TURKEY'S POSITION AND COMPETITIVENESS IN THE GLOBAL AUTOMOTIVE NETWORKS

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ABSTRACT

This study focuses on trade in parts and components (P&C) of the Turkish automotive industry. Currently motor vehicles is one of two largest exporters in the Turkish manufacturing industry. The sector exhibited a notable change in its trade performance, both in terms of final products and in terms of P&C since the late 1990's. Analysis of disaggregated trade data enables the identification of various trade patterns. Trade flows can be classified into ***one-way trade*** or ***vertical intra-industry/horizontal intra-industry trade*** (VIIT/HIIT) by employing the methodology in Fontagné & Freudenberg (1997). Following Ando (2006), trade types can further be categorized as ***export based one-way /import based one-way*** and ***higher unit values or high-skill factor intensity for exports (HQVIIT)*** vs ***lower value added in exports (LQVIIT)***.

The purpose of this study is to assess Turkey's position as a trading partner in global automotive networks. Making use of the above mentioned methodologies, we identify trade patterns. Specifically, we measure Turkey's one-way and intra-industry trade (IIT) in the automotive sector parts and components. Finally we assess Turkey's competitiveness by using indices of revealed comparative advantage (RCA). We calculate RCA indices for the automotive network by making use of trade data compiled according to the Harmonized System (HS) at the 12-digit level.

JEL Code: F14

Keywords: Revealed Comparative Advantage, Intra-Industry Trade, One-Way Trade, Production Sharing (Fragmetation), Turkish Automotive industry

1. Introduction

The automotive sector is comprised of different manufacturing processes brought together by final assembly. This is a feature of the sector that enables production to be organized in the form of global chains or networks and necessitates trade in parts and components.

The diversity of the final product and the geographical fragmentation in production makes motor vehicles the largest traded sector in the world. Our study aims at investigating Turkey's competitiveness in the automotive networks. We focus on trade in inputs and leave the final products outside the scope of our analysis. The final products in the sector involves the

assembly of diverse products involving different skill and factor requirements. An analysis of competitiveness without international input output data at a detailed level is very likely to be misleading. The second reason for focusing on trade in inputs is the existence of products crossing the borders many times. The use of trade in input data only reduces the imported content in exports.

2. Methodology

As globalization shapes production and trade, new types of trade emerge. Currently existing trade types are classified into two broad categories as one-way trade and two-way or intra-industry trade (IIT). IIT can be further broken down to horizontal and vertical. Horizontal IIT (HIIT) arises out of the search for variety and is dominant in trade flows among developed countries in goods of similar quality. Vertical IIT (VIIT) refers to trade between developed and emerging countries in similar products. The theoretical literature on intra-industry trade flows emphasises the importance of product quality differences as a rationale for (VIIT).[1] Another trend to mention is the surge in P&C trade, and the trade types described so far are also valid for P&C trade. A notable facet of the new international division of labour is production sharing or fragmentation of production.[2] Fragmentation involves trade in different stages of the production process between developed and emerging economies and gives rise to complex patterns combining one-way trade and IIT in both final goods and P&C. VIIT hence is not only an indicator of trade arising out of quality differences but also the result of fragmentation (Ando, 2006, p. 269; Wakasugi, 2007, pp. 30-31).

[1]For the theoretical literature on quality differentiation in VIIT, see Falvey (1981); Shaked & Sutton (1984); Falvey & Kierzkowski (1987); Flam & Helpman (1987).

[2]For the theoretical literature on fragmentation of production as a result of the new international division of labor, see Sanyal (1983); Arndt, (1997); Venables, (1999); Deardorff, 2001; Jones &Kierzkowski, (1990, 2001); Yi, (2003).

Trade flows are classified into one-way trade, HIIT and VIIT in final goods and in P&C by employing the methodology in Fontagné & Freudenberg (1997). Trade flows in product j are classified as one-way if the equation below holds, and as IIT if not.[3]

$$\frac{Min(X_j,M_j)}{Max(X_j,M_j)} \leq 0.1 \quad (1)$$

In order to identify HIIT and VIIT, equation 2 is employed. If the ratio of export to import values of product j lies within the critical values 0.8-1.25, then, the IIT in product j is classified as horizontal. If the ratio lies outside this range, then, the trade-flow is classified under VIIT.

$$0.8 \leq \frac{P_j^x}{P_j^m} \leq 1.25,$$

where P: unit value, x: export of good j, m: import of good j (2)

Following Abd-el Rahman (1991) and Greenaway, Hine &Milner (1994), unit values of exports and imports are calculated by dividing values by the corresponding net weight (kg). Following Ando (2006), trade types are further categorized in the following manner:

One-way trade: if export volume > import volume then export based, otherwise import based

VIIT: if $P_j^x / P_j^m >$ 1.25, then higher quality VIIT or (HQVIIT) (3)

if $P_j^x / P_j^m <$ 0.8, then lower quality VIIT or (LQVIIT) (4)

One-way trade: if export volume > import volume then export based, otherwise import based .

The measure of revealed comparative advantage we use (RCA1) is defined as

[3] In line with the suggestion in Ando (2006, p. 271), exports values are adjusted for FOB-CIF differences between exports and imports by multiplying each export value with 1.05. These adjusted export values are then used in all calculations.

