



## Competitiveness of Turkey's Automotive Industry

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### Abstract

This paper attempts to answer the question whether Turkey's Automotive Industry, which was, in 2016, 14<sup>th</sup> largest automotive industry in the world, and the 5<sup>th</sup> in Europe, is competitive or not. To measure the competitiveness of the industry, Revealed Comparative Advantage index (RCA) has been benefited. What differs this study from the previous ones are the facts that: first, the time span that the study which covers a larger period than most of other studies benefiting RCA index, namely, the time coverage of the study is from 2001 to 2016, thus the results will also account for the RCA values of 2001 and 2008, which are the economic crisis years. Second, in addition to having a large time coverage, to the best of the author's knowledge, this study's results provides the most up-to-date RCA values for the industry.

**Keywords:** Competitiveness; Revealed Comparative Advantage (RCA); Turkish Automotive Sector.

### 1. Introduction

According to Republic of Turkey Prima Ministry Investment and Support and Promotion Agency (ISPAT), Thanks to the country's competitive and capable labor power, and thanks to its dynamic market and fortunate geographical location, in 2016, 13 global OEM's vehicle production in Turkey reached to above 1.5 million while it was 374.000 back in 2002. At the end of 2016 Turkey ranked the world's 14<sup>th</sup> largest automotive manufacturer in the world and the 5<sup>th</sup> in Europe. This increase proves an about 10% compound annual growth rate during the time period of 2002-2016. Turkey has been providing a supporting environment in terms of supply chain of the industry as well. The country has nearly 1.100 component suppliers that supporting OEMs' production. The parts from these component suppliers directly go to production lines of manufacturers of vehicles. The rate that at which OEMs localize is a figure between % 50 and % 70. The industry is now aiming to improve its R&D, design and branding capabilities. Ford, Fiat, Daimler, AVL, Segula are some of the remarkable examples of global brands that have R&D and/or engineering and/or designing practices in Turkey with Ford Otosan's R&D center is being the brand's 3<sup>rd</sup> largest R&D center globally, and with Fiat's R&D center is being the only center of the company that gives service to Europe Market except for the one in the company's own country, Italy.

From the exports side, according to (ISPAT), Turkey is a base for auto manufacturers' exports sales, %77 percent of production was designated for other counties' markets in 2016, namely, more than 1.100.000 vehicles were exported from Turkey to outside world. Automotive has been the sector of the most exports since 2010, and according to (TEA) as of 31<sup>st</sup> October exports of the sector has already reached nearly 23.5\$ billion dollars which was 21\$ billion dollars for the same time period in 2016. With its positive and steady long-term increase in exports, and with the all other benefits regarding employment, added value that the industry causes, it is possible to say that automotive industry in Turkey is its one of the most important parts of country's economy.

Thereby, as can be understood from the above explanations, this study has the aim of measuring the competitiveness of one of the important manufacturing industries, automotive industry, in Turkey. So the results of this study hopefully, will give the readers information related to the competitiveness of one of the locomotive industries of Turkey's manufacturing sector, automotive industry.

## 2. A General Look at Turkey's Automotive Industry

### A-) A Brief Historical Background of the Industry

First Turkish Automobile was manufactured in 1961 in Eskişehir Devlet Demiryolları factory. But the production of the car stayed limited to only 4 example models. The reason behind this was the low demand to the car. In 1954, Turkey, for the first time started to manufacture industrial products of automotive sector. This was managed by Turkish Willy Overlands Ltd. The Company manufactured big wheeled strong military vehicles and military vans. After this investment, Türk Otomotiv Endüstrisi A.Ş. company's lorry factory and Otosan and Çiftçiler A.Ş. companies' second and third lorry factories were the investments that took place in the sector. Bus production on the other started in 1963 with the assembly of the bus named Magirus by Otobüs Karöseri San. A.Ş. company. With the effects of economic crisis in 1994 production of automobile in Turkey decreased %39 which means 212.651 units. The share of imports in the total demand decreased to 12% from 23%. In 2000 with a record increase in the production, automotive industry in Turkey reached the production number of 468.381 units. (175.343 automobiles, 95.342 commercial vehicles, 15.052 tractors) In 2001, with the effects of the economic crisis production decreased to 285.737 units. Despite the fall in the production there was a rise in the employment for the period, this caused efficiency for the first 6 months of the period to decrease to %42 (Tekin and Zerenler, 2005). In 2002 the production after crisis again had a rise to 374.000 units. But this was still below the record number of 468.381 in 2000.

