Export diversification in Turkey over time[*]

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Abstract

Turkey has went through an extensive policy change in 1980, moving from an import-substitution based growth policy to an export-oriented one. As a consequence, there was a great increase in Turkey's exports in the post-1980 period. This study concentrates on the diversification-of-exports aspect of this increase. We first classified, for the period 1969-1993, industries into traditional and non-traditional export industries by means of a "traditionality index" and found that the resultant classification was not too different from what one would have obtained if one had, in *a priori* terms, classified primary goods as traditional and manufactured goods as non-traditional. Secondly, we investigated if export composition underwent significant shifts during this period using short term, medium term and static measures of diversification. The findings from all three measures appear to indicate that there was substantial export diversification during the 1980-1986 period which was also the major export-expansion period. Thus, we may conclude that the change in both growth policy and foreign trade regime brought about diversification in our exports.

1. Introduction

The link between export expansion and economic growth has been extensively investigated by several economists, such as Kravis (1970), Michaely (1977), Moschos (1989), Esfahani (1993) and Edwards (1993). All have indicated the existence of a positive link between export expansion and economic growth. Furthermore, not only the expansion of exports, but the diversification of exports have gained importance. In Bond and Milne (1987: 98) export diversification was defined "...as an increase in the number of distinct products in the export base, combined with a reduction in dependence on any one product as a source of foreign exchange earnings." In the case of developing countries, which were faced both by debt problems and the adverse effects of the changes in the terms of trade, this point became much more important because now the questions were whether export diversification would be bringing (a) a growth in export earnings and (b) a stability in export earnings. Beginning in the 1960's, several studies, such as Coppock (1962), Massell (1964), Brainard and Cooper (1970), Brodsky (1983) and Love (1983, 1984, 1986), tried to analyze these new questions. Moreover, for developing countries, Kravis (1970) pointed out that successful developing countries were differentiated from less successful ones by increasing their export shares in international markets and having differentiation in their exports.

Turkey underwent major changes in her trade regime when an outward-oriented growth policy was adopted in the 1980's. This brought an expansion in exports as well as a change in the composition of exports. These changes attracted several researchers to study what was happening to Turkish exports and imports in the pre- and post-1980 periods. For example, Erlat, G. (1993) points to the increase and change in composition of exports after 1980; Erlat and Erlat (1994) indicate that Turkish exports have become more competitive and that both exports and the markets in which they are sold have been diversified. Togan (1994) gives a detailed account of the changes in foreign trade during the 1980's. Although Togan (1994) has a detailed analysis of the export and import structure of Turkey, export diversification is taken into account only through a concentration index.

The first aspect of export diversification that we shall consider is the shift in the composition of exports from "traditional" to "nontraditional" sectors. We thus use a measure of traditionality developed by Amin Gutierrez de Pineres and Ferrantino (1997) to identify which sectors in the Turkish economy may be regarded as "traditional" export sectors and which as "nontraditional".

The second aspect of export diversification that will be investigated is its movement over time. This will enable us to see if export diversification has reached such a level as to constitute a structural shift in the composition of exports and to identify the periods during which this took place. We again use measures suggested by Amin Gutierrez de Pineres and Ferrantino (1997) for this purpose. One of their measures was also used by Togan (1994).

Thus, in the following sections we shall first introduce the measures mentioned above, then describe the data, and present and discuss the empirical results. We shall summarize our conclusions in the final section.

2. The measures

2.1. The traditionality measure

Let e_{it} denote exports by industry i in year t. Then we may obtain the *Cumulative Export Experience Function* (CEEF) for the ith industry as,

$$c_{i\tau} = \frac{\sum_{t=1}^{\tau} e_{it}}{\sum_{t=1}^{T} e_{it}}, \qquad \tau = 1, \dots, T \tag{1}$$

where T is the length of the sample period. The $c_{i\tau}$ have properties similar to that of a cumulative distribution function. It takes values at or close to zero at the beginning of the period and rises to "1" in the final year. As a measure of traditionality one may use it by plotting it against τ. In such a case, given two industries, we would expect the more "traditional" industry to have higher $c_{i\tau}$ values, at least in the early part of the sample period.