$(X_i - M_i)/ (X_i + M_i)$ and ranges between -1 to +1. This also the simplest formula for measuring IIT. This index shows whether the country is a net exporter (advantage) or net importer (disadvantage) . When the index takes on value of 0, it is indicative of perfect IIT.

3. Data description

In order to analyze trade data at a high level of disaggregation, we use HS classification. UN COMTRADE data uses HS6 classification which is globally uniform. Classification at higher levels of disaggregation, however, may change from one country to another.

Our source of the list of parts and components in the automotive industry is provided by The US Department of Commerce, Office of Transportation and Machinery (OTM) Automotive Parts Product Listings. (accessed at www.tradeatlas.com) This data is at a 10 digit level HS10. The Turkish data provided by TURKSTAT, however, is at the HS12 level and requires some discretion to for concordance with the list of OTM. The 12 digit codes used in the present study are shown in Appendix1. There are about a total of 52 products in this list and the concordance for every year from 2002 to 2012 is shown in the same table.

The parts and components are classified under six major groups, namely, *automotive tires and tubes*, *bodies and parts*, *chassis and drivetrain parts*, *electrical and electric components*, *engines and parts*, and *miscellenaous parts*.

4. Overview of Turkish automotive trade

Automotive products form one of the two largest groups in Turkish exports. The Turkish automotive industry exhibited a notable change in its trade performance since the late 1990's. Based on ISIC Rev.3, Turkish motor vehicles and trailers exports rose from $1.7 billion in 2000 to $19.3 billion in 2008. The share of the sector in manufacturing exports during the same time period rose from 6% to 15%. Ensuent to the impact of the financial crisis on European

markets, sectoral exports and imports decreased considerably in 2009. Although there is a recovery, 2008 levels were not met during the following years.

In 2012 exports of parts and components amounted to about 40% of total sectoral exports and imports of parts and components made up 50% of total sectoral imports. Figure 1 shows the trade volumes in P&C. There is always a trade deficit in this area.

Table 1. Turkish Motor Vehicles and Trailers Trade (US $)
(Based on ISIC Rev3. Classification)

	EXPORTS	IMPORTS
1996	975 877	3 084 923
1997	879 948	4 397 831
1998	1 049 170	4 142 458
1999	1 614 792	3 355 281
2000	1 745 046	5 965 641
2001	2 656 691	2 206 124
2002	3 602 800	2 918 481
2003	5 436 950	6 410 789
2004	8 812 615	11 795 945
2005	10 226 102	12 331 890
2006	12 677 257	13 293 824
2007	17 016 180	15 096 193
2008	19 361 877	15 513 689
2009	12 862 756	10 776 027
2010	14 856 618	15 772 608
2011	17 043 514	19 896 077
2012	16 244 049	16 808 552

Source: Turkish Statistical Institute

Figure 1. Exports and Imports of Parts and Components Trade (US $)

