

**DO TURKISH EXPORTS HAVE COMPARATIVE  
ADVANTAGE WITH RESPECT TO THE EUROPEAN UNION  
MARKET, 1990-2000**

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**JEL Classification: F14**

**Key Words: Export performance, comparative advantage**

## 1. Introduction

The objective of this paper is to try to identify those sectors that hold the most promise of being the leading export sectors for Turkey in the future from the point of view of comparative advantage vis-à-vis the pre-expansion fifteen<sup>1</sup> European Union (EU-15) countries. The focus on this market is particularly important now when Turkey is at a point where her relationship with the EU may progress from being a “candidate” to a “possible member” country.

In a previous paper, Erlat and Erlat (2004a), we had again focused on this market (together with the Non-EU OECD countries) and investigated the performance of Turkish exports for the post-1990 period using constant market share analysis with the same objective in mind. In doing so, we used 3-digit SITC Rev.3 data on Turkey’s exports to these countries and on their total imports. In the present study, we again use 3-digit data but our interest is in the total exports of each country regarding each 3-digit sector.

The reason for this choice in data is the tool we used to measure comparative advantage. We used the Revealed Comparative Advantage (RCA) index, as developed by Balassa (1965). This index compares the share of the export of the  $i^{th}$  good in a given country’s total exports to the share of that export good in “world” exports. A value greater than unity indicates that the country in question has comparative advantage in that good<sup>2</sup>.

There are a number of studies where RCA has been used to investigate the competitiveness of Turkish exports. One may cite Lohrmann (2000), Akgungor, Barbaros and Kumral (2002) and Yilmaz (2002) as the most recent ones. Yilmaz (2002) and Akgungor et al. (2002) use two indexes for this purpose. One is the index that we have used but they call it the index of Comparative Export Performance (CEP). The index that Yilmaz (2002) and Lohrmann (2000) call the RCA index<sup>3</sup> is the natural log of an alternative index that was also suggested by Balassa (1965) where the ratio of the exports to imports of the  $i^{th}$  sector for a given country is compared to the ratio of total exports to total imports of the “world”. However, Balassa (1965) points out that this second measure may involve distortions due to tariffs and non-tariff barriers on imports and, in fact, abandons its use in later work (e.g., Balassa, 1977).

Our study differs from that of Akgungor et al. (2002) in scope and from those of Lohrmann (2000) and Yilmaz (2002) in (i) utilizing Balassa’s preferred RCA index, (ii) utilizing a longer time period (1990-2000) and (iii) focusing on the performance of individual 3-digit sectors. Hence, we first classify the sectors as traditional and non-traditional using an

index that was first applied to Turkish data by Erlat and Sahin (1998) and a procedure that was developed in Erlat and Erlat (2004a). Then we classify them according to their technological characteristics using the approach in Yilmaz (2002). The second classification is used in comparing Turkey's RCA performance with the EU-15 while both classifications are used in investigating the RCA performance of individual Turkish exporting sectors.

The plan of the paper is as follows. In Section 2 we shall describe the data and the two classifications mentioned above. The RCA index is introduced in Section 3 and the empirical results are given in Section 4. Our conclusions will be in Section 5.

## **2. The Data and the Two Classifications of Turkish Exports**

The data cover the 1990-2000 period. The Turkish export data have been obtained from the State Institute of Statistics. The data on the exports by Turkey's trading partners were obtained from the UNCTAD-ITC and OECD databases. All data are in \$US terms and include 256, 3-digit sectors classified according to SITC Rev.3.

Turning to the classifications of the data done by us, we start with the one based on the *traditionality index*<sup>4</sup>. The objective of this index is to distinguish between those sectors that show a high export performance at the beginning of a given period (traditional sectors) and those that exhibit such a performance towards the end of the period (non-traditional sectors). Using this index we obtained a traditionality ranking of the sectors. However, we do not only want a traditionality ranking of the sectors; we would also like to group them as traditional and non-traditional. For this purpose, we made use of a statistic that provides us with information about the "degree of traditionality" of each sector. The details of the traditionality index and the classification procedure may be found in Erlat and Erlat (2004a)

The second classification has to do with the *technological nature of the sectors* involved. Yilmaz (2002), based on Hufbauer and Chilas (1974), classifies

SITC 0, 2 (ex. 26), 3 (ex.35), 4, 56 as *Raw material-intensive goods (RMIG)*

SITC 26, 6 (ex. 62, 67, 68), 8 (ex. 87, 88) as *Labour intensive goods (LIG)*

SITC 1, 35, 53, 55, 62, 67, 68, 78 as *Capital-intensive goods (CIG)*

SITC 51, 52, 54, 58, 59, 75, 76 as *Easy-to-imitate research-intensive goods (EIRG)*.

SITC 57, 7(ex. 75, 76, 78), 87, 88 as *Difficult-to-imitate research-intensive goods (DIRG)*.<sup>5</sup>

The details of this classification are given in the Appendix.

We now combine these two classifications and look at the behaviour of Turkish exports both in terms of the distribution of the sectors involved and in terms of the shares of these classifications in Turkey's exports during the period in question. This information is given in Table 1. The first block of figures are the numbers of non-traditional and traditional sectors in technological classes and the second block is their percentage shares. The behaviour of exports in each technological class is presented by two figures; the average of their shares in non-traditional and traditional exports, respectively, for the full 1990-2000 period (Mean-FP) and the average for the last three years of the period (Mean-3Y). This is done so that the behaviour over time may be captured.

