

REVEALED COMPARATIVE ADVANTAGE AND COMPETITIVENESS OF THE TURKISH MANUFACTURING SECTOR IN THE EUROPEAN MARKET

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Abstract

The purpose of this paper is to analyse the competitive performance of the Turkish Manufacturing Sector after the Custom Union Agreement with the EU and to determine whether or not the pattern of comparative advantage for Turkey has undergone a structural shift over the period 1996-2006. Then we examine if Turkey's pattern of comparative advantage is related with industry-level productivity differentials or with differences in factor endowments. The manufacturing sector was chosen because the Custom Union covers all industrial goods but does not address agricultural products (except processed agricultural products), service or public procurement. The Revealed Comparative Advantages (RCA) index and Vollrath's competitiveness indices are used to identify whether or not Turkey has a comparative advantage in any particular product group. In the calculating of these indices, the manufacturing industry is divided into four groups according to intensity of technology: high-tech industries, medium-to-high-tech industries, medium-to-low-tech industries and low-tech industries. It is known that a Custom Union can, in theory, have significant dynamic effects, such as increased competition, stimulation of technical change and investment. There are a number of studies where RCA has been used to investigate the competitiveness of Turkish exports. This study differs from others in terms of the classification of manufacturing sectors according to their technological characteristics.

In the 20th century, technological change became recognized as the most important source of economic growth. According to RCA and Vollrath's indices, Turkey has a comparative advantage in a few low-tech and medium-to-low-tech industries while it has a comparative disadvantage in high-technological products against EU. Therefore, we can say that the Custom Union has not played an important role in effecting changes in trade patterns and comparative advantages in the Turkish manufacturing sector.

Key Words: Revealed Comparative Advantage, Specialization, Competitiveness Measures

JEL Classification:F14, F15

1. INTRODUCTION

Comparative advantage is one of the oldest and most important concepts in economics; however, there is some disagreement in the literature about its precise meaning, scope and measurement. The concept of competitiveness or competitive advantage is even more ambiguous, as it has been interpreted in a variety of ways (Siggel, 2007:5). It is difficult to define the concept of competitiveness; it can be defined at firm level, industry level and national level. Competitive advantage relies heavily on firm-specific factors such as "created" factors, "created" demand for the products, and internal economies achieved through innovation. Comparative advantage, on the other hand, emphasises nationally "endowed" factors, differences in international technology/productivity, external economies, and international policies. Competitiveness and comparative advantage are complements rather than substitutes in determining and sustaining a nation's advantage in international trade and business (Gupta, 2009: 17).

In the theories of international trade, comparative advantage is an important concept for explaining patterns of trade and was first introduced by David Ricardo. The Ricardian model is based on technological differences across countries, which result in differences in productivity (Daskapan, 2008: 2). According to the Heckscher & Ohlin theory (H-O theory), countries with different resources or factor endowments trade each other and a country's comparative advantage is determined by its relative factor scarcity relative to a set of countries. It is the difference in technology and/or endowments according to these early trade theories that are the underlying causes of international trade. The comparative advantage concept is still popular although some other new models have emerged. New trade theories give a central role to increasing returns, product

differentiation, consumer preferences, externalities and innovation in explaining these efficiency differences. A country's comparative advantage might change due to changes in supply and demand in both domestic and international markets(Widodo, 2009).

Up until the 1970s, international trade theory was dominated by the theory of comparative advantage, which is defined as trade due to the differences among countries. Perfect competition and constant returns to scale are two of the basic underlying assumptions of comparative advantage. Since World War II, however, a large and increasing part of trade has come from massive two-way trade in similar industries (Grubel&Lloyd 1975; Linder 1961; Vernon 1966; Krugman 1990) that can not be explained by comparative advantage and was principally driven by advantages resulting from economies of scale, cumulative experience and innovation (Smith, 2010).That is why traditional theory can explain inter-industry trade but not intra-industry trade.