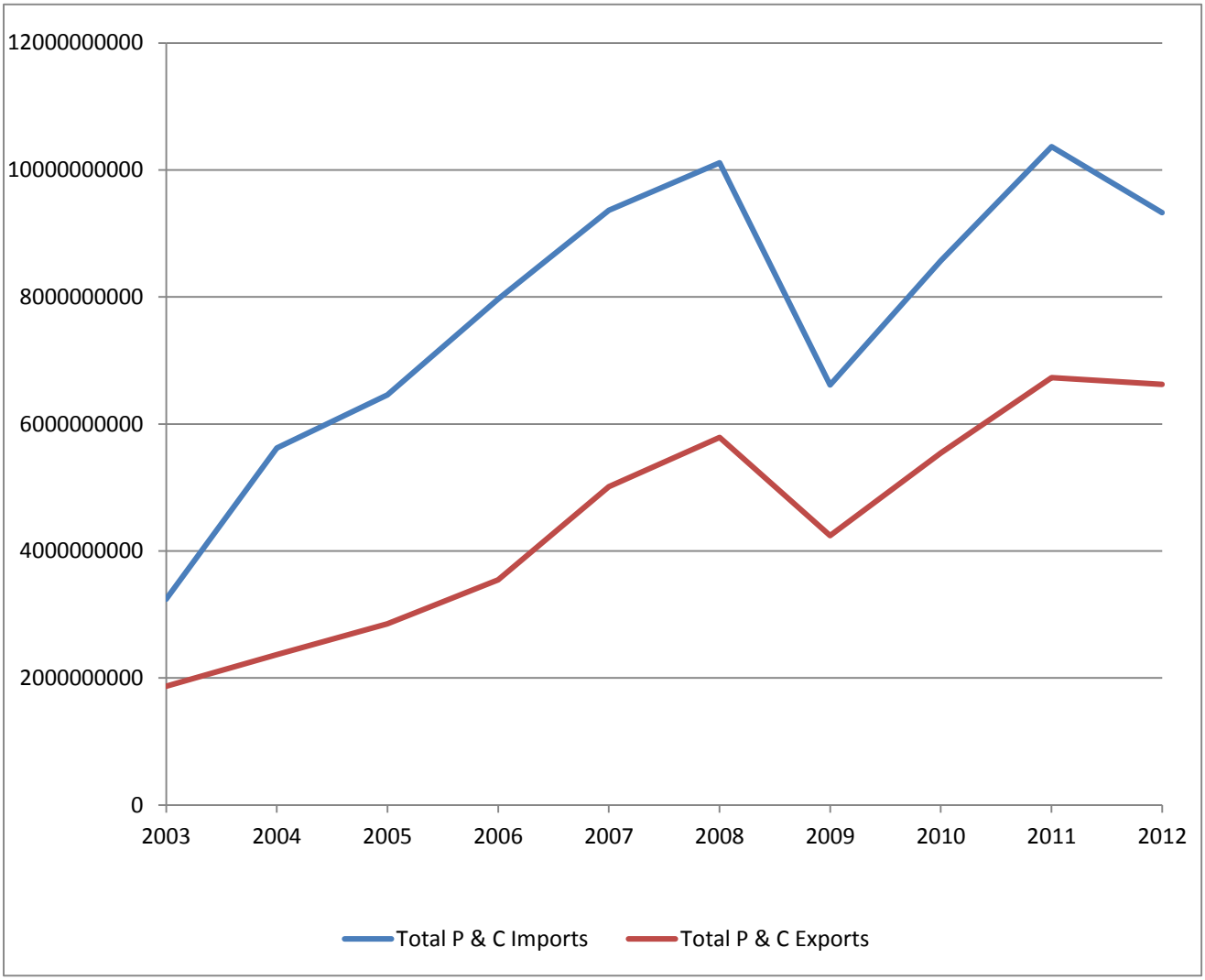
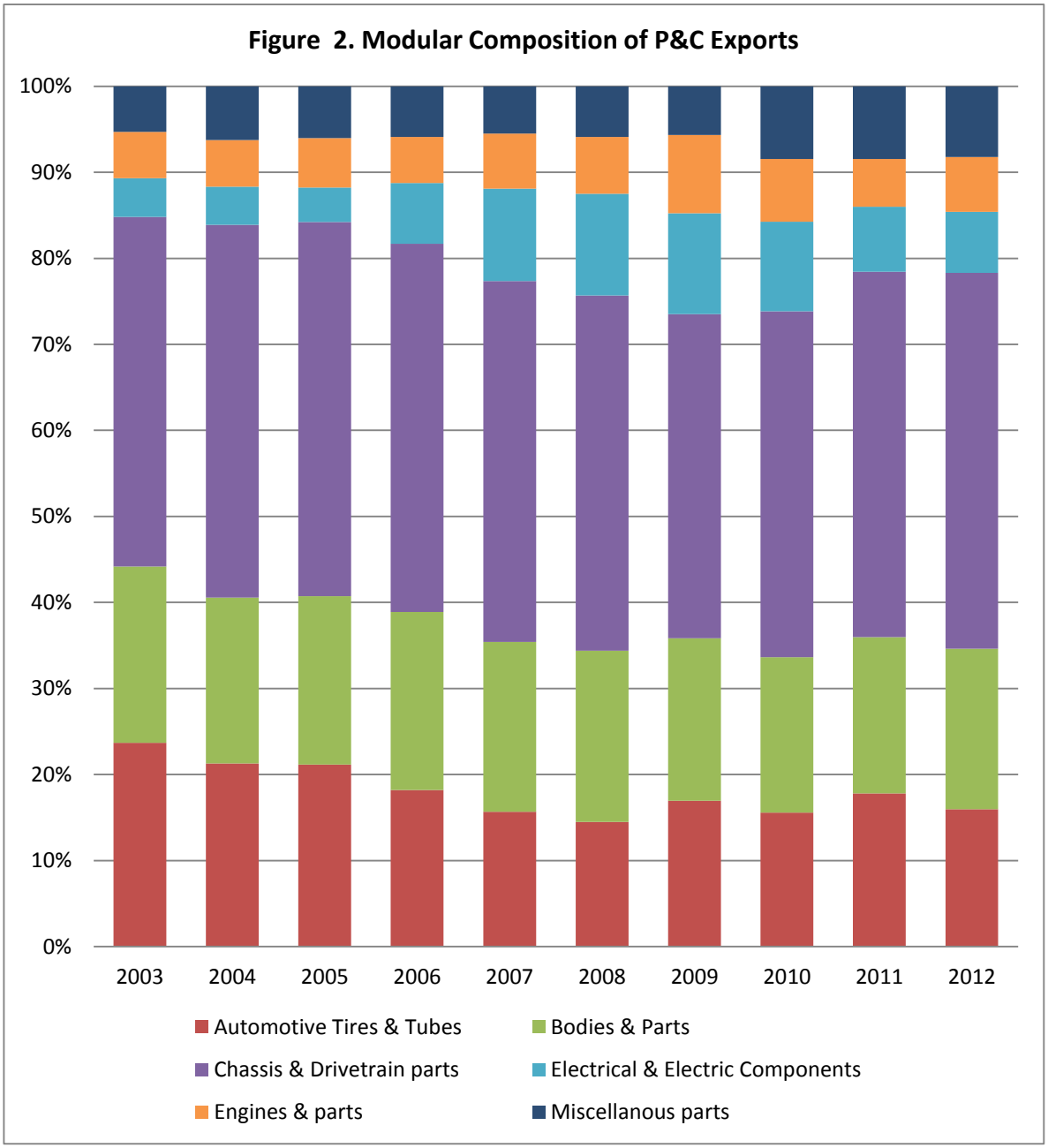
