

# Revealed Comparative Advantage and Competitiveness: Evidence for Turkey *vis-à-vis* the EU/15

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## Abstract:

This study analyses the competitiveness and the pattern of trade flows/trade specialisation from Turkey to the EU on sectoral levels. Our research is mainly based on different measures of Revealed Comparative Advantage (RCA) measures (in addition to simple Balassa Index). Accordingly, alternative RCA indices are calculated. The stability of different measures of RCA is also tested.

The present work also aims to explain if the ongoing customs union process between Turkey and the EU has significant effects on trade patterns, comparative advantages and competitiveness. In the light of evidence, some policy implications are drawn.

## Keywords:

Trade, revealed comparative advantage, competitiveness, specialisation, customs union, measures.

JEL Classification: F10, F14, F15

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## **1. Introduction**

Turkey has been officially considered as a candidate country since the recommendation of the European Commission in 1999. In addition to the well known “political criteria”, the basic pre-conditions of full membership are the establishing of a well-functioning market economy, existence of free and functioning competition (so called the Copenhagen criteria), and the ability to realise the conditions of the Monetary Union (EMU). The fulfilment of the above pre-conditions until December 2004 will give Turkey the chance of starting negotiations with the European Union (EU).

The Customs Union agreement signed between Turkey and the EU that came into force in 1996 has led to a trade liberalisation and increased competitive pressure for both sides. Depending on the acknowledgement of Turkey’s fulfilment of the pre-conditions by the EU, and given the opportunity of starting negotiations in 2005, Turkey’s acceptance to the EU is anticipated in ten years time approximately. At present, over 50 per cent of Turkey’s trade is with the EU. This is expected to increase with beginning negotiations for full membership.

This paper aims to examine Turkey’s relative competitiveness and compare the structure of specialisation in trade *vis-à-vis* the EU. The empirical analysis of the present paper is based on revealed comparative advantage (RCA). Although this is a widely accepted approach to analysing trade data and comparative advantage, the definition and empirical adaptation of RCA are subject to controversies and thus some alternative measures now exist. Since we are interested in the competitiveness of Turkey within a European context, we measure RCAs with respect to the EU as the comparator.

The plan of the paper is as follows. The following section reviews the empirical literature on the comparative advantage and the competitiveness of Turkey. Section 3 outlines the economic relations between Turkey and the EU. Alternative measures of RCA indices, a comparison and our approach are presented in the Section 4. Section 5 reports empirical results. The final section draws some conclusions based on the findings.

## **2. Selective Review on the Revealed Comparative Advantage and the Competitiveness of Turkey**

Using both a version of the Balassa index and an export similarity index, Ferman *et. al.* (2004) determines the competitiveness of Turkish exports in the EU market. The empirical findings suggest that Turkey’s closest rivals in the EU market are China and India. Turkey’s international competitiveness is found to be limited to labour intensive and easily imitable research-oriented products. Competitiveness in difficultly imitable research-oriented products is low.

Yılmaz (2003) examines the international competitiveness of the Turkish economy and the structure of specialisation in trade in comparison with the five EU candidate countries<sup>1</sup> Bulgaria, the Czech Republic, Hungary, Romania, Poland, and the EU/15. By embodying four different measures of competitiveness, namely revealed comparative advantage (RCA), comparative export performance (CEP), trade overlap (TO), and export similarity (ES) indices, the empirical findings suggest that Turkey has a strong comparative advantage in raw material-intensive [SITC 0, 2-26, 3-35, 4, 56]<sup>2</sup> and labour-intensive goods [SITC 26, 6-(62, 67, 68), 8-(87, 88)], and has comparative disadvantages in the difficultly imitable research-oriented goods [SITC 57, 7-(75, 76, 78), 87, 88] and in easily imitable research-oriented goods [SITC 51, 52, 54, 58, 59, 75, 76]. Thus the country shares the same export structure with Romania, Poland, and partly with Bulgaria. Among six countries examined, only Bulgaria and the Czech Republic seem to establish competitiveness in capital-intensive goods [SITC 1, 35, 53, 55, 62, 67, 68, 78]. Besides, Hungary is the only country that has a comparative advantage in exporting of easily imitable research-oriented goods.

A similar work by Yılmaz and Ergun (2003) estimates the competitiveness of the candidate countries in question (Bulgaria, the Czech Republic, Hungary, Romania, Poland, and Turkey) by using seven different measures including the four indices in Yılmaz (2003). The findings suggest that the main common failure of all countries in hand is their weaknesses in the performance of production and competition in research-oriented goods where only Hungary is an exception to some extent. Turkey seems to catch up with the EU in a short time period. Results also show that from the start of the 1990s Turkey has improved its trade diversification. A great deal of acceleration is observed especially after 1996 which prove that the Custom Union (CU) with the EU had a positive effect on the Turkish trade pattern. They point out that attracting foreign direct investment (FDI) is the key factor to transfer technology and to reshape trade patterns. Poland, the Czech Republic and Hungary have trade patterns very similar to the EU whereas Turkey, Bulgaria and Romania show a rather differentiated trade structure from the EU. It is thus not surprising that two-third of FDI invested in Eastern Europe went to the Czech Republic, Hungary, and Poland.

A recent work by the Undersecretariat of Foreign Trade (2003) analyses the competitiveness of the Turkish export commodities by employing RCA measures. Results suggest that 80 per cent of the commodity groups having comparative advantage are the manufactured products. This is followed by 'fruits and vegetables'. However, from Turkey's perspective, these findings do not seem promising in the

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<sup>1</sup> The Czech Republic, Hungary, and Poland are now full members whereas Romania and Bulgaria are still candidates.