<b>Table 1</b>						
<b>The Sectoral Distribution of Turkish Exports and Their Behaviour During the 1990-2000 Period</b>						
<b>Distribution</b>						
	<b>RMIG<sup>1</sup></b>	<b>LIG<sup>1</sup></b>	<b>CIG<sup>1</sup></b>	<b>EIRG<sup>1</sup></b>	<b>DIRG<sup>1</sup></b>	<b>TOTAL</b>
<b>Non-Trad.</b>	23	25	19	10	<b>41</b>	118
<b>Traditional</b>	<b>55</b>	37	18	17	11	138
<b>%</b>						
<b>Non-Trad.</b>	19.5 <sup>2</sup> (3) <sup>3</sup>	21.2 (2)	16.1 (4)	8.5 (5)	<b>34.8 (1)</b>	46.1 <sup>4</sup>
<b>Traditional</b>	<b>39.9 (1)</b>	26.8 (2)	13.0 (3)	12.3 (4)	7.9 (5)	53.9 <sup>4</sup>
<b>Behaviour (%)</b>						
<b>Non-Trad.</b>	<b>RMIG</b>	<b>LIG</b>	<b>CIG</b>	<b>EIRG</b>	<b>DIRG</b>	<b>TOTAL</b>
Mean-FP <sup>5</sup>	3.5 <sup>6</sup> (5)	<b>42.8</b>	19.6	12.0	22.0	21.9 <sup>7</sup>
Mean-3Y <sup>5</sup>	3.2	<b>39.2</b>	20.2	12.7	24.7	32.9
<b>Traditional</b>	<b>RMIG</b>	<b>LIG</b>	<b>CIG</b>	<b>EIRG</b>	<b>DIRG</b>	<b>TOTAL</b>
Mean-FP	25.9 (2)	<b>50.1 (1)</b>	17.9 (3)	2.4 (5)	3.7 (4)	78.1
Mean-3Y	22.5	<b>54.8</b>	16.4	2.4	4.0	67.1
<b>Notes:</b>						
1. RMIG = Raw material-intensive goods, LIG = Labour intensive goods, CIG = Capital intensive good, EIRG = Easy-to-imitate research intensive goods, DIRG = Difficult-to-imitate research intensive goods.						
2. The first five sets of figures in this block are the shares of, e.g., RMIG in Non-traditional and Traditional sectors, respectively.						
3. The figures in parentheses show the ordering of the categories.						
4. These two figures are the shares of the Non-traditional and Traditional groups in the total number of sectors.						
5. Mean-FP = Average percentage of exports for the full 1990-2000 period. Mean-3Y = Average percentage of exports for the last three years of the period.						
6. Average percentage of exports in, e.g., RMIG with respect to total Non-traditional exports.						
7. Average percentage of exports of, e.g., Non-traditional exports with respect to total exports.						

We note, from Table 1, that 53.9% of all exporting sectors are traditional while 46.1% are non-traditional. DIRG is the dominant class in terms of the distribution of non-traditional exporting sectors while RMIG is the dominant class for the traditional sectors. This picture,

however, is not repeated when we look at the behaviour of exports over time for these two classes. The exports of the traditional sectors are much more dominant than what the distribution figures would lead us to expect. We also find that now LIG dominates in both the non-traditional and traditional sectors. Its share, however, appears to decline over time for non-traditional sectors but increases for traditional sectors. DIRG has the second largest share in non-traditional exports and this share appears to increase over time. The second highest share in traditional exports belongs to RMIG which appears to be declining over time. This is also true of CIG but not of DIRG which also shows an increase for traditional sectors.

### 3. Revealed Comparative Advantage

As stated in the Introduction, the concept of Revealed Comparative Advantage and its associated indexes were developed by Balassa (1965). Several alternatives to Balassa's original indexes were later suggested. A comparative account of these, together with some new indexes, may be found in Vollrath (1991)<sup>6</sup>. Of the indexes developed by Balassa we used the one which is completely based on exports.

The concept of Revealed Comparative Advantage is based on comparing the performance of a country in exporting a certain product, to that of the "world". If the performance of that country is better than that of the "world", then it may be concluded that the country in question has comparative advantage in that particular product. In the index that we are calculating export performance is measured by the share of the exports of that particular product in total exports. Hence, if we denote Turkey's exports of goods  $i$  by  $X_i$  and the "world" exports of good  $i$  by  $X_{iw}$ , then the RCA index may be expressed as

$$(1) \quad RCA_i = \frac{X_i / \sum_{i=1}^N X_i}{X_{iw} / \sum_{i=1}^N X_{iw}}, \quad i = 1, \dots, N$$

When this index is greater than unity, it will indicate that Turkey has comparative advantage in the exports of good  $i$ .

At this point we need to clarify what the term "world" covers. It may, of course, cover exports of the world in the widest sense of that term. But it can also cover the exports of a group of countries or even a single country. In this paper we took "world" to imply the pre-

expansion fifteen European Union countries. However, in calculating the denominator of the RCA as given in (1), we included Turkish exports of good  $i$  in  $X_{iw}$ .