Harrigan (1997) and Lai and Zhu (2007) showed that the Heckscher–Ohlin model has greater explanatory power when comparing dissimilar countries, while the Ricardian view tends to gain relevance when analysing only the group of capital-rich countries (Amoroso, Chiquiar and Francia, 2011).The Ricardian model becomes relatively more relevant when comparing specialization patterns of countries with similar endowments. When the export performance of countries with very different factor endowments are analysed, the Heckscher-Ohlin model has greater explanatory power (Amoroso, Chiquiar and Francia, 2011).

This paper is organised as follows: the following section reviews the Turkish and EU relationship and the Custom Union Agreement. Section 3 provides various approaches to measure the revealed comparative advantage and empirical results. The final section presents a short summary of the empirical findings.

2. CUSTOM UNION BETWEEN TURKEY AND EU

A country's comparative advantage in international trade may be influenced not only by differential rates of change in the accumulation of production factors but also by the increased integration of other countries. The reduction of trade barriers creates competitive pressures and the potential for technology transfer so as to lead to productivity gains and the restructuring of an economy toward its comparative advantage. Technology and innovation have important effects on the determinants of economic growth and trade performance. Competition becomes more effective and leads to the research and development of new products (Batra and Khan, 2005).

The development strategy of developing countries has changed in favour of export orientation and trade liberalization instead of the import substitution industrialization strategy for development since the 1980s. Proponents of trade liberalization argue that liberal trade policy, given the right price signals, increases competitive pressure on the production industries to improve their efficiency and competitiveness. As a result, a country will be able to compete on the world market, increase exports, and thus increase its rate of development. The benefit of trade, however, comes with increased specialization in the production of goods where a country has a comparative advantage (Richard, 2008).

Turkey has undertaken a series of economic reforms towards the opening up of the economy since 1980. It has been an associate member of the European Community since 1964. The EU and Turkey signed a Custom Union Agreement, which came in to force on 31 December 1995 and aims at promoting trade and economic relations. The Custom Union covers some industrial products and processed agricultural products, but does not cover agricultural products, services, coal or steel products. These agreements have resulted in some changes in Turkish trade. The amount of trade between Turkey and European Union countries has increased considerably.

Turkey is regarded as a labour-abundant country, which produces “labour-intensive” goods domestically, and exchanges these goods for capital-intensive products via trade. The EU ranks, by far as number one in both Turkey’s imports and exports while Turkey ranks 7th in the EU’s import market and 5th in its export market. The main Turkish export markets in 2010 were the EU (46.3%), Iraq (5.3%), and Russia (4.1%). Machinery and transport equipment dominate Turkey’s exports to the EU (38%), followed by manufactured articles (24.3%). At the same time, the main Turkish import markets were the EU (39.3%), Russia (11.7%), China (9.4%), the USA (6.7%) and Iran (4.2%). The main Turkish imports from the EU are machinery and transport materials (45.1%), chemical products (17.1%) and manufactured goods (15%) (ec.europa.eu).

It was expected that the Custom Union would affect not only the trade flow but also the competitiveness of Turkish industry (Malkoc, 2002). The amount of trade between Turkey and European Union countries has increased considerably. In order to determine if the Custom Union has caused any changes in the competitiveness of the Turkish manufacturing sector, we will use Balassa and Vollrath’s indices.

3. REVEALED COMPARATIVE ADVANTAGE INDEXES AND EMPIRICAL RESULTS

There are a number of studies in which the RCA index has been used to investigate the competitiveness of Turkish exports in EU markets. Some of them are Ferman and et al. (2004), Erlat and Erlat (2005), Ince and Demir (2007), Simsek and et al. (2004) and Yilmaz (2008). Their findings suggest that Turkey's international competitiveness is limited resource-intensive and labour-intensive products. The overall average share of capital-intensive goods, easy-to-imitate research-intensive goods and difficult-to-imitate research-intensive goods in Turkish export is not very high.

Balassa (1965) derived an index that measures a country's revealed comparative advantage (RCA) in the trade of a particular product/industry by determining the share of that product/industry in the country's total exports relative to the product/industry's share in total world export. Balassa suggested that comparative advantage is revealed by observing trade patterns.