<sup>2</sup> Note that SITC 3-35 implies all of SITC 3 except for SITC 35, and SITC 6-(62, 67, 68) implies all of SITC 6 except for SITC 62, 67, 68, and so on.

sense that only about 10 per cent of the total imports of the EU are attributed to the commodity groups that Turkey has comparative advantage. On the other hand, these products cover 68 per cent of Turkey's total exports to the EU.

Karakaya and Özgen (2002), by employing RCA approach, investigate the potential trade creation and diversion effects of economic integration for Turkey and the EU. They also use the RCA index to examine if Turkey's accession will jeopardise the trade for southern members, i.e. Greece, Portugal, and Spain. Results confirm that the export structures are remarkably different among Turkey and the EU. It is pointed out that Turkey, probably, does not change the EU position significantly since country's low trade volume with respect to the EU. Results indicate that Turkey's accession to the EU market with no trade barriers may hamper the export position of the southern EU countries.

Küçükahmetoğlu (2000) tries to investigate the competitiveness of the Turkish industrial products *vis-à-vis* the EU by calculating traditional RCA indices of Balassa. He reports that Turkey has comparative advantage at about 50 per cent of the "standard" industrial products while has a definite disadvantage in "advanced" technology products "advanced" with respect to the EU.

In an extensive work, Togan (1990) calculates for the 1980s that those industries including clothing and clothing accessories (SITC 84), fertilisers (SITC 56), iron and steel (SITC 67), fixed vegetable fats and oils (SITC 42), animal and vegetable oils and fats, waxes (SITC 43), various eatable products (SITC 09), prefabricated buildings, sanitary, heating, lighting etc. (SITC 81), travel goods, handbags and similar goods (SITC 83) have the highest -and increasing in time- RCA values whereas furniture, bedding, mattresses (SITC 82), miscellaneous manufactured products (SITC 89), cork and wood (SITC 24), oil seeds (SITC 22), beverages (SITC 11), metalworking machinery (SITC 73), hides and skins, raw (SITC 21), pulp and waste paper (SITC 25) have the lowest –and decreasing in time- RCA values on the other hand.

Güran (1990), only for the year 1988, and using standard RCA indices investigates Turkey's competitiveness with respect to the EU (the European Community, EC, at the time) and explores that those sectors with SITC codes: 22, 04, 12, 20, 21, 09, 16, 19, 08, 01, 18, 33, 15, 37, 10, 26, 03 have strong comparative advantages whereas sectors with SITC codes: 07, 05, 49, 47, 27, 43, 30, 50, 28, 13, 46, 44, 48, 32, 38, 14, 45, 42, 36, 34, 40, 39, 02, 31, 29, 23, 41 have strong comparative disadvantages.

There also exists a literature measuring Turkey's competitiveness on sectoral/industrial level. Altay and Gacaner (2003), employing RCA indices, compare the competitiveness of textile and clothing industries of Turkey and China *vis-à-vis* the EU and the USA markets. Results suggest that Turkey, compared to China, has a comparative advantage in textile and clothing in both the EU and the USA

markets. However, Turkey's advantage in relative terms is calculated to be higher in the USA market compared to the EU market.

Akgüngör *et al.* (2002), also on a sectoral level, measures the competitiveness of the Turkish Fruit and Vegetable Processing Industry in the EU market. The paper investigates the competitiveness of Turkey's tomato, grape, and citrus fruit processing industry product exports (products with the highest shares in Turkey's total fruit and vegetable exports) in the EU market. The export similarity index reveals that Greece, Spain, and Portugal are Turkey's competitors. The RCA index and comparative export performance index show that Turkey's competitive power is higher than Spain and Portugal in processed grape exports, and is higher than Greece and Portugal in citrus fruit exports. There is however found to be no indication of competitive power for processed tomato exports. The econometric import demand model reveals that relative export prices matter in determining Turkey's competitive power in the EU-processed tomato and grape markets.

### **3. Turkey and the EU Trade Relationship**

There exist two basic dimensions of the European Union (EU) and Turkey relationship (Utkulu and Seymen, 2003; Utkulu *et al.* 2004). The first one started with Turkey's application as an associate member to the European Economic Community (EEC) in 1959. This application forms the basis of Turkey's current Customs Union (CU) Relations which came in to force in 1996. The second is the application for full membership to the EC in 1987. This section focuses particularly on the association relationship between two parties to see their trade relations in specific.

Economic relations between two parties have been strong since the early 1950s, but were intensified over recent decades. The long-standing preferences between Turkey and the EU have resulted in the EU being not only the most important market for Turkey (51.7 per cent of Turkey's exports in 2003) but also one of the main sources for imported goods (45.7 per cent of Turkey's imports in 2003) (See Table 1).

The CU between Turkey and the EU went far beyond a basic custom union with free international trade and common external tariffs, and has given a new impetus to the liberalization process in Turkey. Apart from the liberalisation of tariffs and adoption of the EU's common external tariff for industrial products and the industrial components of processed agricultural products by Turkey, the agreement also embraces a number of integration elements which includes the adoption of the Community's commercial policy towards third countries including textile quotas, the adoption of the free trade agreements with all the EU's preferential trade partners; co-operation on the harmonisation of agricultural policy, mutual minimisation of restriction on trade in services, harmonisation of Turkey's legislation to that of the EU in the area of competition policy, intellectual and industrial property rights, public procurement and technical

barriers to trade (WTO, 1999; Harrison *et al.*, 1996). The scope of the CU excludes Turkey from some of the crucial aspects of the common market: the common agricultural policy, including the free circulation of agricultural products; the free movement of labour and capital; and move towards a single currency. Unlike countries in the European Economic Area, Turkey is also a subject to anti-dumping measures by the EU. The financial support originally envisaged from the EU to Turkey has not yet been made available.