<b>Table 2</b>							
<b>Comparison of Revealed Comparative Advantage For the EU-15 and Turkey in terms of the Distribution of Sectors between Technological Classes</b>							
<b>Distribution</b>							
	<b>RMIG<sup>1</sup></b>	<b>LIG<sup>1</sup></b>	<b>CIG<sup>1</sup></b>	<b>EIRG<sup>1</sup></b>	<b>DIRG<sup>1</sup></b>	<b>TOTAL/ RANK</b>	
<b>Turkey</b>	<b>32</b>	31	12	2	5	82	<b>8</b>
<b>Austria</b>	18	<b>37</b>	19	8	31	113	<b>4</b>
<b>Belgium</b>	<b>43</b>	27	23	17	13	123	<b>1</b>
<b>Denmark</b>	<b>37</b>	23	6	8	19	93	7
<b>Finland</b>	<b>16</b>	13	11	8	13	61	11
<b>France</b>	<b>34</b>	19	27	12	24	116	<b>2</b>
<b>Germany</b>	15	19	17	16	<b>46</b>	113	<b>4</b>
<b>Greece</b>	<b>35</b>	23	12	2	4	76	9
<b>Ireland</b>	<b>23</b>	6	5	12	6	52	12
<b>Italy</b>	16	42	11	3	<b>28</b>	100	6
<b>Netherlands</b>	<b>60</b>	12	14	17	12	115	<b>3</b>
<b>Portugal</b>	<b>26</b>	30	21	5	11	102	5
<b>Spain</b>	<b>35</b>	30	21	5	11	102	5
<b>Sweden</b>	18	12	13	5	<b>24</b>	72	10
<b>UK</b>	21	17	15	18	<b>22</b>	93	7
<b>%</b>							
	<b>RMIG</b>	<b>LIG</b>	<b>CIG</b>	<b>EIRG</b>	<b>DIRG</b>	<b>TOTAL</b>	
<b>Turkey</b>	39.0 <sup>2</sup> ( <b>1</b> ) <sup>3</sup>	37.8 (2)	14.6 (3)	2.4 (5)	6.1 (4)	32.0 <sup>4</sup>	
<b>Austria</b>	15.9 (4)	<b>32.7 (1)</b>	16.8 (3)	7.1 (5)	27.4 (2)	44.1	
<b>Belgium</b>	<b>35.0 (1)</b>	22.0 (2)	18.7 (3)	13.8 (4)	10.6 (5)	48.0	
<b>Denmark</b>	<b>39.8 (1)</b>	24.7 (2)	6.5 (5)	8.6 (4)	20.4 (3)	36.3	
<b>Finland</b>	<b>26.2 (1)</b>	21.3 (2)	18.0 (3)	13.1 (4)	21.3 (2)	23.8	
<b>France</b>	<b>29.3 (1)</b>	16.4 (4)	23.3 (2)	10.3 (5)	20.7 (3)	45.3	
<b>Germany</b>	13.3 (5)	16.8 (2)	15.0 (3)	14.2 (4)	<b>40.7 (1)</b>	44.1	
<b>Greece</b>	<b>46.1 (1)</b>	30.3 (2)	15.8 (3)	2.6 (5)	5.3 (4)	29.7	
<b>Ireland</b>	<b>44.2 (1)</b>	11.5 (3)	9.6 (4)	23.1 (2)	11.5 (3)	20.3	
<b>Italy</b>	16.0 (3)	<b>42.0 (1)</b>	11.0 (4)	3.0 (5)	28.0 (2)	39.1	
<b>Netherlands</b>	<b>52.2 (1)</b>	10.4 (4)	12.2 (3)	14.8(2)	10.4 (4)	44.9	
<b>Portugal</b>	36.6 (2)	<b>42.3 (1)</b>	7.0 (3)	7.0 (3)	7.0 (3)	27.7	
<b>Spain</b>	<b>34.3 (1)</b>	29.4 (2)	20.6 (3)	4.9 (5)	10.8 (4)	39.8	
<b>Sweden</b>	25.0 (2)	16.7(4)	18.1 (3)	6.9 (5)	<b>33.3 (1)</b>	28.1	
<b>UK</b>	22.6 (2)	18.3 (4)	16.1 (5)	19.4 (3)	<b>23.7 (1)</b>	36.3	

Notes: 1. RMIG = Raw material-intensive goods, LIG = Labour intensive goods, CIG = Capital intensive good, EIRG = Easy-to-imitate research intensive goods, DIRG = Difficult-to-imitate research intensive goods.  
2. Share of, e.g., RMIG in total RCA sectors for a given country.  
3. Figures in parentheses show the ordering of the categories.  
4. Percentage of RCA exporting sectors in total exporting sectors.

## 4. Empirical Results

### a. Comparison With the EU-15 Countries

As a first step, we calculated the RCA index for each 3-digit sector for all the countries in this group for each year. Our objective in doing this was to obtain some idea about the RCA position of Turkish exports. For this purpose we calculated the period average of the RCA indexes for each sector, determined those with average RCA's greater than unity and distributed them between the technological classes specified in Section 3 above. The results are presented in Table 2. These results consist of both the actual number of sectors in each technological category and their percentages in the total number over-unity RCA sectors. The last column of the percentages reflect the share of the over-unity RCA sectors in the total of 256 exporting sectors.

The first thing we note from this table is that the percentage of sectors exhibiting RCA's greater than unity does not exceed fifty percent in any of the countries involved. The highest percentage is observed for Belgium, which is followed by France, Netherlands, Austria and Germany. The composition of the sectors in these countries, however, show a great deal of variety. DIRG is only dominant in Germany while RMIG is dominant in Netherlands, Belgium and France. In fact, in the fifteen EU countries there are only two other countries where DIRG is dominant and those are Sweden and the UK. Turkey is also a country where RMIG is dominant but is closely followed by LIG. Countries that exhibit a pattern similar to Turkey are Greece, Spain and Portugal.

Simply looking at the distribution of the sectors may be misleading in assessing the shares of the technological categories with respect to the comparative advantages of a country. Hence, we also calculated the shares of these categories in the total exports of the over-unity RCA sectors and the share of said total exports in the total exports of the country in question. For example, the sum of the exports of the over-unity RCA sectors in each category was obtained and their ratios to the total exports of over-unity RCA sectors were calculated. In addition, the percentage share of this latter sum in the total exports of a given country was computed. The calculations were done for each year of the 1990-2000 period and the full period average (Mean-FP) was taken. The results are given in Table 3.