RCA is measured by the relative share of an industry (commodity) in a country's total exports, divided by the industry's (commodity) relative share in total world (other country or a set of countries, e.g. the EU) exports. The original RCA index, formulated by Balassa, is derived from post-trade (export) data and can be defined as

$$RCA^1 = \frac{X_{ij} / X_{it}}{X_{nj} / X_{nt}}$$

Where, X represents exports, i is a country, j is a commodity, t is a set of commodities, and n is a set of countries. In our case, i is Turkey, j is sectors in four groups industries which are classified according to levels of technology, t is total manufacturing exports and n is the EU-12.

If the value of the index exceeds unity, the country is said to have a revealed comparative advantage. If the value is less than unity, the country is said to have a comparative disadvantage in the product/industry (Havrila and Gunawardana, 2003).

There are several indices, which are used to examine the competitiveness of a country. One of the most widely used of these is the Vollrath (1991) index based on the difference between revealed export advantage (RXA) and the revealed import advantage (RMA), with notation as follows:

$$RCA^2 = \frac{X_{ij} / X_{it}}{X_{nj} / X_{nt}} - \frac{M_{ij} / M_{it}}{M_{nj} / M_{nt}}$$

Where M represents imports. Vollrath's second measure is simply the logarithm of relative export advantage (ln RXA) as follows:

$$RCA^3 = \ln \left(\frac{X_{ij} / X_{it}}{X_{nj} / X_{nt}} \right)$$

Vollrath's third measure is based on the difference between logarithm of relative export advantage (ln RXA) and logarithm of relative import advantage (ln RMA) and as follows:

$$RCA^4 = \ln \left(\frac{X_{ij} / X_{it}}{X_{nj} / X_{nt}} \right) - \ln \left(\frac{M_{ij} / M_{it}}{M_{nj} / M_{nt}} \right)$$

According to Vollrath (1991), positive indices reveal a comparative/competitive advantage, whereas negative values reveal a comparative/competitive disadvantage.

In order to determine the comparative situation of the manufacturing sector of Turkey in the EU market, we used the Balassa and Vollrath indices. The manufacturing industry data used to compute the RCA indices (RCA^1 , RCA^2 , RCA^3 , RCA^4) were grouped according to ISIC Rev.2, based on the OECD's manufacturing industry classification according to levels of technology as stated by Hatzichronoglou (1997) and correspond to the 1996-2006 period. Industries are divided into four groups according to intensity of technology: high-tech industries, medium-to-high-tech industries, medium-to-low-tech industries and low-tech industries. For the details of this classification see the Appendix (Table 1). Export and import data were in US dollars and were retrieved from the 2009 CD-ROM of the Industrial Demand-Supply Balance Database-IDSDB. RCA is measured by the relative share of an industry in Turkey's total manufacturing exports (imports) on global level, divided by the industry's relative share in EU exports (imports) on global level.

Turkey has a comparative advantage in the trade of some low-tech and medium-low-tech industries. According to the results of the RCA^1 indice, the textile and clothing sector in low-tech industries has the highest indice value for the period studied. The following sectors with the highest RCA values are ferrous metals and non-metallic mineral products. The RCA values of other manufacturing and

fabricated metal products show an increasing trend for the period 1996 to 2006 (Table 2). The results of RCA^2 , RCA^3 and RCA^4 show similar results with RCA^1 (Table 3-4-5). The calculated RCA indices for low-tech and medium-low-tech industries have positive values, but negative values for high-tech sectors. In other words, Turkey has mostly a comparative advantage in labour-intensive and raw material-intensive goods.

On the other hand, Turkey has a comparative disadvantage in the trade of high-tech and medium-high-tech industries. Our results are similar with those in the literature. Turkey's comparative advantage has not changed since the Custom Union with the EU so the Heckscher-Ohlin determinants of specialization are still present. In other words, Ricardian productivity differentials may not be important determinants of Turkey's relative patterns of specialization.

4. CONCLUSION

In this paper we presented an analysis of the competitiveness of the Turkish manufacturing sector against EU markets. It was expected that the Custom Union would affect not only the trade flows but also the competitiveness of Turkish industry. In order to determine if the Custom Union effected any changes in the competitiveness of the Turkish manufacturing sectors, we used Balassa and Vollrath Indices.

