermont

Senesen, U., (2004) *İstatistik Sayıların Arkasını Anlamak*, Literature Yayınevi

Siegel, S. and N. J. Castellan, (1988) *Nonparametric Statistics for the Behavioral Sciences*, McGraw-Hill