Table 1: Turkey and the EU Trade (billions dollar, %)

Year	Export (TR)	Change (%)	Export (to the EU)	Change (%)	EU Share of Export	Import (TR)	Change (%)	Import (from the EU)	Change (%)	Import share from the EU	Turkey - the EU Trade Balance
1990	12.9	-	6.9	-	53.4	22.3	-	9.9	-	44.4	-3.0
1995	21.6	-	11.1	-	51.2	35.7	-	16.9	-	47.2	-5.8
1996	23.2	7.3	11.5	4.2	49.7	43.6	22.2	23.1	37.2	53.0	-11.6
1997	26.3	13.1	12.2	6.1	46.6	48.6	11.3	24.9	7.5	51.2	-12.6
1998	27.0	2.7	13.5	10.2	50.0	45.9	-5.4	24.1	-3.2	52.4	-10.6
1999	26.6	-1.4	14.3	6.3	54.0	40.7	-11.4	21.4	-11.0	52.6	-7.1
2000	27.8	4.5	14.5	1.1	52.2	54.5	34.0	26.6	24.3	48.8	-12.1
2001	31.3	12.8	16.1	11.1	51.4	41.4	-24.0	18.3	-31.3	44.2	-2.2
2002	35.8	14.1	18.1	12.0	50.5	51.3	23.8	23.1	26.5	45.1	-5.1
2003	47.3	11.5	24.5	23.5	51.7	69.3	35.1	31.7	37.2	45.7	-7.2

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

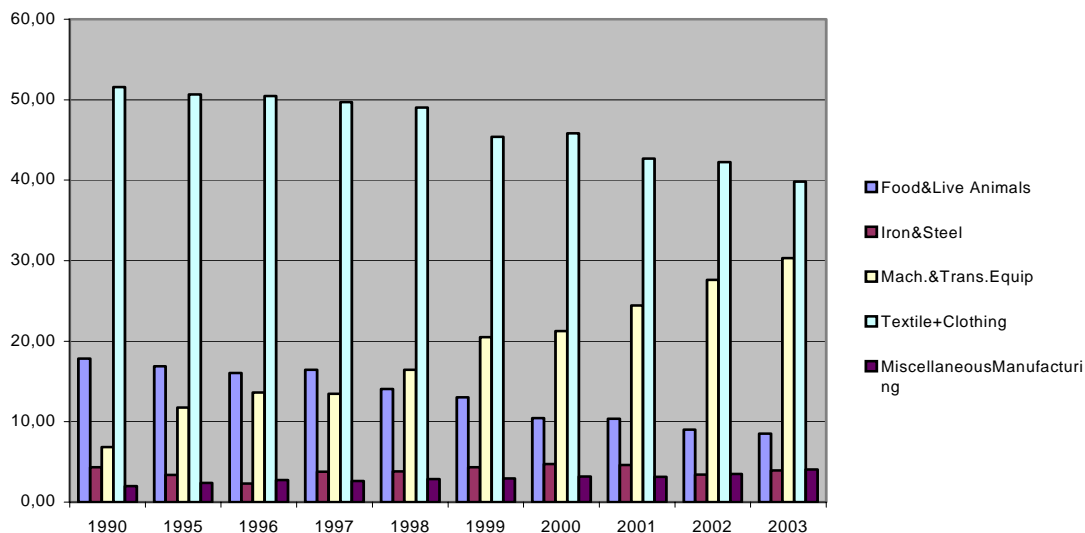
The CU agreement caused some changes in the Turkish trade (Seymen, 1998). It was no doubt that, with the CU, the amount of trade between Turkey and the EU was to increase. Expectedly, there was an increase, especially in the amount of goods that Turkey imported from the EU. A considerable rise in Turkey's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

Turkey's imports from the EU in 1996 (the first year of the CU implementation) reached \$23 billion, with an increase of 37.2%. Considering the 22.2% increase in Turkey's total import in 1996, it is clear that the CU had a certain impact on the increase in imports. Turkey's export to the EU totalled \$11.5 billion with an increase of 4.2%, below the 7.3% increase in total exports in 1996. Consequently, Turkey's foreign trade deficit with the Union doubled and increased to \$11.6 billion in 1996. In 1997 Turkey managed the shock effect of the CU and the rate of increase in imports from the EU decreased. The increase of imports from the EU is %7.5 whereas the increase of exports to the EU is %6.1. In 1999 and 2001 economic stagnation affected Turkey's trade negatively, so imports from the EU decreased as well. With the exception of periods of economic crises, increases in imports were greater than the exports increases. So resulting trade deficits was high. In 2003 Turkey's exports to the EU is \$24.5 billions with the %23.5 increase. Turkey's import from the EU is \$31.7 billions with the %37.2 increase. Turkey's

trade deficit with the Union is \$7.2 billions in 2003. Figures in Table 1 suggest that the EU share in the Turkish exports and imports have always been around 50 per cent. This shows that Turkey and the EU have been traditional and stable trade partners over time. This fact has not changed even in the years of economic crises of 1999, 2001 and after.