We now note that the share of the exports of these sectors in total exports are above fifty percent in all countries. In terms of Mean-FP, this share is highest for Turkey (82.1%) and lowest for France (58.3%)<sup>7</sup>. In three of the countries where RMIG is dominant in the distribution of the sectors, Denmark, Greece and Netherlands, it is also dominant when the

<b>Table 3</b>						
<b>The Export Performance of the RCA Sectors for the EU-15 and Turkey (%)</b>						
	<b>RMIG<sup>1</sup></b>	<b>LIG<sup>1</sup></b>	<b>CIG<sup>1</sup></b>	<b>EIRG<sup>1</sup></b>	<b>DIRG<sup>1</sup></b>	<b>TOTAL</b>
<b>Turkey</b>						
Mean-FP <sup>2</sup>	22.3 <sup>3</sup> (2) <sup>4</sup>	<b>53.3 (1)</b>	18.0 (3)	2.7 (5)	3.8 (4)	82.1 <sup>5</sup>
<b>Austria</b>						
Mean-FP	5.7 (4)	<b>37.3 (1)</b>	18.5 (3)	5.5 (5)	33.1 (2)	73.1
<b>Belgium</b>						
Mean-FP	17.6 (3)	26.0 (2)	<b>32.8 (1)</b>	12.8 (4)	10.9 (5)	71.3
<b>Denmark</b>						
Mean-FP	<b>38.4 (1)</b>	23.8 (2)	2.8 (5)	12.4 (4)	22.7(3)	71.3
<b>Finland</b>						
Mean-FP	14.8 (4)	<b>39.6 (1)</b>	10.9 (5)	14.9 (3)	19.9 (2)	73.8
<b>France</b>						
Mean-FP	16.9 (3)	12.6 (4)	<b>30.9 (1)</b>	10.1(5)	29.5 (2)	58.3
<b>Germany</b>						
Mean-FP	2.8 (5)	11.9 (3)	28.8 (2)	9.0 (4)	<b>47.4 (1)</b>	69.6
<b>Greece</b>						
Mean-FP	<b>41.1 (1)</b>	37.5 (2)	17.7 (3)	1.0 (5)	2.6 (4)	79.3
<b>Ireland</b>						
Mean-FP	19.7 (2)	10.7(3)	5.5(5)	<b>54.2 (1)</b>	9.9 (4)	77.8
<b>Italy</b>						
Mean-FP	0.5 (5)	<b>52.5 (1)</b>	13.0 (3)	2.0 (4)	32.0(2)	64.0
<b>Netherlands</b>						
Mean-FP	<b>45.8 (1)</b>	7.0 (5)	9.6 (4)	24.0 (2)	13.6(3)	63.7
<b>Portugal</b>						
Mean-FP	12.9 (3)	<b>59.4 (1)</b>	14.6 (2)	5.2 (5)	7.8 (4)	77.2
<b>Spain</b>						
Mean-FP	22.7 (3)	20.6 (4)	<b>43.8 (1)</b>	23.3 (2)	10.3 (5)	71.0
<b>Sweden</b>						
Mean-FP	13.9 (4)	<b>24.8 (1)</b>	16.6 (3)	19.9 (2)	<b>24.8 (1)</b>	64.6
<b>UK</b>						
Mean-FP	13.1 (4)	12.9 (5)	13.4 (3)	<b>39.1 (1)</b>	31.5 (2)	64.0
<p><b>Notes:</b> 1. RMIG = Raw material-intensive goods, LIG = Labour intensive goods, CIG = Capital intensive good, EIRG = Easy-to-imitate research intensive goods, DIRG = Difficult-to-imitate research intensive goods.  2. Mean-FP = Average percentage of exports for the full 1990-2000 period.  3. Average percentage of exports in, e.g., RMIG with respect to total RCA sector exports.  4. The figures in parentheses show the ordering of the categories.  5. Average percentage of total RCA sector exports with respect to total exports.</p>						

shares in exports are concerned. The picture, however, is different for Turkey, Belgium, Finland, France, Ireland and Spain. The dominant classes in export shares are now LIG in Turkey and Finland, CIG in Belgium, France and Spain and EIRG in Ireland. These classes have the second highest shares in terms of the distribution of sectors in these countries. LIG was dominant in distribution in Austria, Italy and Portugal and remains dominant in export shares, with DIRG a close second in Austria and Italy. This is also true for Germany and Sweden where DIRG is dominant on both counts but not for the UK where EIRG is dominant in export shares.

## b. The RCA Performance of Individual Turkish Sectors

We now turn to the RCA performance of individual exporting sectors in Turkey. We had given the distribution of these sectors between the five technological categories and their shares in exports while comparing the performance of Turkey with the EU-15 countries. Now, as a first step, we add to this distribution the dimension of traditionality. The results are in Table 4.

<b>Table 4</b>						
<b>The Sectoral Distribution of High RCA Turkish Exports and Their Behaviour During the 1990-2000 Period</b>						
<b>Distribution</b>						
	<b>RMIG<sup>1</sup></b>	<b>LIG<sup>1</sup></b>	<b>CIG<sup>1</sup></b>	<b>EIRG<sup>1</sup></b>	<b>DIRG<sup>1</sup></b>	<b>TOTAL</b>
<b>Non-Trad.</b>	5	11	2	1	3	22
<b>Traditional</b>	27	20	11	1	2	61
<b>%</b>						
<b>Non-Trad.</b>	22.7 <sup>2</sup> (3) <sup>3</sup>	<b>50.0 (1)</b>	9.1 (4)	4.5 (5)	13.6 (3)	26.5 <sup>4</sup>
<b>Traditional</b>	<b>44.3 (1)</b>	32.8 (2)	18.0 (3)	1.6 (5)	3.3 (4)	73.5 <sup>4</sup>
<b>Behaviour (%)</b>						
<b>Non-Trad.</b>	<b>RMIG</b>	<b>LIG</b>	<b>CIG</b>	<b>EIRG</b>	<b>DIRG</b>	<b>TOTAL</b>
Mean-FP <sup>5</sup>	2.8 <sup>6</sup> (5)	<b>60.8 (1)</b>	12.4 (3)	14.0 (2)	10.0 (4)	11.8 <sup>7</sup>
Mean-3Y	3.1	58.9	11.1	16.5	10.4	16.7
<b>Traditional</b>	<b>RMIG</b>	<b>LIG</b>	<b>CIG</b>	<b>EIRG</b>	<b>DIRG</b>	<b>TOTAL</b>
Mean-FP	25.4 (2)	<b>52.4 (1)</b>	18.7 (3)	0.8 (5)	2.7 (4)	70.7
Mean-3Y	21.8	57.1	16.9	1.1	3.2	61.4
<b>Notes:</b>						
1. RMIG = Raw material-intensive goods, LIG = Labour intensive goods, CIG = Capital intensive good, EIRG = Easy-to-imitate research intensive goods, DIRG = Difficult-to-imitate research intensive goods.						
2. The first five sets of figures in this block are the shares of, e.g., RMIG in Non-traditional and Traditional sectors, respectively.						
3. The figures in parentheses show the ordering of the categories.						
4. These two figures are the shares of the Non-traditional and Traditional groups in the total number of sectors.						
5. Mean-FP = Average percentage of exports for the full 1990-2000 period. Mean-3Y = Average percentage of exports for the last three years of the period.						
6. Average percentage of exports in, e.g., RMIG with respect to total Non-traditional exports.						
7. Average percentage of exports of, e.g., Non-traditional exports with respect to total exports.						

