

Demand for Romanian automotive products in the global value chain

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Abstract

The study aims to assess the position of the Romanian automotive sector in intermediate and final production stages along global value chains. Data are collected from WIOD global input-output matrix (2011). The inter-sectorial linkages are split into domestic and foreign use in order to distinguish between national and external demand for intermediate products. In order to emphasise intra and inter-industry linkages of the Romanian automobile industry, the consumption of transport equipment products as intermediate products is then analysed at the sector level (foreign and domestic), highlighting the main countries and sectors using these products as inputs. Although it remains crucially dependent on the timing and accuracy of GVC databases, this analysis brings the competitiveness debate into new territories.

Keywords: global value chains, automotive industry, vertical specialization, Romania

1. Introduction

With a declining share in exports from 8.47% in 1989 to less than 2% in 2000¹, the automotive sector seemed a lost bet on the ambitious plan of the communist regime to nurture a competitive domestic industry, including not only cars, but also tractors and trucks. A botched investment by Daewoo Corp. in Automobile Craiova car factory in 1994, unprofitable operations at two other stars of the command economy era, SUV-maker Aro Campulung and personal car producer Dacia in Mioveni, were but a vivid reminder of the merciless market forces in open competition. Yet, two successive foreign direct investments, by Renault group in Dacia in 1999 and Ford Motor Co. in Automobile in 2008, changed dramatically the fate of the industry. Today, automotive products account for 11%

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¹ Calculations are based on Comtrade (Harmonized System 1992) and refer to "Vehicles".

of GDP and 24% of exports (Druta, 2014) and have become the driving force behind Romania's integration in the global networks of production and trade.

It would come naturally to any research agenda to investigate the potential Romania's automotive industry enjoys now to benefit for "moving up the value chain". This analytical framework has attracted increased interest of recent research (see Maurer and Degain, 2010; Baldwin and Lopez-Gonzalez, 2013; Baldwin and Venables, 2013; Timmer et al., 2014) and for good reason global businesses are riding an extremely auspicious wave of globalisation with intermediate goods and services incorporated at various stages in the production process representing around 60% of the world trade (World Investment Report, 2013). The automotive industry makes no exception; it is actually considered one of the most fragmented industries and so with the lengthiest value chains due to the fact that its parts and components can be easily manufactured separately and assembled in final products in factories spread worldwide according to the optimal conditions of cost efficiency and location advantages. The industry ranks first by ratio of foreign value added in exports with a share of 30% to 60% (WIR, pp. 127-129).

Without doubt, this sheer statistics suggests an ample scope for searches to find new determinants for upgrading competitive advantages across integrated stages of production. However, the objective of this paper is to remain at an intermediary analytical stage and take on a rather modest task: to give an account of the demand for Romanian automotive products within global value chains (GVC). The approach attempts to contribute to current analyses that look either at countries' position or industry position at the global level, but rarely enlarge the view with a sectoral outlook at the national level (for example, The European Commission 2009). Accordingly, the paper aims to estimate the contribution of the Romanian automotive sector to the final production in national and foreign sectors, that is, the extent to which exports of transport equipment from Romania are used by the rest of the world, by which countries and in which industry.

The article is organised as follows. Section 2 provides background on the importance of GVCs analysis in estimating the impact of vertical specialization on value added in international trade (domestic vs. foreign production and/or by country and industry). A description of data collection and other methodological aspects are presented in Section 3. Section 4 introduces the case study on the motor vehicle industry in Romania. Section 5 concludes.

2. Theoretical background: GVC analysis and the global position of the automotive industry

Whereas the standard assumption of trade theory is that the gains from trade result from the exchange of domestically produced goods and services with foreign ones based on comparative costs, it is a fact that countries have to compete increasingly by specializing in high value-added productive roles within value chains – a concept denoting the full range of processes from downstream to upstream

activities necessary to bring a product onto the market – rather than by specializing in unconnected lines of production. The role of GVC analysis successfully mirrors the latest trends in international competition: (1) increased geographical dispersion of production activities in a single industry; (2) the shift in countries' specialisation towards tasks and business functions rather than specific products; (3) the emergence of global networks of buyers and suppliers (OECD, 2012, p.7).

Evaluating a country's position in GVC has therefore become a necessary condition in analysing the competitive advantages of its industries. Two related aspects are important: the extent to which final consumption depends on imported inputs and the extent to which exports depend on imported intermediates; together, they reflect the conditions of product integration on the global scale, more or less advantageous as to the possibility to add value to and so extract gains from the marketplace. For example, a large share of *foreign value added content* in a country's exports indicates small role the country has in that particular product market, whereas a rather low foreign content points to a considerable degree of domestic product integration. In general, it is considered that "the higher the foreign value-added embodied in gross exports and the higher the value of inputs exported to third countries and used in their exports, the higher the participation of a given country in the value chain" (De Backer and Miroudot, 2012).