Figure 1 gives the share of main sectors in exports with the EU for the years 1990 and 1995-2003. As seen from figures, exports of manufactures are concentrated on several products such as textile and clothing, machinery and transport equipment. Foods, live animals and iron and steel have also significant proportions in total exports. Bearing in mind that sectors such as iron and steel, textile, clothing, and foods are classified mostly as semi-processed primary goods, it is clear that Turkish export is mainly dependent on low-technology products. But in order to obtain a sustainable export growth, the structure of export has to be changed in favour of more technology-intensive products. Textile and clothing sectors together account for nearly 45 per cent of total exports to the EU. This shows that the diversification of export has not been achieved yet. On the other hand, it is worth to note that, from 1996 to 2003, the share of textile and clothing exports to the EU decreased from 50.4% to 39.8%, while the share of machinery and transport equipment increased from 13.5% to 30.3%. This might be considered as a evident for a gradual change of the Turkish exports to the EU towards higher value-added products.

Figure 1: Sectoral Share of Turkish Exports to the EU (%)



Source: SPO, SIS

#### 4. Measuring Revealed Comparative and Competitive Advantages

There mainly exist two prominent theories of trade based on comparative advantage: the Ricardian theory and the Heckscher-Ohlin (H-O) theory. The Ricardian theory assumes that comparative advantage arises from differences in technology across countries while the H-O theory suggests that technologies are the same across countries. Instead, the H-O theory attributes comparative advantage to cost differences resulting from differences in factor prices across countries. In brief, the predictions of orthodox (classical) trade theories are based on the principle of comparative advantage which derives from relative price determination, i.e. differences in pre-trade relative prices across countries, underlined by supply and demand factors.

According to the H-O theory, a country's comparative advantage is determined by its relative factor scarcity (i.e. its factor endowment ratios, relative to the rest of the world or a set of countries). However, it is well known that measuring comparative advantage and testing the Heckscher-Ohlin (H-O) theory have some difficulties (Balassa, 1989: 42-4) since relative prices under autarky are not observable. Given this fact, Balassa (1965) proposes<sup>3</sup> that it may not be necessary to include all constituents effecting country's comparative advantage. Instead, he suggests that comparative advantage is "revealed" by observed trade patterns, and in line with the theory, one needs pre-trade relative prices which are not observable. Thus, inferring comparative advantage from observed data is named "revealed" comparative advantage (RCA). In practice, this is a commonly accepted method to analysing trade data. Balassa (1965) derives an index (called the Balassa Index) that measures a country's comparative advantage. The Balassa index tries to identify whether a country has a "revealed" comparative advantage rather than to determine the underlying sources of comparative advantage. However, since first suggested by Balassa (1965), the definition of RCA has been revised and modified such that an excessive number of measures now exist. Some studies measures RCA at the global level (see e.g. Vollrath, 1991), others at a sub-global / regional level (see Balassa's original index), and while some others evaluates the measurement as bilateral trade between two countries or trading partners (see e.g. Dimelis and Gatsios, 1995).

However, before Balassa introduced his famous RCA index in 1965, Liesner (1958) had already contributed to the empirical literature of RCA. In this sense, Liesner (1958) is the first empirical study in the area of RCA. The proposed simple measure of RCA by Liesner is the following:<sup>4</sup>

$$RCA_I = X_{ij} / X_{nj} \quad (1)$$

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<sup>3</sup> See also Balassa (1977).

<sup>4</sup> It is important to note that Liesner originally tried to measure the revealed comparative advantage of the UK with the Common Market (at the time) as the comparator.



where  $X$  represents exports,  $i$  is a country,  $j$  is a commodity ( or industry), and  $n$  is a set of countries (e.g. the EU).

A comprehensive / advanced measure of RCA was later on presented by Balassa (1965). This is a widely accepted and afterwards modified measure of RCA in the literature. It is expressed as follows:

$$RCA_2 = (X_{ij} / X_{it}) / (X_{nj} / X_{nt}) = (X_{ij} / X_{nj}) / (X_{it} / X_{nt}) \quad (2)$$

where  $X$  represents exports,  $i$  is a country,  $j$  is a commodity (or industry),  $t$  is a set of commodities (or industries) and  $n$  is a set of countries.  $RCA_2$  measures a country's exports of a commodity (or industry) relative to its total exports and to the corresponding exports of a set of countries, e.g. the EU. A comparative advantage is "revealed", if  $RCA_2 > 1$ . If  $RCA_2$  is less than unity, the country is said to have a comparative disadvantage in the commodity / industry. It is argued that the  $RCA_2$  index is biased due to the omission of imports especially when country-size is important (Greenaway and Milner, 1993).

An alternative RCA index ( $RCA_3$  of Equation 3) is computed in order to make reference to the "own" country trade performance only. This type of measurement of a country's RCA recognises the possibility of simultaneous exports and imports within a particular commodity / industry.

$$RCA_3 = (X_{ij} - M_{ij}) / (X_{ij} + M_{ij}) \quad (3)$$

In the case of Equation 3, the index ratio ranges from -1 ( $M_{ij} = 0$  and revealed comparative disadvantage) to +1 ( $X_{ij} = 0$  and revealed comparative advantage). However, regarding  $RCA_3$ , there exist ambiguities around zero values (Greenaway and Milner, 1993).