The calculated indices are not consistent with the hypothesis that, the Custom Union causes important changes in the competitiveness of the Turkish manufacturing sector. The empirical findings suggest that Turkey has a comparative advantage in the trade of some low-tech and medium-low-tech industries. The trend of export patterns in Turkey after the CU agreement has not shifted towards high-tech manufacturing sectors with a comparative advantage. We conclude that domestic supply conditions explain the pattern of exports, but productivity differentials do not. The Custom Union cannot have significant dynamic effects, such as increased competition, stimulation of technical change and investment.

The Turkish manufacturing production has a high import dependency. This situation leads high trade deficits and negative impact on the economy. That is why, manufacturing production needs to upgrade the technology content and to reduce the import dependency. For this reason the Turkish government should improve economic policies in order to be more competitive in the high-tech aspects of the manufacturing sectors. These sectors have high-income elasticity

and internal and/or external economies that may become a source of comparative advantage in the long run.

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Appendix

Table 1.Sectors in Manufacturing Industry According to Intensity of Technology(ISICRev.2)

Industries According to Intensity of Technology	ISIC Rev.2 Code	UNIDO ISIC Rev.2
A. High-Tech Industries		
1. Aerospace	3845	3845
2. Computers, Office Machinery	3825	3825
3. Electronics-Communications	3522	3522
4. Pharmaceuticals	3832	3832
B. Medium-High-Tech Industries		
5. Scientific Instruments	385	3851+3852+3853
6. Motor Vehicles	3843	3843
7. Electrical Machinery	383-3832	(3831+3832+3833+3839)-3832
8. Chemicals	351+352-3522	(3511+3512+3513+3521+3522+3523+3529)-3522
9. Other Transport Equipment	3842+3844+3849	3842+3844+3849
10.Non-Electrical Machinery	382-3825	(3821+3822+3823+3824+3825+3829)-3825
C. Medium-Low-Tech Industries		
11. Rubber and Plastic Products	355+356	3551+3559+3560
12. Shipbuilding	3841	3841
13. Other Manufacturing	39	3901+3902+3903+3909
14. Non-Ferrous Metals	372	3720
15. Non-Metallic Mineral Products	36	3610+3620+3691+3692+3699
16. Fabricated Metal Products	381	3811+3812+3813+3819
17. Petroleum Refining	353+354	3530+3540
18. Ferrous Metals	371	3710
D. Low-Tech Industries		
19. Paper Printing	34	3411+3412+3419+3420
20. Textile and Clothing	32	3211+3212+3213+3214+3215+3219+3220+3231+3232+3233+3240
21. Food, Beverages and Tobacco	31	3111+3112+3113+3114+3115+3116+3117+3118+3119+3121+3122+3131+3132+3133+3134+3140
22. Wood and Furniture	33	3311+3312+3319+3320

Source: Hatzichronoglou, 1997: 6; UNIDO, 2009.

* For the content of the products in the ISIC Rev.2 classification, see UNIDO, 2009.

Table 2. The Comparative Advantage of Turkey with Respect to the EU on the Global Level, by Balassa Index (RCA¹) in Manufacturing Industry