### B-) Some Main Figures of the Industry

Table 1: The Production Units of the Automotive Manufacturers by the End of December Source: Automotive Manufacturers Association (OSD)								
Years	P.Car	Truck	Pick-Up	Bus	Minibus	Midibus	F.Tractor	Total
2000	297.476	28.348	68.807	4.213	20.597	11.506	37.434	468.381
2001	175.343	6.683	76.672	2.501	6.486	3.000	15.052	285.737
2002	204.198	12.295	116.872	2.684	6.139	4.337	10.840	357.405
2003	294.116	19.041	195.606	4.490	13.625	6.794	29.778	563.450
2004	447.152	31.790	301.563	4.839	28.161	9.903	40.665	864.073
2005	453.663	37.227	349.885	5.406	26.162	7.109	36.527	915.979
2006	545.682	37.026	369.862	6.019	20.728	8.263	38.841	1.026.421
2007	634.883	34.544	371.737	6.946	21.999	9.305	33.518	1.132.932
2008	621.567	36.800	449.434	7.526	21.123	10.660	24.807	1.171.917
2009	510.931	8.246	330.044	5.931	11.829	2.624	14.861	884.466
2010	603.394	23.851	442.408	5.268	16.978	2.658	30.425	1.124.982
2011	639.734	37.396	479.110	6.907	22.475	3.509	45.506	1.234.637
2012	577.296	29.129	426.633	6.427	29.335	4.158	42.255	1.115.233
2013	633.604	30.082	410.556	8.345	37.750	5.197	40.509	1.166.043
2014	733.439	29.909	359.911	6.442	35.420	5.324	48.403	1.218.848
2015	791.027	35.838	468.933	8.789	47.078	7.1031	51.238	1.410.034

Table 1 above shows the total production for different groups of vehicles to draw a general image of the industry. From the table we understand, during the after the crisis year of 2001, in 10 years period, to 2011, automotive sector in Turkey grown to the annual production of 1.124.982. Even though with the crisis of 2009 production decreased to 884.466 units, the following year the industry had one of the biggest jumps in the production since 2000 and the production was 1.124.982 in 2010. In 2015 the total production of automotive industry was 1.410.034 vehicles. Among this figure of

production of personnel cars for every and each year was the biggest item of total production, actually, for every year more than half of the total production, among categories of different vehicles, was sourced from personnel car production. This makes personnel cars the biggest actor of the industry.

According to the table 2, we understand, in last 5 years investment into the industry has increased. The largest part of the investments has consisted of “New Model Development” investments, which might be attributed to the successful R&D base of the industry in the country.

Table 2: Realized Sectorial Investments (USD) Source: Automotive Manufacturers Association (OSD)					
Projects	2012	2013	2014	2015	2016
Capacity Development	130.000.000	142.000.000	150.000.000	43.000.000	82.000.000
Modernization	113.000.000	75.000.000	60.000.000	221.000.000	63.000.000
New Model Development	723.000.000	855.000.000	1.000.000.000	615.000.000	825.000.000
Quality Development	46.000.000	30.000.000	26.000.000	23.000.000	53.000.000
Localization	23.000.000	3.000.000	8.000.000	5.000.000	12.000.000
Others	80.000.000	95.000.000	130.000.000	147.000.000	96.000.000
Total	1.115.000.000	1.200.000.000	1.374.000.000	1.054.000.000	1.131.000.000

Table 3 below shows the exports of Turkish automotive sector where we observe a steady increasing trend except for 2009 because of the economic crisis. In 2009 sector's exports shrank nearly 33% percent, which was at their record highest value of 17\$ billion since 2001 yet, following 6 years to 2016, exports have grown to 19\$ billion which is even a higher value than 2008

Table 3: Exports of Automotive Sector Source: International Trade Centre	
Years	Value(US\$)
2001	2985475
2002	3128953
2003	3967397
2004	8157515
2005	9399670
2006	11712597
2007	15530960
2008	17817614
2009	11850201
2010	13475644
2011	15393411
2012	14609461
2013	16467347

2014	17393341
2015	16783330
2016	19113379

**Note: The exports values of automotive sector below were calculated by the author, by adding up the exports values of commodities under 4 digit hs codes 87.01-87.08 this is because automotive industry's products are found under these eight codes.**

### 3. Studies of Competitiveness of Industries in Turkey

Many studies have attempted to measure the competitiveness of different industries of Turkey. These studies have varied from each other either because of the method chosen to measure competitiveness or either because of the countries that have been compared with Turkey. Some studies compared Turkey with the whole world, some others compared the country with a specific country or country groups or formal unions such as European Union.