One can derive another version of RCA from Balassa (1965). The equation is as follows:

$$RCA_4 = (X_{ij} / X_{it}) / (M_{ij} / M_{it}) = (X_{ij} / M_{ij}) / (X_{it} / M_{it}) \quad (4)$$

where  $X$  and  $M$  represents exports and imports respectively.  $i$  is a country,  $j$  is a commodity (or industry),  $t$  is a set of commodities (or industries). A similar version of Equation 4 derived from Balassa (1965) is the following:<sup>5</sup>

$$RCA_5 = \ln (X_{ij} / X_{it}) / (M_{ij} / M_{it}) * 100 = \ln (X_{ij} / M_{ij}) / (X_{it} / M_{it}) * 100 \quad (5)$$

Vollrath (1991), on the other hand, offered mainly three alternative ways of measurement of a country's RCA. These alternative specifications of RCA are called *the relative trade advantage* (RTA), *the logarithm of the relative export advantage* (ln RXA), and *the revealed competitiveness* (RC). In this study, for the sake of being systematic, we call them as  $RCA_6$ ,  $RCA_7$ , and  $RCA_8$  respectively. It is clear

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<sup>5</sup> Note that  $RCA_3$ ,  $RCA_4$  and  $RCA_5$  might be calculated either in global or bilateral/regional levels

that the advantage of presenting latter two indices (i.e.  $RCA_7$  and  $RCA_8$ ) is that they become symmetric through the origin. Positive values of Vollrath's three alternative measures of revealed comparative advantage reveal a comparative/competitive advantage whereas negative values indicate comparative /competitive disadvantage.

However, a problem of implementing these or similar RCA indices is that real (observed) trade patterns may be distorted by government interventions, thus causing misrepresentation of underlying comparative advantage. It is thus a concern that import restrictions, export subsidies and other protectionist policies of governments, to an extent, may distort RCA indices. Fertő and Hubbard (2003), in this respect, uses nominal assistance coefficients (NACs) estimated by the OECD by country and commodity to filter the effects of possible distortions in measuring Hungarian Agri-food sector RCAs vis-à-vis the EU. Greenaway and Milner (1993), on the other hand, suggests the employment of a price-based measure of RCA called "implicit revealed comparative advantage" (IRCA) to get rid of the distortion caused by the post-policy intervention.

Vollrath (1991) suggests that the RC index ( $RCA_8$  in the present paper) is preferable since supply and demand balance embodied in the index. Evaluating the shortcomings of Vollrath's three indices, Vollrath acknowledges that the RXA (relative export advantage) index which reduces the distortion effects is more commonly used in practice. It is important to point out that Balassa and Vollrath indices are based on different concepts and thus are not strictly comparable.

*The relative trade advantage* (RTA) (here  $RCA_6$ ) is calculated as the difference between *relative export advantage* (RXA), which is the equivalent to the original Balassa index ( $RCA_2$ ), and its counterpart, *relative import advantage* (RMA). It is important to note that the main difference of Vollrath's RXA from Balassa's original  $RCA_2$  index is that it prevents from double-counting. In the present paper, the indices used are hybrids, in that the set of countries (n) is restricted to the EU whereas the set of commodities (t) refers to all trade. Although double-counting is not eliminated, it does not cause a problem since we are using 'reasonably' low level of commodity aggregation (63 product groups) and since Turkey is not yet part of the EU.

$$RCA_6 = RTA = RXA - RMA$$

where  $RXA = RCA_2 = (X_{ij}/X_{it}) / (X_{nj}/X_{nt})$  and

$$RMA = (M_{ij}/M_{it}) / (M_{nj}/M_{nt})$$

where  $M$  accounts for imports. In consequence;

$$RCA_6 = RTA = RXA - RMA = (X_{ij}/X_{it}) / (X_{nj}/X_{nt}) - (M_{ij}/M_{it}) / (M_{nj}/M_{nt}) \quad (6)$$

Vollrath's second RCA measure is the logarithm of the relative export advantage (here as RCA<sub>7</sub>):

$$RCA_7 = \ln RXA = \ln RCA_2 \quad (7)$$

The third measure of Vollrath is the revealed competitiveness (RC) (here as RCA<sub>8</sub>), expressed as:

$$RCA_8 = RC = \ln RXA - \ln RMA \quad (8)$$

It is important to note that the original RCA measure, i.e. RCA<sub>2</sub>, and its different variants presented in the present paper implicitly assume that the firms of the country *i* compete with domestic firms in a set of countries (e.g. the EU single market) rather than competing with firms exporting to the EU single market. However, if one assumes that firms of the country *i* compete with firms exporting to the the EU market, then the original formula may be rearranged as in the following:

$$RCA_9 = (X_{ij} / X_{it}) / (X_{wnj} / X_{wnt}) \quad (9)$$

where *X* represents exports, *i* is a country, *j* is a commodity (or industry), *t* is a set of commodities (or industries) and *n* is a set of countries. RCA<sub>2</sub> measures a country's exports of a commodity (or industry) relative to its total exports and to the corresponding exports of the world in to a set of countries, e.g. the EU.

Given that there exists a range of RCA alternative indices suggested and employed in the literature to measure comparative advantage, some inconsistent results may occur obtained by the use of different RCA indices. Interpretation of the RCA indices in the ordinal or cardinal senses is another field of dispute. Furthermore, the stability and the consistency of alternative measures of RCA have been called into questioned (e.g. Balance et al., 1987; Yeats, 1985; Hinloopen and Van Marrewijk, 2001). It is therefore encouraged that the policy makers need cautious interpretation of RCA indices by especially underlining probabilities of revealing a comparative advantage or disadvantage.