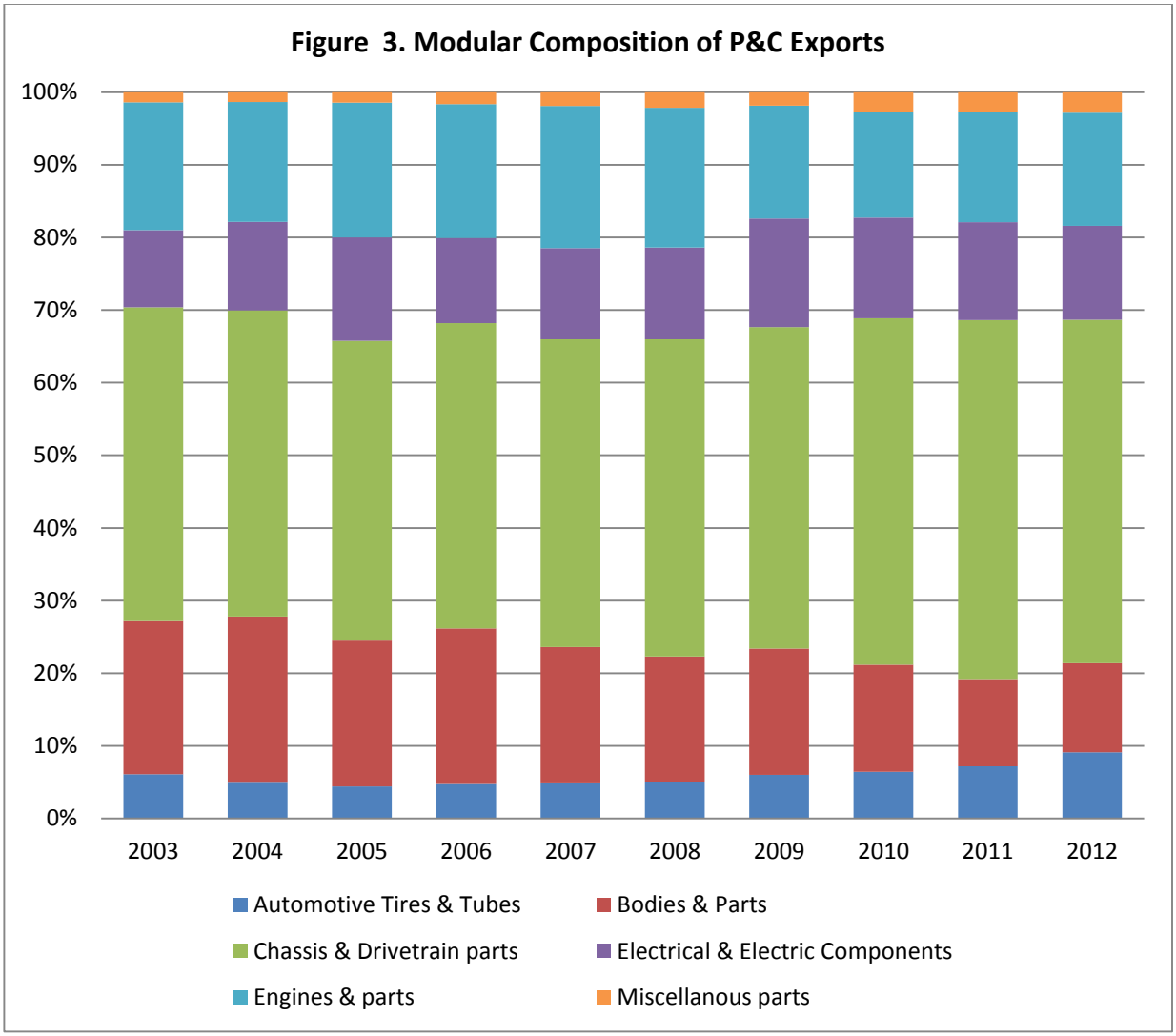