Industries According to Intensity of Technology	RCA ¹										
	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
A. High-Tech Industries											
1. Aerospace	0,1322	na	0,2752	0,7910	0,8748	0,6303	0,1915	0,4289	0,3712	0,1539	0,1436
2. Computers, Office Machinery	0,0298	0,0367	0,0380	0,0499	0,0490	0,0370	0,0225	0,0249	0,0243	0,0285	0,0307
3. Electronics-Communications	0,2078	0,2014	0,1506	0,1483	0,1815	0,1394	0,1187	0,1161	0,1076	0,0963	0,0204
4. Pharmaceuticals	0,3438	0,3791	0,5623	0,4732	0,4672	0,4620	0,6595	0,6792	0,7291	0,6519	0,6141
B. Medium-High-Tech Industries											
5. Scientific Instruments	0,1291	0,1146	0,1000	0,0913	0,1097	0,1254	0,0891	0,0909	0,0885	0,0901	0,0403
6. Motor Vehicles	0,3726	0,2805	0,2292	0,4067	0,4329	0,6108	0,6728	0,7642	0,9464	0,9776	0,3141
7. Electrical Machinery	0,9806	0,9014	0,7713	0,7443	0,7815	0,8661	0,9255	0,9642	0,9191	0,9909	0,8955
8. Chemicals	0,6863	0,6457	0,5319	0,5032	0,4983	0,4821	0,4388	0,4025	0,4016	0,3985	0,3370
9. Other Transport Equipment	0,1920	0,3416	0,1899	0,1681	0,1786	0,1672	0,1436	0,1972	0,1748	0,2162	0,0326
10. Non-Electrical Machinery	0,2260	0,2655	0,2530	0,2817	0,3031	0,3133	0,3148	0,3676	0,3656	0,3965	0,2709
C. Medium-Low-Tech Industries											
11. Rubber and Plastic Products	0,9962	1,0483	0,9141	0,8753	1,0309	1,0864	1,0563	1,0597	1,0406	1,1460	1,0808
12. Shipbuilding	0,4265	1,0073	0,9410	1,0190	0,6621	1,4635	1,2657	1,4410	1,8367	3,1489	0,7533
13. Other Manufacturing	0,1696	0,6917	0,7325	0,8981	1,1168	1,2108	1,2188	1,2513	1,2918	1,4123	2,1339
14. Non-Ferrous Metals	0,8574	0,8838	0,8720	0,7895	0,7708	0,7166	0,6493	0,6776	0,6448	0,7174	0,5250
15. Non-Metallic Mineral Products	2,1390	2,3090	1,9581	2,0096	2,4404	2,3762	2,4656	2,3660	2,3722	2,4806	2,3787
16. Fabricated Metal Products	0,6817	0,7105	0,6515	0,6956	0,7565	0,6949	0,7601	0,8492	0,9238	0,9785	1,0406
17. Petroleum Refining	0,7663	0,4923	0,6955	0,7812	0,4049	0,6109	0,9040	0,8042	0,6903	0,8874	0,0553
18. Ferrous Metals	3,2492	3,5346	2,4076	2,6648	2,6448	3,2636	3,1589	2,7607	3,1027	2,4466	3,0034
D. Low-Tech Industries											
19. Paper Printing	0,2013	0,2244	0,1737	0,1728	0,1804	0,2464	0,3006	0,2927	0,2867	0,3213	0,2520
20. Textile and Clothing	4,4477	4,4669	6,3658	6,3111	6,5691	5,9088	6,0041	5,7106	5,2216	5,1201	8,1568
21. Food, Beverages and Tobacco	2,1349	2,1727	1,6804	1,4957	1,4096	1,3100	1,0350	1,0152	1,0406	1,2441	1,4495
22. Wood and Furniture	0,3134	0,3169	0,3068	0,3541	0,3882	0,3970	0,4810	0,6368	0,6648	0,6863	0,9115

Table 3. The Comparative Advantage of Turkey with Respect to the EU on the Global Level, by Vollrath Index (RCA²) in Manufacturing Industry