## 5. Data and Empirical Findings

Following the contributions by Balassa and Vollrath, the present empirical analysis is based on the measurement of RCA. Since we are interested in the competitiveness of Turkey within a European context, we calculate alternative measures of RCA presented in the earlier section with respect to the EU as the comparator both on global (RCA<sub>2</sub>, RCA<sub>6</sub>, RCA<sub>7</sub>, and RCA<sub>8</sub>) and bilateral levels (RCA<sub>3</sub>, RCA<sub>4</sub>, RCA<sub>5</sub>).<sup>6</sup> On the global level, the global competitiveness of Turkey and the EU are compared assuming that both Turkey and the EU are exporting to and importing from the world. On the bilateral level,

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<sup>6</sup> For a similar empirical study of Hungary *vis-à-vis* the EU, see Fertő and Hubbard (2003).

however, trade between Turkey and the EU are taken into account only, i.e. bilateral competitiveness. The stability of the results is then tested.

In order to calculate  $RCA_2$ ,  $RCA_6$ ,  $RCA_7$ , and  $RCA_8$  in the sense of global competitiveness of Turkey with respect to the EU, we used annual two-digit SITC Rev.3 data (63 product groups) covering Turkey's exports and imports on the world level for the period 1990-2002 from the Undersecretariat of Foreign Trade (DTM), and also annual two-digit SITC Rev.3 data (63 product groups) covering Extra-EU-15 exports and imports on the world level for the same period of 1990-2002 from the EUROSTAT. Calculating  $RCA_3$ ,  $RCA_4$ ,  $RCA_5$  indices in the sense of bilateral competitiveness of Turkey with respect to the EU, however, required annual two-digit (three or even four digits for some commodity groups such as SITC Rev. 3 No: 661, 664, 665, 781, 782, 783, 784, 7132, 7783, 776, 713, 785, 786, 7131, 7133, 7138, 7139, 8481, 8483) SITC Rev. 3 data covering Turkey's exports and imports to the EU for the period 1990-2003 from the Undersecretariat of Foreign Trade (DTM).

The followings are the basic points and outcomes on our alternative RCA calculations (see Appx. Table 4 and Table 5). The following classifications are based on the common characteristics of commodity groups, and are taken into account the all indices. The following calculations are expressed on the mean level and for the period 1990-2003 unless otherwise stated.

*i) Sectors which have revealed comparative advantages (RCA) in all (seven) indices are the*

- vegetables and fruit (05)
- sugar, sugar preparations, honey (06)
- tobacco (12)
- oil seeds and oleaginous fruits (22)
- rubber manufactures (62)
- textile yarn, fabrics and related products (65)
- clothing and clothing accessories (84)

*ii) Sectors that have revealed comparative disadvantages (RCD) in all (seven) indices are the*

- feeding stuff for animals (08)
- hides and skins, raw (21)
- crude rubber (23)
- cork and wood (24)
- pulp and waste paper (25)
- coal, coke and briquettes (32)
- organic chemicals (51)
- tanning and colouring materials (53)

- medicinal and pharmaceutical products (54)
- essential oils, perfume mat., cosmetics (55)
- fertilizers (56)
- plastic in primary forms (57)
- plastic in non-primary forms (58)
- leather manufactures, dressed fur, skins (61)
- paper, paper board and articles thereof (64)
- manufactures of metals (69)
- power generating machinery and equipment (71)
- machinery specialised for particular ind. (72)
- metalworking machinery (73)
- general industry machinery and equipment (74)
- office machines and computers (75)
- telecommunication, sound, TV, video (76)
- electrical Machinery (77)
- road vehicles (78)
- other transport equipment (79)
- professional, scientific and controlling instruments and apparatus, n.e.s. (87)
- photographic apparatus, optical goods, clocks (88)
- miscellaneous manufactured articles (89)

iii) Sectors which have “increasing” revealed comparative advantages in time period (year-by-year)

Turkey vis-à-vis the EU in the world market

- sugar, sugar preparations, honey (06)
- textile yarn, fabrics and related products (65)
- prefabricated buildings, sanitary , heating,  
lighting (81)
- clothing and clothing accessories (84)

Turkey vis-à-vis the EU in the EU market

- sugar, sugar preparations, honey (06)
- beverages (11)
- rubber manufactures (62)
- lime, cement, and fabricated  
construction materials (661)

iv) Sectors which have “decreasing” revealed comparative advantages in time period

Turkey vis-à-vis the EU in the world market

- live animals (00)
- fish crustaceans, molluscs (03)
- vegetables and fruit (05)
- coffee, tea, cocoa, spices (07)
- tobacco (12)
- oil seeds and oleaginous fruits (22)
- crude fertilizers (27)
- animal and vegetable oils and fats, waxes (43)

Turkey vis-à-vis the EU in the EU market

- vegetables and fruit (05)
- tobacco (12)
- oil seeds and oleaginous fruits (22)
- crude animal and vegetable materials, n.e.s (29)
- textile yarn, fabrics and related products (65)
- glass and glassware (664, 665)
- travel goods, handbags and similar goods (83)
- clothing and clothing accessories (84)
- leather and fur (848.1, 848.3)

v) Sectors which “losing” their revealed comparative advantages in time period and has revealed comparative disadvantage at present ( $RCA \Rightarrow RCD$ ) (1990-2003) and (year-by-year observation)

Turkey vis-à-vis the EU in the world market

- gas, natural and manufactured (34)
- non-ferrous metals (68)