However, such comparisons are rather tedious. They may be facilitated if they were reduced to comparing values that summarize the information in functions corresponding to each industry. Such values may simply be the *means* of the $c_{i\tau}$'s:

$$\bar{c}_i = \frac{\sum_{\tau=1}^{T} c_{i\tau}}{T}, \qquad i = 1, \dots, N \tag{2}$$

where N is the number of industries. Thus, now, the most traditional industry would have the highest $\bar{c}_i$ and so on. Hence, we would end up with a "traditionality" ranking of the industries.

This information may be further enhanced by carrying out pairwise comparisons. This will be done by testing if the mean of the CEEF for industry i is significantly different from the mean of the CEEF for industry j. The relevant test statistics would be calculated as

$$\frac{\bar{c}_i - \bar{c}_j}{\sqrt{\dfrac{\hat{\sigma}_i^2}{T} + \dfrac{\hat{\sigma}_j^2}{T}}}$$

where $\hat{\sigma}_r^2 = \sum_{t=1}^{T} (c_{r\tau} - \bar{c}_r)^2/(T-1)$, $r = i$ or j, and will have an asymptotic standard normal distribution under the null hypothesis that the means are the same. What one expects to gain from this exercise is information about the "degree of traditionality", so to speak.

2.2. Measures of structural change

a. TRAD7: The first is a medium term measure of structural change and will be called TRAD7 because it involves constructing seven yearly moving averages. We calculate the average of the $c_{i\tau}$ for the first seven years,

$$\bar{c}_{i,7}^1 = \frac{\sum_{\tau=1}^{7} c_{i\tau}}{7}, \qquad i = 1, \dots, N$$

and then calculate the variance of the $\bar{c}_{i,7}^1$ *across industries*:

$$\hat{\sigma}_{7,1}^2 = \frac{\sum_{i=1}^{N} [\bar{c}_{i,7}^1 - \text{mean}(\bar{c}_{i,7}^1)]^2}{N} \tag{3}$$

Next, we drop the first year and add the eighth year and obtain

$$\bar{c}_{i,7}^2 = \frac{\displaystyle\sum_{t=2}^{8} c_{i\tau}}{7}, \qquad i = 1, \dots , N$$

from which we calculate

$$\hat{\sigma}_{7,2}^2 = \frac{\displaystyle\sum_{i=1}^{N} [\bar{c}_{i,7}^2 - mean(\bar{c}_{i,7}^2)]^2}{N}$$

This is repeated until the last seven years is reached. In other words, we obtain the 7-year moving averages for the $c_{i\tau}$ and then obtain their variances across industries. There will be $T-6$ estimated variances; we shall loose three observations from the top and the bottom of the sample.

A high variance value implies a relatively divergent growth pattern during the 7-year period while a low variance implies a relatively stable composition of exports for the period. Hence, high variances are taken to be indicative of structural change for that period.

b. CSX: The second measure provides information on the year-to-year changes in the composition of exports. It is denoted by CSX and is a measure of short-term structural change. Thus, let s_{it} be the share of the ith industry in total exports for year t.

$$s_{it} = \frac{e_{it}}{\displaystyle\sum_{i=1}^{N} e_{it}}, \qquad i = 1, \dots , N; \quad t = 1, \dots , T$$

Then,

$$CSX_t = \sum_{i=1}^{N} min(s_{it}, s_{i,t-1}), \qquad t = 2, \dots , T \tag{4}$$

If all $s_{it} = s_{i,t-1}$, i.e., there is no change in export composition, then $CSX = \sum_{i=1}^{N} s_{it} = 1$, while if all $s_{i,t-1} = 0$, i.e., if none of the goods exported at t had been exported at t-1, then CSX = 0. Thus, values of CSX close to unity indicate short-run stability in export composition.