We find that LIG dominates, in *distribution*, for *non-traditional sectors* followed by RMIG, DIRG, CIG and EIRG. This ordering is somewhat changed when we consider the export behaviour of these sectors. LIG still dominates but is now followed by EIRG, CIG, DIRG and RMIG. We further note that the overall average share in exports is not very high (11.8%) but it appears to show an increase for the last three years (16.7%). Increases are also observed for the shares of EIRG, DIRG and RMIG but these increases are rather small for the last two categories. For *traditional sectors*, RMIG now dominates in *distribution* and is

followed by LIG, CIG, DIRG and EIRG. LIG and RMIG change places for the ordering of the *export shares* with LIG, DIRG and EIRG showing increases in the last three years. The overall average share in exports is high (70.7%) but decreases to 61.4% for the last three years.

**Table 5**  
Non-Traditional Turkish Export Sectors with RCA's Greater Than Unity

	Trad. Index	Mean-FP	Mean-8Y	Mean-3Y
<b>RMIG</b>				
<b>211</b>	0.2683	<b>0.35</b>	0.10	<b>1.00</b>
<b>283</b>	0.3714	<b>9.31</b>	<b>6.29</b>	<b>17.36</b>
<b>025</b>	0.3830	0.97	0.77	<b>1.49</b>
<b>273</b>	0.3928	<b>1.02</b>	0.78	<b>1.66</b>
<b>223</b>	0.4120	<b>6.82</b>	<b>6.42</b>	<b>7.88</b>
<b>LIG</b>				
<b>897</b>	0.2762	<b>1.18</b>	0.61	<b>2.71</b>
<b>891</b>	0.3322	0.87	0.56	<b>1.70</b>
<b>656</b>	0.3425	<b>3.39</b>	<b>2.42</b>	<b>5.95</b>
<b>613</b>	0.3732	0.72	0.50	<b>1.29</b>
<b>691</b>	0.3853	0.75	0.60	<b>1.16</b>
<b>654</b>	0.3911	0.93	0.72	<b>1.47</b>
<b>655</b>	0.4149	<b>3.18</b>	<b>2.85</b>	<b>4.06</b>
<b>658</b>	0.4154	<b>11.28</b>	<b>10.03</b>	<b>14.60</b>
<b>662</b>	0.4162	<b>1.56</b>	<b>1.34</b>	<b>2.12</b>
<b>269</b>	0.4164	<b>1.29</b>	<b>1.06</b>	<b>1.90</b>
<b>653</b>	0.4185	<b>3.41</b>	<b>2.88</b>	<b>4.80</b>
<b>CIG</b>				
<b>783</b>	0.3753	<b>1.60</b>	<b>1.39</b>	<b>2.15</b>
<b>554</b>	0.4255	<b>2.35</b>	<b>2.21</b>	<b>2.70</b>
<b>EIRG</b>				
<b>761</b>	0.3823	<b>4.49</b>	<b>3.17</b>	<b>7.98</b>
<b>DIRG</b>				
<b>775</b>	0.3809	<b>1.11</b>	0.88	<b>1.71</b>
<b>733</b>	0.3843	0.62	0.45	<b>1.08</b>
<b>727</b>	0.3961	0.72	0.60	<b>1.04</b>
<p>Notes: 1. RMIG = Raw Material Intensive Goods, LIG = Labour Intensive Goods, CIG = Capital Intensive Goods, EIRG = Easy-to-Imitate Research Intensive Goods, DIRG = Difficult to Imitate Research Intensive Goods.</p> <p>2. Mean-FP = Average for the full 1990-2000 period, Mean-8Y = Average for the first eight years, Mean-3Y = Average for the last three years.</p>				

We now direct our attention to individual 3-digit sectors. The information concerning these sectors are presented in two tables. In each table we present the average RCA's for the period as a whole (Mean-FP), for the first eight years (Mean-8Y) and for the last three years (Mean-3Y). The reason for doing so was our observation that there was a significant difference between the RCA performance of these sectors between the first eight years of the

1990-2000 period and the last three years. The sectors are grouped according to the technological categories and they are ordered according to their traditionality indexes. Non-traditional sectors are ordered from the least traditional onwards while the traditional sectors are ordered from the most traditional onwards.

Table 5 contains the *non-traditional sectors*. The majority of these sectors show over-unity RCA behaviour throughout the 1990-2000 period. These are 283 - Copper ores and concentrates; copper mattes; cement copper, 223 - Oil-seeds and oleaginous fruits, whole or broken, of a kind used for the extraction of other fixed vegetable oils (including flours and meals of oil-seeds or oleaginous fruit, n.e.s.), (RMIG), four sectors in 65 - Textile yarn, fabrics, made-up articles, n.e.s. and related Products (656, 655, 658, 653), 662 - Clay construction materials and refractory construction materials, 269 - Worn clothing and other worn textile articles; rags, (LIG), 783 - Road motor vehicles, n.e.s., 514 - Nitrogen-function compounds, (CIG), and 761 - Television receivers (including video monitors and video projectors), whether or not incorporating radio-broadcast receivers or sound- or video-recording or reproducing apparatus, (EIRG). All 22 sectors in this group show an increase in RCA in the last three years. Eleven of them had RCA's below unity in the first eight years and this increase has carried them over the unity threshold has carried them over the unity threshold in the last three years. We may list them as follows:

#### RMIG

- 211 Hides and skins (except fur skins), raw
- 025 Eggs, birds', and egg yolks, fresh, dried or otherwise preserved, etc.
- 273 Stone, sand and gravel

#### LIG

- 897 Jewellery, goldsmiths' and silversmiths' wares, etc.
- 891 Arms and ammunition
- 613 Fur skins, tanned or dressed, unassembled, or assembled, etc.
- 691 Structures and parts of structures, n.e.s., of iron, steel or aluminium
- 654 Other textile fabrics, woven

#### DIRG

- 775 Household-type electrical and non-electrical equipment, n.e.s.
- 733 Machine tools for working metal, sintered metal carbides or cermets, etc.
- 727 Food-processing machines (excluding domestic); parts thereof

There are also sectors that have shown a great deal of improvement in their RCA levels in the last three years. These include 283 - Copper ores and concentrates; copper mattes; cement copper (RMIG), 656 - Tullies, lace, embroidery, ribbons, trimmings and other

**Table 6**  
**Traditional Turkish Export Sectors with RCA's Greater Than Unity**

	<b>Trad. Index</b>	<b>Mean-FP</b>	<b>Mean-8Y</b>	<b>Mean-3Y</b>
<b><u>RMIG</u></b>				
<b>001</b>	0.7111	<b>2.53</b>	<b>3.33</b>	0.37
<b>074</b>	0.6745	<b>2.90</b>	<b>3.50</b>	<b>1.29</b>
<b>422</b>	0.6627	<b>2.57</b>	<b>3.17</b>	<b>0.95</b>
<b>285</b>	0.6318	<b>1.11</b>	<b>1.32</b>	0.54
<b>277</b>	0.5964	<b>3.72</b>	<b>4.16</b>	<b>2.56</b>
<b>036</b>	0.5792	<b>1.03</b>	<b>1.22</b>	0.53
<b>344</b>	0.5654	<b>1.58</b>	<b>1.97</b>	0.55
<b>054</b>	0.5632	<b>3.64</b>	<b>4.08</b>	<b>2.48</b>
<b>421</b>	0.5422	<b>2.94</b>	<b>3.20</b>	<b>2.26</b>
<b>041</b>	0.5355	<b>2.27</b>	<b>1.76</b>	<b>3.63</b>
<b>278</b>	0.5343	<b>7.08</b>	<b>7.35</b>	<b>6.38</b>
<b>291</b>	0.5330	<b>3.55</b>	<b>3.79</b>	<b>2.93</b>
<b>091</b>	0.5282	<b>10.76</b>	<b>12.02</b>	<b>7.38</b>
<b>056</b>	0.5269	<b>4.99</b>	<b>5.30</b>	<b>4.14</b>
<b>043.</b>	0.5267	<b>2.50</b>	<b>2.27</b>	<b>3.12</b>
<b>046</b>	0.5199	<b>7.11</b>	<b>7.74</b>	<b>5.44</b>
<b>057</b>	0.5173	<b>9.49</b>	<b>10.08</b>	<b>7.92</b>
<b>287</b>	0.4944	<b>7.30</b>	<b>7.42</b>	<b>6.97</b>
<b>075</b>	0.4894	<b>11.82</b>	<b>12.54</b>	<b>9.93</b>
<b>059</b>	0.4892	<b>2.21</b>	<b>2.38</b>	<b>1.73</b>
<b>061</b>	0.4876	<b>2.09</b>	<b>1.87</b>	<b>2.67</b>
<b>431</b>	0.4793	<b>3.93</b>	<b>4.38</b>	<b>2.72</b>
<b>058</b>	0.4594	<b>7.89</b>	<b>7.49</b>	<b>8.96</b>
<b>048</b>	0.4590	<b>1.51</b>	<b>1.62</b>	<b>1.20</b>
<b>062</b>	0.4522	<b>4.19</b>	<b>4.29</b>	<b>3.93</b>
<b>037</b>	0.4459	<b>1.52</b>	<b>1.49</b>	<b>1.63</b>
<b>073</b>	0.4289	0.90	0.84	<b>1.04</b>
<b><u>LIG</u></b>				
<b>848</b>	0.6090	<b>14.13</b>	<b>16.18</b>	<b>8.68</b>
<b>263</b>	0.5989	<b>17.99</b>	<b>20.18</b>	<b>12.16</b>
<b>664</b>	0.5125	<b>1.27</b>	<b>1.31</b>	<b>1.16</b>
<b>659</b>	0.5092	<b>4.84</b>	<b>4.77</b>	<b>5.04</b>
<b>266</b>	0.5055	<b>5.98</b>	<b>5.57</b>	<b>7.08</b>
<b>844</b>	0.5007	<b>18.60</b>	<b>19.43</b>	<b>16.38</b>
<b>651</b>	0.4911	<b>4.60</b>	<b>4.30</b>	<b>5.38</b>
<b>841</b>	0.4667	<b>6.73</b>	<b>6.44</b>	<b>7.49</b>
<b>657</b>	0.4630	<b>1.24</b>	<b>1.24</b>	<b>1.26</b>
<b>652</b>	0.4622	<b>4.05</b>	<b>3.85</b>	<b>4.58</b>
<b>842</b>	0.4597	<b>8.02</b>	<b>7.46</b>	<b>9.51</b>
<b>845</b>	0.4595	<b>9.33</b>	<b>8.92</b>	<b>10.45</b>
<b>665</b>	0.4588	<b>2.63</b>	<b>2.42</b>	<b>3.19</b>
<b>661</b>	0.4556	<b>3.72</b>	<b>3.41</b>	<b>4.55</b>
<b>264</b>	0.4537	<b>1.06</b>	<b>1.25</b>	0.56
<b>693</b>	0.4494	<b>2.48</b>	<b>2.16</b>	<b>3.34</b>
<b>697</b>	0.4474	<b>2.06</b>	<b>1.88</b>	<b>2.56</b>
<b>812</b>	0.4411	<b>1.73</b>	<b>1.60</b>	<b>2.08</b>
<b>843</b>	0.4386	<b>10.39</b>	<b>9.84</b>	<b>11.84</b>