Industries According to Intensity of Technology	RCA2										
	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
A. High-Tech Industries											
1. Aerospace	-1,2099	na	-0,6744	0,0521	-0,0287	-0,0257	-0,2038	0,2718	-0,3179	0,0180	0,0456
2. Computers, Office Machinery	-0,3491	-0,4363	-0,3489	-0,4372	-0,4016	-0,3343	-0,3940	-0,3743	-0,3798	-0,4666	-0,6051
3. Electronics-Communications	-0,6220	-0,9714	-0,9110	-1,1401	-0,9915	-1,2222	-0,9710	-0,9551	-0,8385	-0,7443	-0,5423
4. Pharmaceuticals	-0,3325	-0,6184	-0,3347	-0,8119	-0,6031	-0,4161	-0,1887	-0,1560	-0,1158	-0,1886	0,0191
B. Medium-High-Tech Industries											
5. Scientific Instruments	-0,6736	-0,9386	-0,7238	-0,7711	-0,6753	-0,6628	-0,6809	-0,6377	-0,6065	-0,6641	-0,6966
6. Motor Vehicles	-0,3304	-0,9416	-0,5828	-0,3436	-0,6810	0,0556	0,1208	-0,1248	-0,1813	-0,0747	-0,3258
7. Electrical Machinery	0,0867	-0,3662	-0,2938	-0,3901	-0,0961	-0,0481	-0,0699	0,0666	0,0299	0,0981	0,0950
8. Chemicals	-1,0388	-1,5060	-1,0779	-1,1973	-1,0835	-1,3012	-1,4219	-1,3483	-1,2022	-1,1807	-1,4806
9. Other Transport Equipment	-1,0950	-0,8068	-0,1823	-0,3595	-0,5204	-0,5011	-0,1218	-0,3020	-0,3533	-0,4346	-0,9231
10. Non-Electrical Machinery	-2,1852	-2,7468	-1,8719	-1,3252	-1,1855	-1,5081	-1,6783	-1,5211	-1,2897	-1,2559	-1,5583
C. Medium-Low-Tech Industries											
11. Rubber and Plastic Products	0,3759	0,2379	0,2608	0,1743	0,3377	0,3830	0,3150	0,3084	0,3060	0,4437	0,2846
12. Shipbuilding	0,2548	0,7817	0,8702	0,9619	0,6413	1,3585	1,1915	1,4271	1,7997	3,0745	0,7478
13. Other Manufacturing	-0,2084	0,1374	0,2526	0,4642	0,7307	0,7200	0,7564	0,7631	0,7978	0,9161	1,4858
14. Non-Ferrous Metals	0,8254	0,8355	0,8477	0,7648	0,7462	0,6914	0,6143	0,6470	0,6017	0,6716	0,4958
15. Non-Metallic Mineral Products	1,3587	1,4513	1,1908	1,2605	1,7964	1,6937	1,7754	1,7110	1,7071	1,6743	1,3865
16. Fabricated Metal Products	-1,1132	-1,8045	-0,9183	-0,6073	-0,7033	-0,4917	-0,4834	-0,1556	-0,1165	-0,0838	-0,4229
17. Petroleum Refining	-0,1376	-0,5354	-0,2814	-0,4356	-0,8240	-0,4040	-0,3347	-0,4461	-0,5406	-0,2763	-1,5226
18. Ferrous Metals	1,5346	1,1076	0,6806	0,9802	0,7348	1,1873	1,1677	0,6282	1,1585	0,3915	0,9564
D. Low-Tech Industries											
19. Paper Printing	-0,5251	-0,6839	-0,5470	-0,6950	-0,6917	-0,6156	-0,6309	-0,6235	-0,5932	-0,6509	-0,8143
20. Textile and Clothing	3,7207	3,3975	5,4879	5,5085	5,6858	4,8681	4,9379	4,6564	4,2577	4,1693	6,9511
21. Food, Beverages and Tobacco	1,3814	1,2966	1,1078	0,9618	0,8903	0,7232	0,4951	0,5295	0,6367	0,8592	1,0423
22. Wood and Furniture	0,0514	-0,0219	-0,0092	0,0471	0,0643	0,1253	0,2397	0,3817	0,3582	0,3405	0,4895

Table 4. Comparative Advantage of Turkey with Respect to the EU on the Global Level, by Vollrath Index (RCA³) in Manufacturing Industry