The importance of the new research direction may be highlighted both in terms of dedicated databases and methodologies – UNCTAD - EORA GVC Database, OECD - Inter-Country- Input-Output model (ICIO), OECD - Trade in Value Added (TiVA) database, Global Trade Analysis Project (GTAP), World Input-Output Database (WIOD); and specific indicators – vertical specialization share, GVC participation index, index of the length of GVCs, distance to final demand (OECD, 2012; Cattaneo et al., 2013; OECD, WTO, UNCTAD 2013; OECD, WTO, and the World Bank, 2014). All these techniques make use of input-output (I-O) tables to estimate the value added across inter-sectoral linkages both within and between national economies. The construction of I-O tables is based on national supply and uses (in case "construction" is the subject) tables combined with statistics on international trade and this has made possible to split the use of products in each country into domestic origin and foreign origin. This gives a clear picture of where industry imports originate, of a country's exports use by the rest of the world, by which industry or final end user (Timmer, 2012). It is thus possible to estimate, for example, the use of Bulgarian rubber and plastics products in producing Romanian cars bought by German consumers. A template of the flow of data is provided in Table 1 in Annex.

The automotive industry is exceptionally placed among those to take advantage of the opportunities of vertically integrated production. First, the sector is an important growth multiplier due to its strong inter-sectoral linkages with industries such as electronics, mechanical and electrical engineering, information technology, steel, chemicals, plastics, metals and rubber. Worldwide, transport

equipment industry ranks second (after the communications equipment industry) in terms of length of the value added chain reflecting the development of significant global supply networks (OECD, 2012). Currently, the component suppliers' contribution to the automotive value chain accounts for about three quarters of the content of a vehicle (The Centre for Automotive Research, 2014).

Second, the sector has a particularly important cross-border influence. At the European level, suppliers, manufacturers, and downstream services create a network of mutual interest involving all member states. Within the EU, there are 250 production lines spread between 16 Member States, but each member state is involved in the production supply chain and in the sales chain. Generally, there are about 50 components suppliers for a car spread all over Europe and about 75% of the added value of a new car is generated by these suppliers (The European Commission, 2009). The distribution of value added in the automotive industry between the EU states (in 2006 figures) places Germany as responsible for a substantial share of the total value added generated by the automotive industry in the EU (47%); France ranks second (14%), while the UK is the third largest contributor, with approximately 9% of the EU total.

In Romania, the sector is represented by two final producers (Renault and Ford) and a range of international first-tier suppliers (e.g. Continental, Michelin, Auto Chassis International – auto bridges; Valeo – wiring and air-conditioning; Johnson Controls – chairs; Cortubi – exhaust system; Euro APS – thermoformed plastic parts; Delphi, Yazaki, Leoni, Lear). Their outputs are not sold only on the domestic market, but also to international costumers, making Romania part of the GVC. At the same time, local companies (e.g. Topoloveni Auto Parts, Componente Auto Pitesti, Ronera Rubber Pitesti etc.) have managed to penetrate the GVC by developing their own products and selling them internationally. Moreover, the strong integration of the Romanian automobile industry is revealed by the fact that “there is literally no car producer in Europe that does not use parts produced in Romania, in other words the assembly lines in Europe are supported by deliveries from Romania” (Dobreanu, 2014, p. 86).

Against this background, this paper attempts to produce the first estimates about Romania's automotive industry position in GVC. We limit our discussion to a status check that says less than an investigation into the industry's competitive potential, but may nevertheless contribute to a current assessment of this sector, in particular of the demand for its products which has become increasingly important for both Romania's and the EU's economies.

3. Methodology

The data on global value chains are collected from the World Input-Output Database (WIOD²) that includes inter-industry and inter-national transactions for

² available at http://www.wiod.org/new_site/home.htm.

40 economies (EU27 + other 13 countries) + the rest of the world (see Table 2 in Annex for the complete list of countries) and offers data for 35 sectors per economy at 2-digit NACE. The transactions reflected in the database cover more than 85% of world GDP in 2008 figures.

The analysis is performed at sector level and investigates the flow of Romanian transport equipment products across industries and countries as reflected in the global input-output matrix. Our focus is on the *transport equipment* sector, an aggregation of *manufacture of motor vehicles, trailers and semi-trailers* - NACE 1.1 code 34, and *manufacture of other transport equipment* – NACE 1.1 code 35. The data is at the level of 2011 based on the latest version of the database (published in November 2013 and never updated since).

The flow of products is first split into shares of *domestic and foreign use* in order to distinguish between *national and external demand* for intermediate products of the industry. In order to emphasize intra and inter-industry linkages of the Romanian automotive industry, the consumption of transport equipment products as intermediate products is then analysed at the *sector level* (foreign and domestic), highlighting the main countries and sectors using these products as inputs.

4. Results and discussion

Integration of Romania's transport equipment sector into GVCs

The section highlights the main countries (excluding the Rest of World) and sectors (both foreign and national) using transport equipment as intermediate products and the income distribution across sectors among countries and sectors.

The total output of the Romanian transport equipment industry in 2011 was US \$3,253 million, of which 74% (US \$2,415 million) represented *foreign consumption* (US \$1,808 mil. in 28 countries included in the WIOD and US \$607 mil. in the Rest of the World) and 26% (US \$838,26 mil.) was meant for *national consumption*.