CSX can, of course, be generalized to measure stability for intervals of more than a year:

$$CSX(m)_t = \sum_{i=1}^{N} \min(s_{it}, s_{i,t-m}), \quad m>1, \ t=1, \ ... \ T$$

This may provide information to complement the results obtained from TRAD7.

c. *SPECL*: Finally, we have a static measure of specialization, SPECL, which is nothing but the application of the Hirschman-Herfindahl index of concentration to export shares. Thus, we have

$$SPECL_t = \sum_{i=1}^{N} s_{it}^2, \quad t=1, \ ... \ T \tag{5}$$

Thus, a value of SPECL close to unity implies a high concentration of exports while a value close to zero implies export diversification.

3. Empirical results

The data used in calculating the measures above were obtained from the Undersecretariat of Foreign Trade. They are export figures and are in terms of 1985 $US and are classified according to the International Standard Industrial Classification, Revision 2, (ISIC, Revision 2) and cover 39[1] sectors at the 3-digit level for the period 1969-1993. The list of the sectors are given in Table 1.

As we pointed out in the introduction, one of the purposes of this study was to classify exporting sectors as "traditional" and "nontraditional" based on their export experiences over the period 1969-1993. The measures used for this purpose, as given in section 2, are the means of CEES for each industry; namely

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[1]   The following three sectors were eliminated from the total of 43 sectors because they made no exports for the period in question: 000 Semi Defined Services, 113 Hunting Activities, and 410 Electricity, Gas and Steam.

Table 1

Ranking Export Sectors From The Least Traditional to The Most Traditional

Code	Industry	Traditionality Score	Variance of Traditionality Score
220	Crude Oil and Natural Gas	0.077494	0.053660
314	Tobacco Products	0.100732	0.056194
383	Electric Machinery & Equip.	0.177596	0.087653
420	Water (Supply, Cleaning, Trans)	0.177917	0.100056
324	Shoes	0.188201	0.090491
355	Rubber Industry	0.193835	0.084977
323	Skin and Fur	0.195971	0.093800
352	Other Chemical Products	0.200624	0.098923
371	Iron and Steel Products	0.207439	0.100729
361	Ceramic Industry Products	0.210103	0.101710
322	Clothing Products	0.216839	0.096769
356	Unclassified Plastic Ind. Prod.	0.222222	0.091415
385	Professional Scientific Equip.	0.226380	0.113250
122	Unprocessed Forestry Products	0.231260	0.119830
384	Transportation Vehicles	0.237107	0.093128
381	Metallic Goods	0.237885	0.100788
321	Textile Industry Products	0.250060	0.096931
382	Mach. & Equip. Exc. Electric	0.250153	0.118151
351	Chemical Industry Products	0.250212	0.120044
341	Paper and Paper Products	0.252433	0.117135
390	Other Industrial Products	0.254118	0.094548
354	Other Petr. & Coal Ind. Prod.	0.266748	0.145251
362	Glass Industry Products	0.267704	0.105180
313	Beverage Industry Products	0.273143	0.093571
312	Other Food Industries	0.273913	0.088227
342	Press Industry Products	0.277983	0.112872
332	Wooden Furniture	0.282876	0.119286
311	Food Industry Products	0.296035	0.098519
372	Non-Ferrous Metal Products	0.300630	0.112810
369	Cement, Stone, Asbestos	0.307165	0.098622
353	Processed Petroleum Products	0.319125	0.128591
290	Quarrying and Mining	0.342169	0.115655
331	Wood and Cork Products	0.358021	0.133319
130	Fishery Products	0.396049	0.105315
111	Agr., Livestock, Animal Prod.	0.400628	0.104941
230	Metallic Ores	0.408612	0.101299
121	Forestry Products	0.414754	0.112074
112	Other Agricultural Products	0.443204	0.146309
210	Hardcoal, Lignite	0.614733	0.093305