Industries According to Intensity of Technology	RCA ³											
	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	
A. High-Tech Industries												
1. Aerospace	-2,0235	na	-1,2902	-0,2345	-0,1338	-0,4616	-1,6529	-0,8465	-0,9911	-1,8714	-1,9407	
2. Computers, Office Machinery	-3,5119	-3,3058	-3,2689	-2,9985	-3,0163	-3,2968	-3,7955	-3,6937	-3,7180	-3,5582	-3,4839	
3. Electronics-Communications	-1,5714	-1,6026	-1,8932	-1,9088	-1,7066	-1,9701	-2,1314	-2,1536	-2,2295	-2,3400	-3,8914	
4. Pharmaceuticals	-1,0678	-0,9699	-0,5758	-0,7483	-0,7609	-0,7723	-0,4163	-0,3869	-0,3159	-0,4279	-0,4875	
B. Medium-High-Tech Industries												
5. Scientific Instruments	-2,0468	-2,1664	-2,3031	-2,3938	-2,2099	-2,0766	-2,4185	-2,3976	-2,4242	-2,4073	-3,2123	
6. Motor Vehicles	-0,9873	-1,2712	-1,4731	-0,8996	-0,8372	-0,4930	-0,3962	-0,2689	-0,0550	-0,0227	-1,1582	
7. Electrical Machinery	-0,0196	-0,1038	-0,2597	-0,2953	-0,2465	-0,1437	-0,0775	-0,0364	-0,0843	-0,0092	-0,1104	
8. Chemicals	-0,3764	-0,4374	-0,6314	-0,6869	-0,6965	-0,7296	-0,8237	-0,9102	-0,9123	-0,9201	-1,0878	
9. Other Transport Equipment	-1,6502	-1,0741	-1,6611	-1,7831	-1,7228	-1,7885	-1,9407	-1,6237	-1,7441	-1,5314	-3,4237	
10. Non-Electrical Machinery	-1,4874	-1,3260	-1,3746	-1,2670	-1,1937	-1,1605	-1,1557	-1,0008	-1,0062	-0,9251	-1,3059	
C. Medium-Low-Tech Industries												
11. Rubber and Plastic Products	-0,0039	0,0472	-0,0899	-0,1332	0,0304	0,0829	0,0547	0,0580	0,0398	0,1363	0,0777	
12. Shipbuilding	-0,8521	0,0073	-0,0608	0,0188	-0,4124	0,3808	0,2357	0,3653	0,6080	1,1471	-0,2832	
13. Other Manufacturing	-1,7740	-0,3686	-0,3113	-0,1075	0,1105	0,1913	0,1979	0,2242	0,2561	0,3452	0,7579	
14. Non-Ferrous Metals	-0,1539	-0,1235	-0,1370	-0,2363	-0,2603	-0,3333	-0,4319	-0,3893	-0,4387	-0,3321	-0,6443	
15. Non-Metallic Mineral Products	0,7603	0,8368	0,6720	0,6979	0,8922	0,8655	0,9024	0,8612	0,8638	0,9085	0,8666	
16. Fabricated Metal Products	-0,3831	-0,3417	-0,4284	-0,3629	-0,2791	-0,3640	-0,2743	-0,1634	-0,0792	-0,0218	0,0398	
17. Petroleum Refining	-0,2662	-0,7086	-0,3631	-0,2470	-0,9041	-0,4928	-0,1009	-0,2179	-0,3706	-0,1195	-2,8955	
18. Ferrous Metals	1,1784	1,2626	0,8786	0,9801	0,9726	1,1828	1,1502	1,0155	1,1323	0,8947	1,0997	
D. Low-Tech Industries												
19. Paper Printing	-1,6031	-1,4944	-1,7502	-1,7556	-1,7128	-1,4009	-1,2019	-1,2287	-1,2494	-1,1354	-1,3782	
20. Textile and Clothing	1,4924	1,4967	1,8509	1,8423	1,8824	1,7764	1,7924	1,7423	1,6528	1,6332	2,0989	
21. Food, Beverages and Tobacco	0,7584	0,7760	0,5190	0,4026	0,3433	0,2700	0,0344	0,0151	0,0398	0,2184	0,3712	
22. Wood and Furniture	-1,1603	-1,1492	-1,1815	-1,0382	-0,9463	-0,9238	-0,7318	-0,4512	-0,4082	-0,3765	-0,0927	

Table 5. Comparative Advantage of Turkey with Respect to the EU on the Global Level, by Vollrath Index (RCA⁴) in Manufacturing Industry