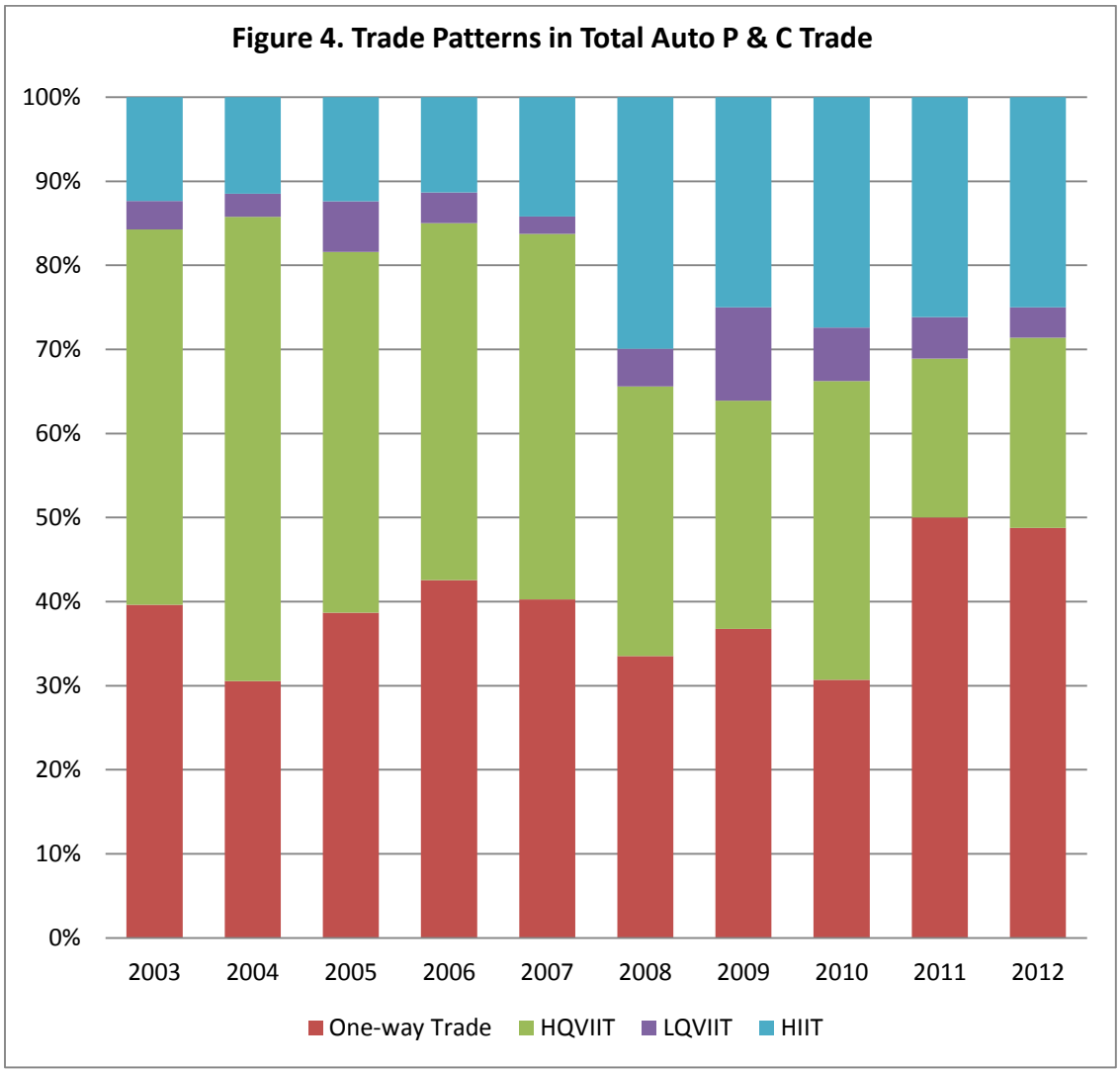
Figure 2. Modular Composition of P&C Exports