the $\bar{c}_i$. These are given in Table 1 and reflect the ranking of the sectors in ascending order according to the values of the $\bar{c}_i$. We note that sectors like Hardcoal, Lignite (210), Forestry (121), Metallic Ores (230), Agriculture, Livestock, Animal Products (111), Other Agricultural Products (112), Quarrying a nd Mining (290), etc., may be regarded as "traditional" while Crude Oil and Natural Gas (220), Tobacco (314), Electric Machinery and Equipment (383), Shoes (324), Rubber Industry Products (355), Ceramic Industry Products (361), Clothing (322), etc., may be considered as "non-traditional".

We may compare these findings with the *a priori* classification used by Togan (1994) and the findings of Amin Gutierrez de Pineres and Ferrantino (1997) for Chile. Togan, by using the SITC classification defines *a priorily* the primary goods as: "SITC 0 +1+2+3+4+67+68" and manufactured goods as: "SITC : 5+6-67-68+ 7+8" [Togan (1994: 162)]. This corresponds to, what is regarded in development economics literature, as the traditional and non-traditional export sectors in a developing economy. Our findings above appear to conform to this classification with some exceptions such as tobacco, skin and fur, natural gas, etc. On the other hand, Amin Guiterrez de Pineres and Ferrantino's findings for Chile do not conform to this classification, implying that a proper measure of "traditionality" should be used in making a classification, not *a priori* reasoning. When we compare the traditionality classification of Amin Gutierrez de Pineres and Ferrantino's and our findings, it is seen that both results support the nontraditionality of Tobacco Products (314), Clothing (322) and Rubber Industry Products (355), while both studies agree on the traditionality of Nonferrous Metal Products, Agricultural, Livestock and Animal Products (111, 112). However, there is no agreement on the traditionality classification of, e.g.,Wood and Cork Products (331), Wooden Furniture (332), Beverage Industry Products (313), Iron and Steel Products (371), Skin and Fur Products (323) and Textile Industry Products (321), etc.. Our findings do not negate their conclusions; they simply provide evidence, broadly speaking, in favour of the conventional classification as far as Turkey is concerned.

We also performed all pairwise comparison tests. We found that sectors which were placed in the top and bottom ranking indicated significant difference from most if not all sectors in the list. For example, 121 Forestry Products, a "traditional" sector, exhibits significant difference from 16 sectors while 314 Tobacco Products, a "non-traditional" sector, shows significant pairwise difference from 19 sectors. The full results are too many to present with this paper but are available upon request.

A second purpose of this study was to investigate the diversification of

exports over time as a question of structural change. Three measures were suggested for this purpose. The results are given in Table 2.

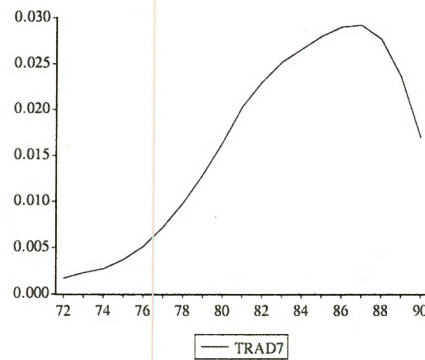**Table 2**
Measures of Structural Change