Turkey vis-à-vis the EU in the EU market

- metalliferous ores and metal scrap (27,28)
- animal oils and fats (3)
- petroleum and petroleum products (33)

vi) Sectors which have revealed comparative advantages at present and has revealed comparative disadvantages at past ( $RCD \Rightarrow RCA$ ) (1990-2003) and (year-by-year observation)

Turkey vis-à-vis the EU in the world market

- manufactures of metals n.e.s (69)

Turkey vis-à-vis the EU in the EU market

- oils, fats and waxes (4)
- other transport equipment (79,785,786,7131,7133,7138,7139)
- furniture bedding, mattresses (82)

vii) Sectors which have RCA in the world market but have RCD in the EU market

- live animals (00) – on the year-by-year base there is a “decrease” in the competitiveness level in the world markets-

viii) Sectors which have RCA in the EU market but have RCD in the world market

- beverages (11)
- travel goods, handbags and similar goods (83)

(Valid for  $RCA_2$  and  $RCA_7$  indices)

ix) Sectors which are thought to start “losing” their competitiveness (decreasing RCA) after the CU

Turkey vis-à-vis the EU in the world market

- vegetables and fruit (05)
  - tobacco (12)
  - oil seeds and oleaginous fruits (22)
  - travel goods, handbags and similar goods (83)
  - clothing and clothing accessories (84)
- a slight decrease!-

Turkey vis-à-vis the EU in the EU market

- vegetables and fruit (05)
  - tobacco (12)
  - oil seeds and oleaginous fruits (22)
  - textile yarn, fabrics and related products (65)
  - glass and glassware (664, 665)
  - travel goods, handbags and similar goods (83)
  - clothing and clothing accessories (84)
- a substantial decrease!-

Only if a sector’s RCA starts decreasing with the start of the CU then this may be considered as an effect of the CU. However, if a decrease starts much earlier than the beginning of the CU, i.e. from the early 1990s, then this has not been taken into account as a possible outcome of the CU. For instance, as for the “clothing and clothing accessories”, when two periods 1990-95 and 1996-2003 compared, there seems to be a substantial decrease due to the start of the CU in the EU market on bilateral level. As for the trade between Turkey and the EU in the global level, findings reveal just a slight decrease which in fact grounded from the early 1990s. Those results may imply possible “negative” *trade creation* effect for Turkey as a consequence of the CU whereas *trade diversion* effects seem less important / apparent.

However, a quite different picture emerges in agricultural products. Although there exists a slight decrease in e.g. vegetables and fruit after the CU, this structure goes beyond the earlier 1990s and late 1980s influenced by the efforts of industrialisation.

The above examples for “clothing and clothing accessories” and “vegetables and fruit” are important to draw attention to the different outcomes of the CU on different sectors. Since the CU includes the industrial products only, ongoing import liberalisation intensified especially after the CU had an effect on the “clothing and clothing accessories”.

x) Sectors which have RCA before the CU but have RCD after the CU in the world market.

No commodity groups found!

xi) Sectors which are thought to “increase” their competitiveness (increasing RCA) after the CU.

Turkey vis-à-vis the EU in the world market

- sugar, sugar preparations, honey (06)
- rubber manufactures (62)
- textile yarn, fabrics and related products (65)

Turkey vis-à-vis the EU in the EU market

- sugar, sugar preparations, honey (06)
- beverages (11)
- rubber manufactures (62)

It is worth pointing out that we have decreasing RCD in all the sectors within the “machines and vehicles” group although they still have RCD.

xii) Sectors which have RCD before the CU and has RCA at present.

Turkey vis-à-vis the EU in the world market

- non-metallic mineral manufactures (66)  
(valid for RCA<sub>2</sub> and RCA<sub>7</sub>)

Turkey vis-à-vis the EU in the EU market

- beverages (11) (valid for RCA<sub>3</sub>)
- rubber manufactures (62)  
(valid for RCA<sub>3</sub>)

## 6. Stability of the RCA Indices

Summary statistics (mean and coefficient of variation) for the four indices RCA<sub>2</sub>, RCA<sub>6</sub>, RCA<sub>7</sub>, and RCA<sub>8</sub> (i.e. Turkey *vis-à-vis* the EU on global level) and for the three indices RCA<sub>3</sub>, RCA<sub>4</sub>, RCA<sub>5</sub> (i.e. Turkey *vis-à-vis* the EU on bilateral level) are presented in Table 6 and Table 7 (see Appx.) respectively. The coefficients of variation (which equals standard deviation divided by mean) shown in Table 6 and 7 imply that the RCA indices are fairly stable over the period 1990-2002 and 1990-2003 respectively.

A number of measures of stability are also applied to the indices. One can observe that a certain product group may reveal a comparative advantage (RCA) at t time period whereas a comparative disadvantage (RCD) at t+1 time period, or vice versa. The relative importance of those products might be used as a simple stability indicator (Fertö and Hubbard, 2003; Hoekman and Djankov, 1997). The commodity/product groups as regards the four indices RCA<sub>2</sub>, RCA<sub>6</sub>, RCA<sub>7</sub>, and RCA<sub>8</sub> (i.e. Turkey *vis-à-vis* the EU on global level) in which Turkey has an RCA in 1992 but an RCD in 2002 account for between 4.6 and 4.9 per cent of the total exports value in 1990 and between 1.4 and 2.1 per cent in 2002. The product groups for which there exists a “shift” in the opposite direction, i.e. an RCD in 1990 but an RCA in 2002, are more obvious but still accounted for only, at most, 14.8 per cent in 1990 and 17.1 per cent in 2002 (Table 2). These findings seem to give support the view that the structure of Turkey’s RCA has not changed remarkably during the period.