Figures 2 and 3 show that the largest part of exports and imports take place in chassis and drivetrain parts. These are high value added parts of the sector.

5. Trade patterns in automotive P&C flows



The figures below show a plot of RCA against the relative export and import prices which is the indicator for low or high quality goods in trade in 2012. These figures show the number of products in each group of P&C. In chassis and drivetrain parts, the number of components is the largest. Whereas in electrical parts the number of commodities is very small which shows this to be an area Turkey did not specialize in. The figures also show that Turkish export prices are lower than import prices as RCA increases. The figures also show that HQIIT is very rare.

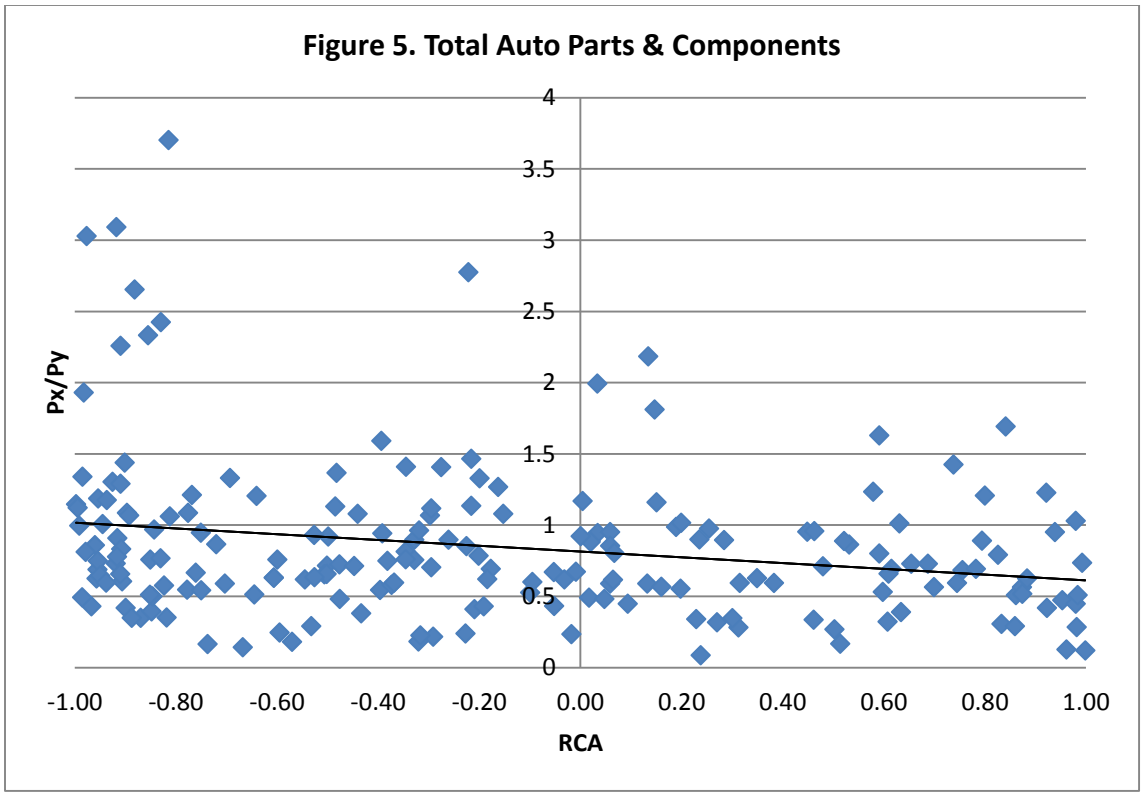


Figure 5. Total Auto Parts & Components
Px/Py
4
3.5
3
2.5
2
1.5
1
0.5
0
-1.00
-0.80
-0.60
-0.40
-0.20
0.00
0.20
0.40
0.60
0.80
1.00
RCA

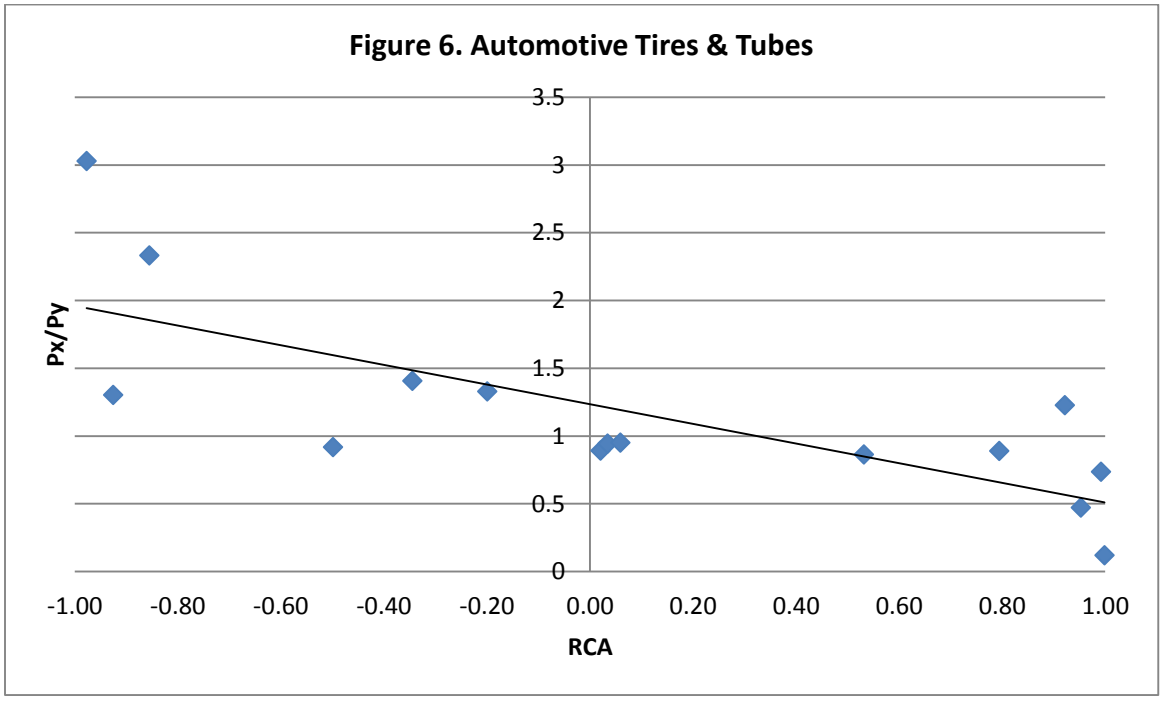


Figure 6. Automotive Tires & Tubes
Px/Py
3.5
3
2.5
2
1.5
1
0.5
0
-1.00
-0.80
-0.60
-0.40
-0.20
0.00
0.20
0.40
0.60
0.80
1.00
RCA

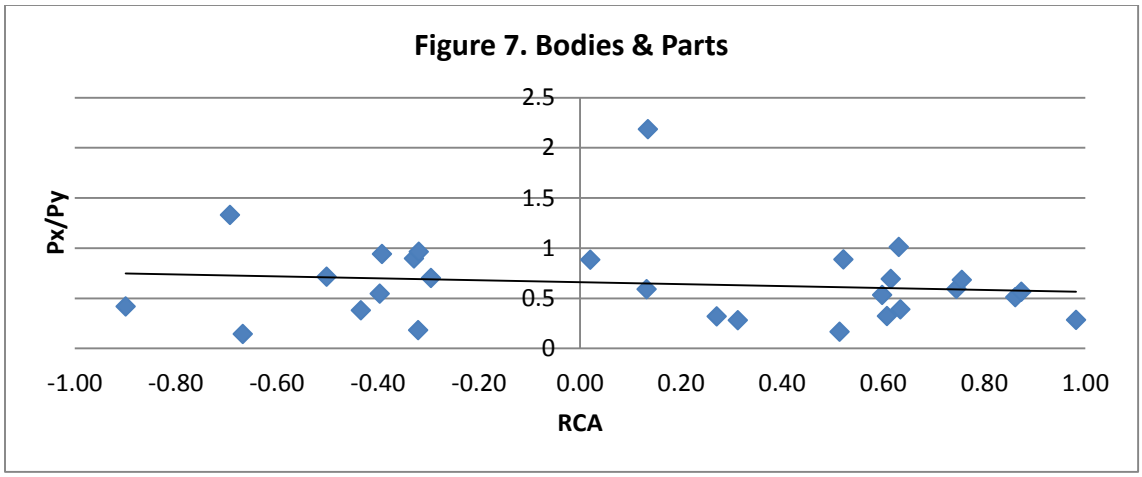


Figure 7. Bodies & Parts
Px/Py
2.5
2
1.5
1
0.5
0
-1.00
-0.80
-0.60
-0.40
-0.20
0.00
0.20
0.40
0.60
0.80
1.00
RCA