(Bulu, Erarslan and Kaya, 2006) has analyzed the competitiveness of Turkish Electronic sector through Porter's Diamond Model using secondary and primary research collection methods. After examining 4 different variables and taking into account the contribution by the government to competitiveness they have found the competitiveness of Turkey's electronic sector at middle level. According to them competitiveness of the industry benefited from the relatively cheaper and capable labor yet, foreign-source dependency in raw materials dragged the competitiveness down.

More recently, (Bilgen, 2010) has also benefited the diamond model, investigating Global Competitiveness Index values under the model, in order to measure the competitiveness of the defense industry of Turkey. As a result they the competitiveness level of the country in the industry was found to be moderate.

Another study by (Aynagöz Çakmak,2005) also measured revealed comparative advantages indices for textiles and clothing industries as a whole and for the all sub-industries of these industries for the time span of 1989-2003 and found that for the analyzed time span Turkey had comparative advantage in the world. According to her studies, Turkey is more competitive in SITC 84 (Articles of Apparel and Clothing Accessories) than SITC 65 (Textiles Yarn, Fabrics, Made-up Articles and Related Products) in the world markets. Nearly for the all the sub-sectors of Clothing and Textiles industry competitiveness was found to fall.

(Erkan, 2013) has analyzed the competitiveness in Turkey's export of textile and apparel sector. As happened in (Aynagöz Çakmak, 2005), Vollrath index was benefited to measure the competitiveness. The index values were calculated for the time span of 1993-2009 at SITC rev.3 4 digit basis. According to the study, 43 pcs of export of sub-product group of textile sector and 34 pcs of export of sub-product group of apparel sector were found to have competitive advantage.

For the automotive sector which is also interest area of this study, (Başkol,2011) attempted to determine the competitiveness for the time span of 1996-2010. He analyzed the sector with the tools of revealed comparative advantage index, import penetration rate, specialization coefficient, openness in foreign competition. Study found that Turkish automotive sector is competitive in the world area, yet strong competition in the world obliges the country to put forward new policies to remain competitive and to pre-serve current levels of competitiveness.

(Erkan,2012) more recently, calculated Turkey's and Syria's revealed comparative advantages in SITC rev. 3, 2 digit codes commodity groups for the time period of (200-2008). Syria was found to have comparative disadvantages against Turkey in 57 of 66 goods with a strong degree of comparative advantage in 45 of them.

(Altay and Gürpınar, 2008) aimed to determine the international competitiveness of the furniture industry of Turkey. They found, for SITC. Rev. 3, code: 821, commodity group, and they found Turkish furniture industry had a disadvantage for the time span of 2001-2004 yet, for the last two years of the examined period, namely, for the years of 2005-2006, the sector was found to have comparative advantage.

### 4. Measuring Competitiveness

This study to aims to decide whether the industry is competitive or not, based on revealed comparative advantage index. The formula for the calculation of revealed comparative advantage index (RCA) was first established in (Balassa,1965). However his formulation was limited to only developed and high income countries and only to a cluster of manufactured products.

(Vollrath, 1991) suggested an enlargement to the formula that was used by Balassa, with some small modification in it, the formula became available to measure the revealed comparative advantages of all countries (either industrialized or

not, and either low or middle or high income) and for all traded commodities (rather than being limited to a cluster of manufactured goods only) The last form of the formula was turned out be as follows:

$$RCA = \frac{\left(\frac{X_{ia}}{X_{it}}\right)}{\left(\frac{X_{wa}}{X_{wt}}\right)} \text{ e. q. 1}$$

Where:

RCA=Revealed comparative advantage

a=any specific commodity whether manufactured or not

t=all traded commodities

i=the reference country that for which we are willing to measure the revealed comparative advantage

w=the world

According to this, to calculate a country's revealed comparative advantage, one should first calculate the share of a specific commodity's or a specific sector's in the exports of a country, then divide this figure by the share of the same commodity or of the same sector's in the exports of the world. If the value found after calculations is greater than 1 then the country is regarded to have revealed comparative advantage in the examined sector. If the value is less than 1 then the country is considered to have revealed comparative disadvantage in the sector. Thereby, if the RCA value for the year, say, "x" is greater than 1 then we will consider automotive industry competitive, otherwise, if the RCA value is less than 1, then the industry will be considered not competitive.