Year	Specl	CSX(1)	CSX(2)	CSX(3)	TRAD7
1969	0.500009				
1970	0.512683	0.9421			
1971	0.479451	0.9451	0.9225		
1972	0.433322	0.9329	0.8924	0.8871	0.0017
1973	0.380712	0.9034	0.8629	0.8309	0.0023
1974	0.306343	0.8882	0.8369	0.8099	0.0027
1975	0.311414	0.9256	0.8872	0.8486	0.0037
1976	0.394577	0.8849	0.8580	0.8788	0.0051
1977	0.350563	0.9279	0.9049	0.8875	0.0072
1978	0.434107	0.9013	0.9256	0.8366	0.0098
1979	0.349950	0.9152	0.9343	0.8920	0.0129
1980	0.332273	0.9407	0.8910	0.9287	0.0164
1981	0.238902	0.8669	0.8429	0.7833	0.0203
1982	0.165841	0.8588	0.7536	0.7421	0.0230
1983	0.146564	0.8975	0.7988	0.7126	0.0252
1984	0.120973	0.8780	0.8230	0.7098	0.0266
1985	0.104424	0.8734	0.8421	0.7770	0.0280
1986	0.119089	0.9047	0.8879	0.8607	0.0290
1987	0.109609	0.8823	0.8504	0.8497	0.0292
1988	0.115391	0.8940	0.9114	0.8895	0.0277
1989	0.116509	0.9298	0.8794	0.8798	0.0236
1990	0.121501	0.9400	0.9059	0.8876	0.0169
1991	0.122207	0.9392	0.9134	0.8881	
1992	0.119319	0.9356	0.9092	0.8730	
1993	0.121807	0.9612	0.9224	0.9202	

We start with the TRAD7 results, the medium term measure of structural change which is based on 7-year moving averages of the c_i. In addition to the figures in Table 2, we shall also use the plot of TRAD7 as given in Figure 1. Since a high value for TRAD7 implies a relatively divergent pattern during the 7-year period, we note that this growth pattern increases steadily until 1987 after which it declines. It gains momentum around 1979-80; the TRAD7 figure for 1980 (0.0203) shows a visible upward jump and this relatively high increase continues untill 1986. The 1987 figure also shows a small increase but it is not

comparable to the previous figures. In other words, it appears that the main changes in export structure took place between the years 1980-86 after which, one may say that the adjustment period was completed.

Figure 1

Time series of plot of TRAD7 (1972-1990)

Turning to the short term measure of structural change, CSX, we have calculated this measure for yearly, bi-yearly and tri-yearly changes and denoted each one as CSX(m), m = 1,2,3. The figures are given in Table 2 and are plotted in Figure 2. We immediately note that all three versions of CSX indicate an increase in short term diversification between 1971-75 and considerably more for the period 1980-85. This increase becomes sharper as m increases. This second period reinforces our observation, based on the TRAD7 results, that the period of high export growth of 1980-86, (which also was a period of diversification of export markets (see Erlat, 1993) is also a period of significant export diversification.

Figure 1

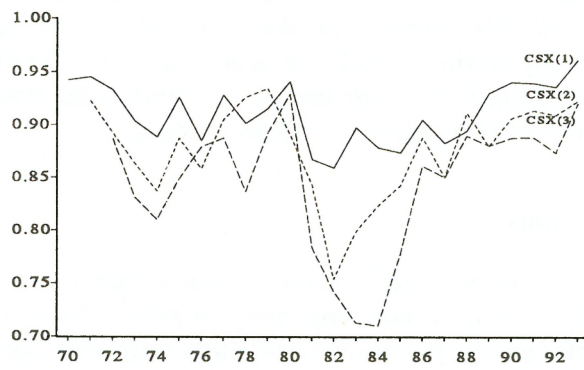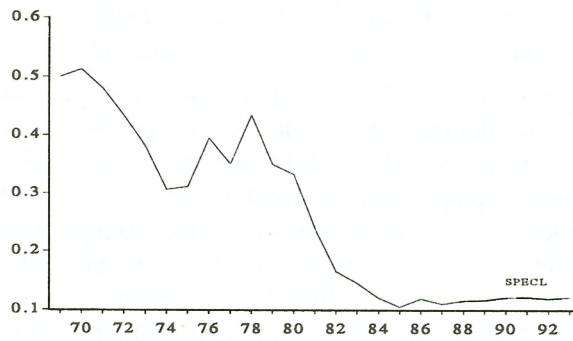Time Series Plot of CSX(1), CSX(2), CSX(3)