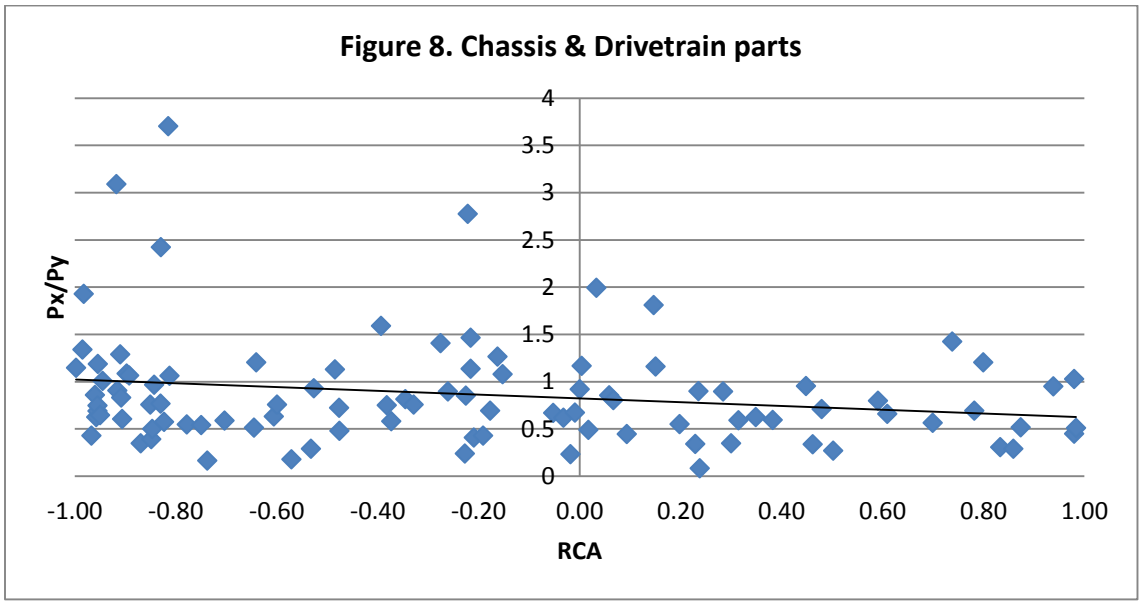


Figure 8. Chassis & Drivetrain parts
Px/Py
4
3.5
3
2.5
2
1.5
1
0.5
0
-1.00
-0.80
-0.60
-0.40
-0.20
0.00
0.20
0.40
0.60
0.80
1.00
RCA