<b>846</b>	0.4383	<b>4.31</b>	<b>3.98</b>	<b>5.19</b>
<b>CIG</b>				
<b>672</b>	0.6023	<b>7.83</b>	<b>9.18</b>	<b>4.22</b>
<b>671</b>	0.5524	<b>4.51</b>	<b>4.77</b>	<b>3.83</b>
<b>121</b>	0.5354	<b>30.35</b>	<b>32.53</b>	<b>24.54</b>
<b>676</b>	0.5105	<b>7.56</b>	<b>7.72</b>	<b>7.13</b>
<b>682</b>	0.4992	<b>1.23</b>	<b>1.22</b>	<b>1.24</b>
<b>679</b>	0.4835	<b>1.45</b>	<b>1.37</b>	<b>1.65</b>
<b>532</b>	0.4776	<b>2.13</b>	<b>2.07</b>	<b>2.30</b>
<b>625</b>	0.4689	<b>1.69</b>	<b>1.64</b>	<b>1.82</b>
<b>673</b>	0.4406	<b>1.05</b>	0.91	<b>1.41</b>
<b>684</b>	0.4319	0.78	0.68	<b>1.05</b>
<b>EIRG</b>				
<b>523</b>	0.4573	<b>3.53</b>	<b>3.01</b>	<b>4.89</b>
<b>DIRG</b>				
<b>773</b>	0.4487	<b>2.44</b>	<b>2.46</b>	<b>2.38</b>
<b>793</b>	0.4847	0.97	0.93	<b>1.09</b>
<p>Notes: 1. RMIG = Raw Material Intensive Goods, LIG = Labour Intensive Goods, CIG = Capital Intensive Goods, EIRG = Easy-to-Imitate Research Intensive Goods, DIRG = Difficult to Imitate Research Intensive Goods.</p> <p>2. Mean-FP = Average for the full 1990-2000 period, Mean-8Y = Average for the first eight years, Mean-3Y = Average for the last three years.</p>				

small wares, 655 - Knitted or crocheted fabrics (including tubular knit fabrics, n.e.s., pile fabrics and openwork fabrics), n.e.s., 653 - Fabrics, woven, of man-made textile materials (not including narrow or special fabrics) (LIG), and 761 - Television receivers (including video monitors and video projectors), whether or not incorporating radio-broadcast receivers or sound- or video-recording or reproducing apparatus (EIRG).

The results pertaining to *traditional sectors* for the same group of countries are given in Table 6. We note that, except for three sectors (073, 684 and 793), all sectors have RCA's greater than unity for the period as a whole. But, apparently, what distinguishes the traditional sectors from the non-traditionals is the fact that 33 out of the 61 sectors in this group show a decrease in the last three years. These are concentrated in the RMIG category (22 out of 27), while 6 out 20 sectors for LIG, 4 out of 11 for CIG and 1 out of 2 for DIRG show this type of performance. Four of those in RMIG (001 - Live animals other than animals of division 03, 285 - Aluminium ores and concentrates (including alumina), 036 - Crustaceans, molluscs and aquatic invertebrates, whether in shell or not, fresh (live or dead), chilled, frozen, dried, salted or in brine; crustaceans, in shell, cooked by steaming or boiling in water, whether or not chilled, frozen, dried, salted or in, 344 - Petroleum gases and other gaseous hydrocarbons, n.e.s.) and one in LIG (264 - Jute and other textile based fibres, n.e.s., raw or processed but

not spun; tow and waste of these fibres (including yarn waste and garneted stock)) have RCA's below unity in the last three years.

On the other hand, of the 28 sectors that have increased their RCA's in the last three years, only four have raised them above unity during this period. These are,

<u>RMIG</u>	073	Chocolate and other food preparations containing cocoa, n.e.s.
<u>CIG</u>	673	Flat-rolled products of iron or non-alloy steel, not clad, plated or coated
	684	Aluminium
<u>DIRG</u>	793	Ships, boats (including hovercraft) and floating structures

## 5. Conclusions

In this study we investigated the RCA performance of Turkish 3-digit exporting sectors vis-à-vis the EU-15. In doing so we utilised both a two-way classification based on a traditionality index and a five-way classification based on the technological characteristics of the sectors. Our conclusions may be listed as follows:

1. When we compare the RCA performance of Turkey with the EU-15 countries, we find that, as far as the distribution of the sectors between the technological categories are concerned, there are five countries that appear to show a similar performance; Belgium, Denmark, Finland, Greece and Spain. But, when we take into account the shares in actual exports, we first note that the ordering of the categories, Turkey's included, change and this leads to a considerable revision as to which countries show a similarity to Turkey. Now, only Belgium appears to be similar to Turkey.

3. The two conclusions stated above point to the importance of considering the distribution of high RCA sectors together with their shares in actual exports. The fact that there are a large or small number of sectors in a given category does not necessarily imply that the share of that category in exports will also be large or small.

4. When the traditionality dimension is introduced for the aggregate results for Turkey, we find that the traditional sectors dominate both in distribution and in export shares. However, we also note that the export shares of the traditional sectors are declining over time while the shares of non-traditional sectors are increasing. In terms of the five categories, Raw-Material Intensive Goods is the dominant category for the traditional sectors as far as distribution is concerned while Labour Intensive Goods is dominant category for non-traditional sectors. When export shares are considered, Labour Intensive Goods becomes the dominant category in both cases.

5. When individual sectors are considered, we find that the non-traditional sectors all show increases in RCA over time. The RCA indexes for eleven of these sectors exceed unity in the last three years of the period. For the traditional sectors this figure is four. On the other hand, thirty-three traditional sectors show decreases in their RCA indexes over time. Five sectors appear to have lost their competitive advantages in the last three years of the period.