Figure 3

Time Series Plot of SPECL (1969-1993)

The last measure of structural change, SPECL is basically a measure of concentration, as mentioned above, and a decrease in its value would be regarded as evidence of diminishing reliance on a small number of export products; namely diversification. The figures are again given in Table 2, while a plot can be found in Figure 3. We note a declining trend from 1970 onwards, which continues to 1974 when a break takes place until 1978, after which we observe a markedly downward shift that continues on to 1985-86 and then stabilizes around the figure 0.11. This trend is also found for the 1980-90 period by Togan but it is not as steady as our results indicate.

4. Conclusions

In this paper we tried to establish certain stylized facts about the composition of exports for Turkey over time. Our primary focus was to see if the export-oriented growth policies and associated foreign trade regimes which were initiated in 1980 led to diversification in exports.

We considered the period 1969-1993 and used data on 39 exporting sectors at the three digit level as classified by ISIC, Revision 2. We first tackled the problem of identifying the "traditional" and "non-traditional" sectors in Turkey for the period in question. We then turned to the change in the composition of exports over time. We may list our conclusions as follows:

1. Based on the "traditionality index" described in section 2.1, we found that our classification of industries as "traditional" and "nontraditional" approximated the conventional classification of traditionality in terms of "primary goods" and "manufactured goods", with some exceptions.

2. Using three measures of structural change as described in section 2.2 above, we found that all three measures indicated a definite increase in export diversification beginning in 1980 and that this process went on until 1986, after which the new export composition stabilized. However, CSX and SPECL also indicated an earlier episode of diversification to have taken place between 1970 and 1973-74, but not of the same magnitude as the post-1980 one. It is interesting to note that both episodes follow periods of crises and IMF supported stabilization programs [see, e.g., Celasun and Rodrik (1989) for an account], and this finding is quite similar to the results relating to Chile where episodes of diversification were encountered after the crises in 1973 and 1982 when massive exchange rate devaluations were undertaken.

Nevertheless, what is of more significance for Turkey is that the 1980-86 period coincides with the rapid expansion of exports and constitutes evidence

in favour of the expectation that an export oriented growth policy will not only increase the volume of exports but also lead to its considerable diversification.

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Özet

Türkiye'de ihracatın zaman içinde çeşitlenmesi

Türkiye 1980'de radikal bir politika değişikliği sonucunda ithalat ikamesine dayalı bir büyüme politikasından, ihracata yönelik büyüme politikasına geçti. Bunun sonucunda 1980 sonrasında Türkiye'nin ihracatı önemli ölçüde arttı. Bu çalışma, ihracatın çeşitlenmesi boyutu üzerinde yoğunlaşmaktadır. Biz bu çalışmada ilk olarak 1969-1993 döneminde, "gelenekselllik endeksi" yardımıyla sektörleri "geleneksel" ve "geleneksel olmayan" diye ayırdık ve bunun sonucuda, bu sınıflandırmanın a priori olarak yapılan "temel mallar" ve "imalat sanayii malları" sınıflandırmasından pek farklı olmadığını gözlemledik. İkinci olarak, kısa, orta vadeli ve statik "çeşitlenme" ölçütlerini kullanarak, ele alınan dönemde ihracat kompozisyonunda yapısal değişmeler olup olmadığını araştırdık. Bu son üç ölçüte dayanan bulgularımız 1980-1986 da gözlemlenen büyük boyuttaki ihracat artışının yanısıra, ihracatta önemli ölçüde çaşitlenmenin olduğunu da ortaya çıkardı. Sonuç olarak, büyüme ve dış ticaret rejimindeki değişmelerin Türkiye'nin ihracatında hem artışa, hem de çeşitlenmeye yol açtığına işaret edebiliriz.