Industries According to Intensity of Technology	RCA ⁴											
	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	
A. High-Tech Industries												
1. Aerospace	-2,3177	na	-1,2385	0,0681	-0,0323	-0,0400	-0,7249	1,0045	-0,6186	0,1242	0,3823	
2. Computers, Office Machinery	-2,5416	-2,5571	-2,3194	-2,2033	-2,2951	-2,3059	-2,9196	-2,7754	-2,8119	-2,8551	-3,0309	
3. Electronics-Communications	-1,3848	-1,7619	-1,9530	-2,1622	-1,8662	-2,2788	-2,2173	-2,2223	-2,1742	-2,1664	-3,3164	
4. Pharmaceuticals	-0,6767	-0,9674	-0,4670	-0,9992	-0,8289	-0,6422	-0,2517	-0,2067	-0,1474	-0,2541	0,0316	
B. Medium-High-Tech Industries												
5. Scientific Instruments	-1,8271	-2,2182	-2,1091	-2,2457	-1,9679	-1,8386	-2,1571	-2,0810	-2,0605	-2,1251	-2,9069	
6. Motor Vehicles	-0,6349	-1,4718	-1,2649	-0,6123	-0,9451	0,0955	0,1980	-0,1513	-0,1753	-0,0736	-0,7117	
7. Electrical Machinery	0,0925	-0,3410	-0,3228	-0,4214	-0,1160	-0,0541	-0,0728	0,0716	0,0331	0,1042	0,1121	
8. Chemicals	-0,9217	-1,2037	-1,1075	-1,2177	-1,1551	-1,3080	-1,4447	-1,4702	-1,3847	-1,3770	-1,6853	
9. Other Transport Equipment	-1,9025	-1,2125	-0,6729	-1,1436	-1,3647	-1,3856	-0,6142	-0,9289	-1,1057	-1,1019	-3,3784	
10. Non-Electrical Machinery	-2,3675	-2,4288	-2,1283	-1,7413	-1,5915	-1,7601	-1,8454	-1,6367	-1,5102	-1,4273	-1,9098	
C. Medium-Low-Tech Industries												
11. Rubber and Plastic Products	0,4737	0,2574	0,3359	0,2221	0,3968	0,4346	0,3541	0,3439	0,3482	0,4896	0,3056	
12. Shipbuilding	0,9095	1,4963	2,5861	2,8824	3,4611	2,6347	2,8355	4,6438	3,9040	3,7446	4,9060	
13. Other Manufacturing	-0,8013	0,2215	0,4229	0,7274	1,0620	0,9029	0,9691	0,9413	0,9612	1,0461	1,1916	
14. Non-Ferrous Metals	3,2877	2,9066	3,5781	3,4635	3,4435	3,3491	2,9214	3,0998	2,7049	2,7507	2,8886	
15. Non-Metallic Mineral Products	1,0085	0,9903	0,9368	0,9868	1,3322	1,2475	1,2732	1,2844	1,2716	1,1238	0,8744	
16. Fabricated Metal Products	-0,9681	-1,2640	-0,8794	-0,6275	-0,6574	-0,5351	-0,4922	-0,1683	-0,1188	-0,0822	-0,3410	
17. Petroleum Refining	-0,1651	-0,7360	-0,3398	-0,4432	-1,1102	-0,5077	-0,3150	-0,4412	-0,5784	-0,2711	-3,3516	
18. Ferrous Metals	0,6393	0,3759	0,3323	0,4586	0,3255	0,4523	0,4615	0,2582	0,4674	0,1744	0,3834	
D. Low-Tech Industries												
19. Paper Printing	-1,2834	-1,3982	-1,4227	-1,6138	-1,5759	-1,2524	-1,1310	-1,1412	-1,1214	-1,1072	-1,4424	
20. Textile and Clothing	1,8112	1,4296	1,9812	2,0622	2,0065	1,7365	1,7283	1,6895	1,6895	1,6836	1,9118	
21. Food, Beverages and Tobacco	1,0415	0,9082	1,0765	1,0301	0,9985	0,8031	0,6507	0,7372	0,9463	1,1732	1,2697	
22. Wood and Furniture	0,1791	-0,0669	-0,0295	0,1427	0,1812	0,3792	0,6899	0,9147	0,7740	0,6856	0,7701	