## 5. Findings and Conclusion and Future Work

### 5.1 Findings and Conclusion

**Table 4: Revealed Comparative Advantage Values of Automotive Sector**  
Source: International Trade Centre & Authors Own Calculations

Years	RCA	Comment
2001	0,84	Disadvantage
2002	0,97	Disadvantage
2003	1,18	Advantage
2004	1,49	Advantage
2005	1,55	Advantage
2006	1,73	Advantage
2007	1,80	Advantage
2008	1,87	Advantage
2009	1,82	Advantage
2010	1,76	Advantage
2011	1,73	Advantage
2012	1,44	Advantage
2013	1,62	Advantage

2014	1,59	Advantage
2015	1,55	Advantage
2016	1,69	Advantage

According to the findings Turkish automotive industry for a notably long time span, namely, from 2003 to 2016 has been competitive except for the years of 2001 and 2002, however even during the economic crisis year of 2008-2012 (i.e. the values read for each year from the table 4 except for the years of 2001 and 2002 are above 1 and this is the indication of being competitively advantaged.) This might be a solid indicator of how the sector is sound and important for the country. In this 16 years period only 2001 and 2002 have been found to be the years that Turkish automotive sector was not competitive. This might have caused by 2001 economic crisis. What should be giving special care and consideration is actually the fact that, according to the results, after 2008 crisis the sector has never reached the RCA figure of 1.87 as it was in 2008. From the year 2001 to 2008 we witness and increase about 1, 03 in RCA value in 8 years. And the following 8 years period from 2008 to 2016 not an increase but a trend of decrease is found in the RCA values. So even though there is still revealed comparative advantage in the industry after 2008 crisis the advantage is getting weaker for the sector. The attention should be directed to the reasons behind this phenomenon and the solutions to have an increasing trend in the competitiveness.

## 5.2. Future Work

This paper has attempted to answer the question whether Turkish Automotive Industry, which was, in 2016, 14<sup>th</sup> largest automotive industry in the world, and the 5<sup>th</sup> in Europe, is competitive or not. To measure the competitiveness of the industry, Revealed Comparative Advantage index (RCA) has been benefited. What differs this study from the previous ones are the facts that: first, the time span that the study which covers a larger period than most of other studies benefiting RCA index, namely, the time coverage of the study is from 2001 to 2016, thus the results will also account for the RCA values of 2001 and 2008, which are the economic crisis years. Second, in addition to having a large time coverage, to the best of the author's knowledge, this study's results provides the most up-to-date RCA values for the industry.

Even though the results of the study has identified the industry that is being studied as competitive to have a better understanding of the actual competitiveness of the industry the study can be modified into a more detailed and into a larger scope. To be able to do so following suggestions or path of studies can be taken into account.

- i) In this study competitiveness of the Turkish automobile industry has been attempted to evaluated through RCA index yet, while doing so the exports values of commodities under 4 digit HS codes 87.01-87.08 were added up to have a general idea on the competitiveness of the whole industry. However, this addition of different sub-sectors of the automobile industry may cause a relatively less-clear idea about the competitiveness of the industry. Rather than adding up the values of different sub-sectors in future work, RCA values of all these different sub-sectors can be calculated differently and after this process an implication could be made about the whole automotive industry. Additionally by doing the research that way, deeper knowledge on the inside dynamics of the automotive industry could be reaped from the study. For example if the results are positive for the whole industry, if the study is made the suggested way, we would be able to know which sub-sector of the automobile industry is the most effective player in the advantage or which of the sub-sectors should be given more attention to find new ways to improve them.
- ii) Another improvement that could be applied in the future is that, the country coverage of the analysis can be enlarged onto a political union, or a group of countries or onto a regional study. By this, what is meant is, RCA values for not only Turkey's automotive industry but also for the automotive industries of different country or country groups could be calculated and the value for the RCA's for the automotive industry or for the sub-groups of it can be compared to each other. The study also could be enlarged in terms of the sector it covers. For example by calculating the RCA values for other important industries of the country, the main industry of the country could be compared to each other. This might let us have the knowledge of which of the so-called key industries of the country are actually the most competitive against the all other industries. And which of the industries should be taken under consideration to figure out ways of improving them so that they can be more competitive. Such kind of study also do this different-industry comparisons among different countries as well. For example, imagine the scenario that the country X is claimed to be competitive in producing textiles and the country Y is in furniture industries. If the RCA values for a specific time span for X's textiles and Y's furniture industries are known these two key industries of two different countries could be compared to each other to have some beneficial implications on the competitive features of the countries.

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