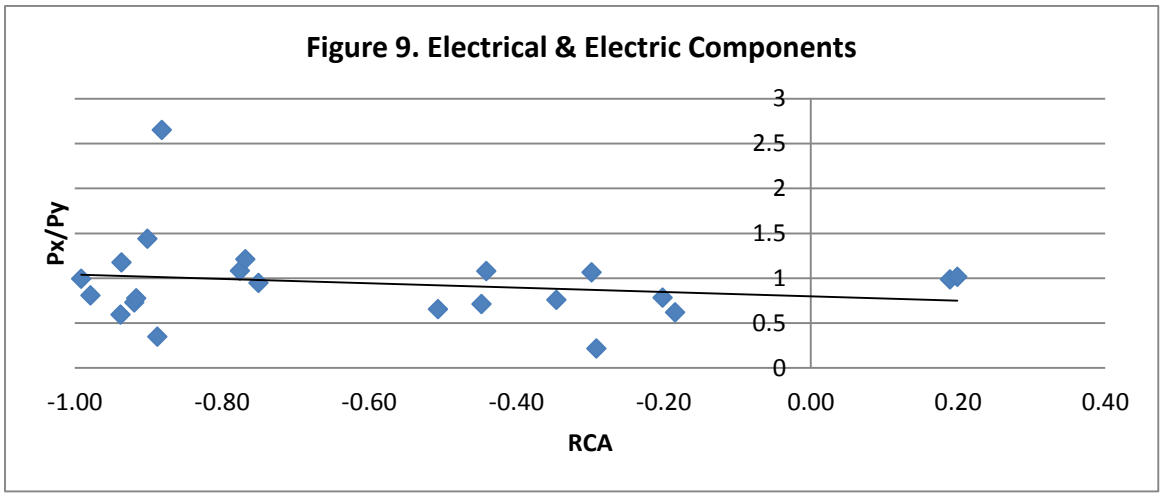
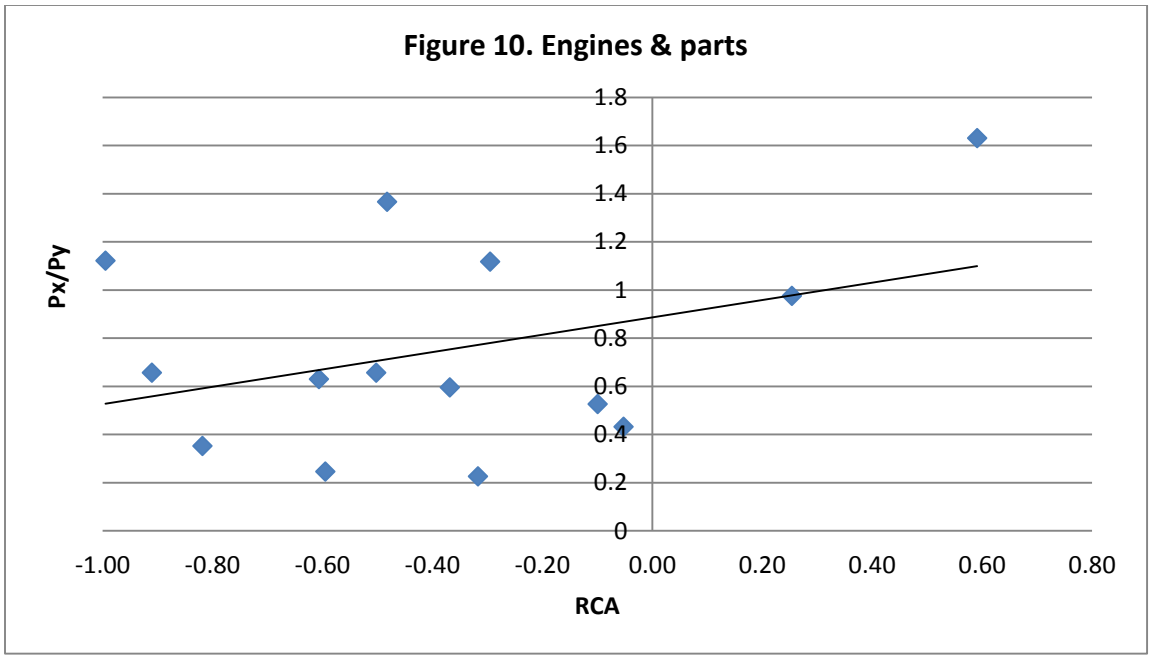
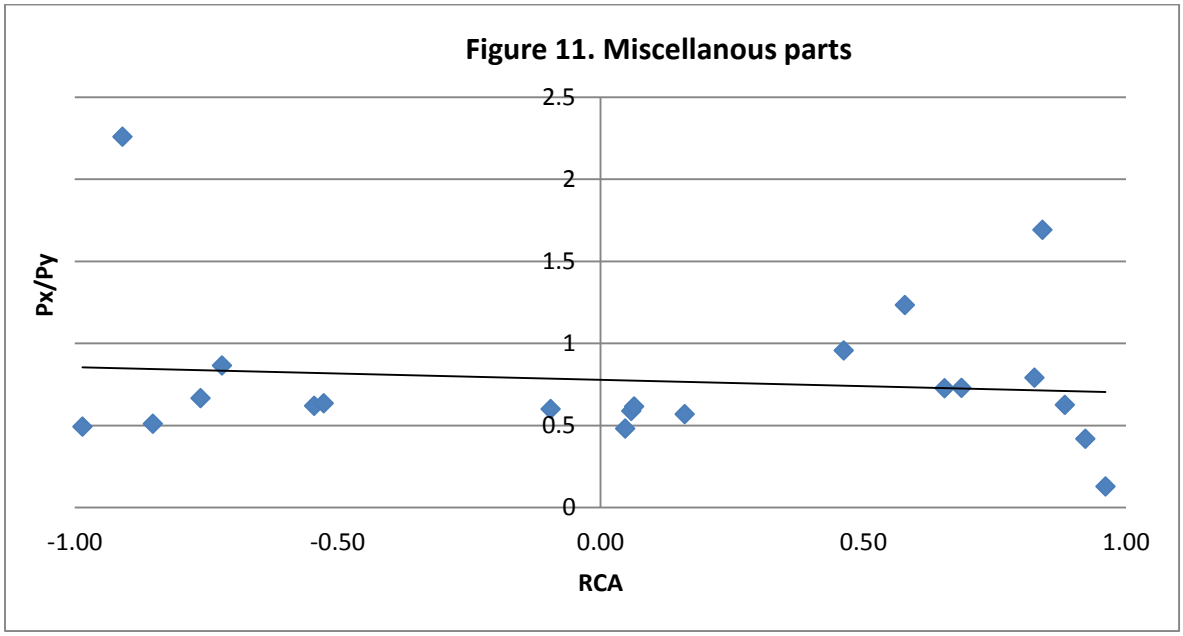


Figure 9. Electrical & Electric Components
Px/Py
3
2.5
2
1.5
1
0.5
0
-1.00
-0.80
-0.60
-0.40
-0.20
0.00
0.20
0.40
RCA





Conclusion

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Appendix 1: List of HS12 P&C

2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
400922100000-400922909000			400912009000	400912009000	400912009000	400912009000	400912009000	400912009000	400912009000
			400922009000	400922009000	400922009000	400922009000	400922009000	400922009000	400922009000
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