6. The majority of the sectors with declining RCAs are in Raw-Material Intensive Goods category.

7. What can be said about the performance of Easy-to-Imitate and Difficult-to-Imitate Research Intensive Goods? Their combined share in distribution, for all above-unity RCA sectors, is 8.5% and when the traditionality classification is made this share becomes 18.1% for non-traditional sectors and 4.9% for traditional sectors. The corresponding full-period average export share figures are 24.0% for non-traditional sectors and 3.5% for traditional sectors in and they both show increases during the last three years.

8. Comparing the distribution results for all above-unity RCA sectors given in (7) above, with the results in Erlat and Erlat (2004b) regarding Turkey and Middle East Countries, we note that even though Labour Intensive Goods (30.4%) and Raw Material Intensive Goods (29.8) are still the two major categories, the third category is Difficult-To-Imitate Research Intensive Goods and its combined share with Easy-To-Imitate-Research Intensive Goods is 26.7%. Noting the fact that this percentage reflects 51 sectors out of total of 191 sectors, it may be claimed that exports of research intensive goods appear to have a promising future regarding the Middle East market than the EU market.

9. The majority of the sectors in the research intensive goods category belong to SITC 7 – Machinery and Transport Equipment with two sectors from SITC 52 – Inorganic Chemicals and two from SITC 58 – Plastics in Non-Primary Forms and these sectors either attain above-unity RCA levels during the last three years of the period or increase them. Coupling this with the aggregate results regarding the Middle East market (which, however do not contain any evidence regarding export shares), it may be tempting to say that these sectors are those with the dynamism to become the leading export sectors in the future. But, we need to consider the fact that the majority of the non-traditional sectors that show increases only in the last three years are labour-intensive sectors. Three of these sectors are in SITC 6 – Manufactured Goods Classified Chiefly by Material and SITC 8 – Miscellaneous Manufactured Articles. Thus, it may be safe to say that, from the perspective of revealed comparative advantage and in terms of the European Union market, the Labour Intensive Goods category still contains the majority of the sectors that will be the leading export sectors

for Turkey in the future and that it will be a while, if at all, before research intensive sectors gain the ascendancy in this respect.

## Endnotes

1. The actual number of countries considered is fourteen since the data for Belgium also contains the data for Luxemburg.
2. Our approach contains no evidence regarding “price competitiveness”. For a study on Turkey where the focus is on “price competitiveness” see Kotan and Sayan (2002).
3. What Akgungor et al. (2002) regard as the RCA index is simply the ratio of the RCA (or CEP) indexes for the  $i^{th}$  good calculated for two countries. It may be a better idea to call it the index of relative export performance rather than RCA.
4. This index was developed by Amin Gutierrez de Pineres and Ferrantino (1997) and was applied to export data, by Erlat and Sahin (1998) and to both export and import data, by Erlat (1999).
5. Hufbauer and Chilas (1974) use a three-way classification: *Ricardo goods*, which use primarily natural resources in their production; *Heckscher-Ohlin goods*, which are produced using a standard technology that may either be labour or capital intensive; *product cycle goods*, which use high-technology with an important research component. In terms of the classification above, RMIG, obviously, corresponds to Ricardo goods, Heckscher-Ohlin goods are subdivided into LIG and CIG, and product cycle goods into EIRG and DIRG.
6. For an application of Vollrath’s indexes to Turkish data, see Togan (1994) and for a recent application to Australian data, see Havrila and Gunawardana (2003).
7. This implies that, even if Turkey’s number of over-unity RCA sectors are low (82) compared to that of France (116), they account for the majority of the exports (Table 3) and if one is trying to identify the leading export sectors of Turkey in the future, they most likely be among these over-unity RCA sectors where as, in France, such sectors may well emerge from outside of such group.

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## **Appendix**

### Raw Material Intensive Goods

- SITC 0 Food and Live Animals
- SITC 2 Crude Material, Inedible, Except Fuels (excluding 26)
- SITC 3 Mineral Fuels, Lubricants and Related Materials (excluding 35)
- SITC 4 Animal and Vegetable Oils, Fats and Waxes
- SITC 56 Fertilizers (Other Than Those of Group 272)

### Labour-Intensive Goods

- SITC 26 Textile Fibres (Other Than Wool Tops and Other Combed Wool) and Their Wastes  
(Not Manufactured Into Yarn or Fabric)
- SITC 6 Manufactured Goods Classified Chiefly by Material (excluding 62, 67, 68)
- SITC 8 Miscellaneous Manufactured Articles (excluding 88, 87)

### Capital-Intensive Goods

- SITC 1 Beverages and Tobacco
- SITC 35 Electric Current
- SITC 53 Dyeing, Tanning and Colouring Materials
- SITC 55 Essential Oils and Resinoids and Perfume Materials; Toilet, Polishing and  
Cleansing Preparations
- SITC 62 Rubber Manufactures, n.e.s.
- SITC 67 Iron and Steel
- SITC 68 Non-Ferrous Metals
- SITC 78 Road Vehicles (Including Air-Cushion Vehicles)

### Easy-to-Imitate Research-Intensive Goods

- SITC 51 Organic Chemicals
- SITC 52 Inorganic Chemicals
- SITC 54 Medicinal and Pharmaceutical Products
- SITC 58 Plastics in Non-Primary Forms
- SITC 59 Chemical Materials and Products, n.e.s.
- SITC 75 Office Machines and Automatic Data-Processing Machines
- SITC 76 Telecommunications and Sound-Recording and Reproducing Apparatus and  
Equipment

### Difficult-to-Imitate Research-Intensive Goods

- SITC 57 Plastics in Primary Forms
- SITC 7 Machinery and Transport Equipment (excluding 75, 76, 78)
- SITC 87 Professional, Scientific and Controlling Instruments and Apparatus, n.e.s.
- SITC 88 Photographic Apparatus, Equipment and Supplies and Optical Goods, n.e.s.;  
Watches and Clocks