	Percentage Share of Product Groups Where:			
	RCA <sub>90</sub> and RCD <sub>02</sub>		RCD <sub>90</sub> and RCA <sub>02</sub>	
Index	1990	2002	1990	2002
RCA <sub>2</sub> ve RCA <sub>7</sub>	4.66	1.4	5.67	9.58
RCA <sub>6</sub> ve RCA <sub>8</sub>	4.99	2.16	14.80	17.08
	RCA <sub>90</sub> and RCD <sub>03</sub>		RCD <sub>90</sub> and RCA <sub>03</sub>	
	1990	2003	1990	2003
RCA <sub>3</sub>	10.40	3.92	1.92	7.85
RCA <sub>4</sub> ve RCA <sub>5</sub>	8.15	2.80	7.24	20.88

Source: Authors’ calculations based on SITC Rev. 3 data



The commodity/product groups regarding the three indices  $RCA_3$ ,  $RCA_4$ ,  $RCA_5$  (i.e. Turkey *vis-à-vis* the EU on bilateral level), however, reveal slightly less stable pattern. Even in this case, Turkey still has an RCA in 1992 but an RCD in 2003 account for between 8.1 and 10.4 per cent of the total exports value in 1990 and between 3.9 and 2.8 per cent in 2003. The product groups for which there exists a “shift” in the opposite direction, i.e. an RCD in 1990 but an RCA in 2003, are more apparent but still accounted for only, at most, 7.2 per cent in 1990 and 20.8 per cent in 2003 (Table 2). These findings do still seem to support that the structure of Turkey’s RCA has not changed remarkably during the period.

To analyse the stability issue of the RCA indices in hand further, we follow Hinloopen and Van Marrewijk (2001) in examining changes in the distribution of the original Balassa index (here named  $RCA_2$ ) over the period 1990-2002. Our findings suggest that Turkey’s revealed comparative advantage has weakened to an extent, i.e. the distribution tends to shift to the left, resulting in a higher percentage of lower value indices (see Table 3). The mean value of the Balassa index,  $RCA_2$ , almost halved (from 2.07 to 1.31) over the period 1990-2002, and the maximum value declined from 20.3 to 12.7. In addition, in 1990, 74 per cent of the Balassa index values are less than 2; by 2003 this ratio rises to 83 per cent. These results show a slight weakening of comparative advantage of Turkey with respect to the EU on the global level. Overall, however, it is still more sensible to evaluate findings as “reasonably stable”. Indeed, the percentage of the Balassa indices showing a comparative disadvantage ( $RCA_2 < 1$ ) produce almost no fluctuation and no trend over the period 1990-2002.

	1990	1993	1994	1995	1996	1998	1999	2000	2001	2002
Mean	2.07	1.90	1.75	1.68	1.69	1.58	1.52	1.46	1.50	1.31
Maximum	20.36	16.75	14.91	14.33	14.51	13.81	13.59	14.05	11.92	12.75
Per cent of $RCA_2$										
<1	62	65	63	63	61	60	64	63	63	63
<2	74	78	77	73	74	79	77	80	79	83
<3	80	83	84	83	86	86	84	89	87	90
<4	90	90	90	91	93	91	93	93	90	93

Source: Authors’ calculations based on SITC Rev. 3 data

## 7. Conclusion

An analysis of the competitiveness of Turkey with respect to the EU have been presented, based on seven indices of revealed comparative advantage, and calculated for the period 1990 to 2003. Given that a range of alternative RCA indices have been employed in the present study, results need cautious interpretation. In addition, evaluation of RCA indices in the ordinal or cardinal senses is another field of

dispute. Furthermore, the stability of alternative measures of RCA has been called into question. Based on the findings of our stability tests, however, we can confirm that our results are reasonably stable. All seven indices show that Turkey has revealed comparative advantages for seven of the 63 product groups: clothing and clothing accessories; vegetables and fruit; sugar, sugar preparations, honey; tobacco; oil seeds and oleaginous fruits; rubber manufactures; textile yarn, fabrics and related products. It is also worth noting that we observe effects of the subsequent economic crises in 1994, 1999, and 2001 on the revealed comparative advantages of Turkey. Despite these economic crises and the effects of the CU, the RCA indices have remained reasonably stable. There is, however, an evidence of a weakening of intensity of comparative advantage as shown in the original Balassa index.

It is also important that RCA calculations are based on observed trade data. Thus, there are possible influences of government interventions in the markets such as tariffs, quotas or subsidies. Although we have not measured the effect of government interventions on the RCA indices, we can still confirm that distortions are at reasonably minimal levels. Due to the implementation of the CU especially, there exists no tariffs and quotas on industrial commodities between Turkey and the EU. Furthermore, Turkey has preferential trade agreement with the EU on agricultural products.

Results also reveal that regarding all the indices in hand, the commodity groups having the highest RCA values are the “clothing and clothing accessories” and “vegetables and fruit”. On the other hand, these commodities seem to lose their level of comparative advantages in time. The former one however increase its comparative advantage in the world market while decrease in the EU market which presumably caused by the CU. The RCA values of the latter one in both the EU and the world markets decrease which caused by the industrialisation policies rather than the CU.

We feel that, despite their shortcomings, RCA indices provide a useful tool to detect comparative advantage. They also offer additional information on the competitiveness of Turkey in relation to the EU. This undoubtedly has further implications for Turkey as a candidate and potential member at present and as a member in the foreseeable future.

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