Most of the product flows was established with European countries, of which 17 EU members, followed by Asia and Pacific Area (7 of the 9 countries included), and with all four North and Latin American countries whose data was available (USA, Canada, Brazil, and Mexico). As regards *foreign consumption* (Table 1), German industries have used an overwhelming share of 38.6%, followed by France (10.18%) and the Netherlands (8.73%). The main ten economies that use transport equipment originating in Romania as intermediate products represent more than 87% of Romanian exports of transport equipments.

The findings parallel those in terms of *main destination markets* of the two aggregated products for the same year: *Parts & accessories of motor vehicles* were mainly exported to Germany (34.6%), Russian Federation (9.1%) and France

(7%), while *Cars -incl. station wagon* were mainly sold in France (31.1%), Germany (15.1%), and Italy (10.1%) (Negrea and Cojanu, 2013).

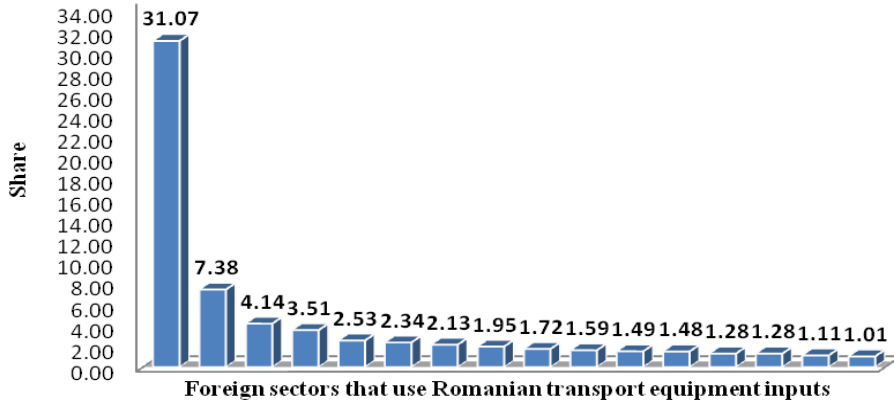
Table 1. Main countries with intermediate use of Romanian transport equipment products

No.	Country	Value (millions of US\$)	Share in total foreign consumption
1	Germany	698	38.60%
2	France	184	10.18%
3	The Netherlands	158	8.73%
4	Russia	131	7.26%
5	Spain	112	6.18%
6	Italy	88	4.88%
7	Turkey	76	4.23%
8	Poland	50	2.79%
9	USA	50	2.76%
10	Austria	41	2.25%
	Total	1.588	87.86%

Source: Authors' calculation based on WIOD data

Intra-industry trade (consumption by foreign transport equipment sectors of Romanian transport equipment products) varies greatly for 26 of the 40 economies, but the highest ratios occur in relation to Germany, France, Spain and Russia that represent together 46.1% of the Romanian transport equipment foreign consumption (see Table 2). Romania has no or insignificant intra-industry trade with 10 of the EU countries (Bulgaria, Cyprus, Denmark, Finland, Greece, Ireland, Luxembourg, Malta, Estonia and Lithuania) and with Australia and Indonesia. On the list of the most relevant sectors using Romanian transport equipment, *inter-industry trade* is represented by the *service sector* represented by the German 'Public Admin. and Defence; Compulsory Social Security' sector (2.53%) and by the Spanish 'Sale, Maintenance and Repair of Motor Vehicles and Motorcycles; Retail Sale of Fuel' sector (1.72%) and by the 'Air Transport' sector (2.34%).

Generally, the foreign sectors that are the main consumers of the industry belong to the main countries emphasised above as major purchasers of transport equipment products as inputs for final or intermediate use.

Table 2. Main sectors by country with intermediate use of Romanian transport equipment products

<i>Sector</i>	<i>Country</i>	<i>Value</i>	<i>Share</i>
Transport Equipment	DEU	562	31.07%
Transport Equipment	FRA	133	7.38%
Transport Equipment	ESP	75	4.14%
Transport Equipment	RUS	64	3.51%
Public Admin. and Defence; Compulsory Social Security	DEU	46	2.53%
Air Transport	DEU	42	2.34%
Transport Equipment	TUR	39	2.13%
Transport Equipment	NLD	35	1.95%
Sale, Maintenance and Repair of Motor Vehicles and Motorcycles; Retail Sale of Fuel	ESP	31	1.72%
Transport Equipment	ITA	29	1.59%
Transport Equipment	POL	27	1.49%
Transport Equipment	SUA	27	1.48%
Electrical and Optical Equipment	NLD	23	1.28%
Transport Equipment	AUT	23	1.28%
Transport Equipment	CZE	20	1.11%
Transport Equipment	KOR	18	1.01%
Total		1,195	66.02%

Source: Authors' calculation based on WIOD data

The global picture of *foreign sectors* using Romanian intermediate inputs shows that, except for 'Private Households with Employed Persons', all the other 34 sectors use Romanian inputs. The *intra-industry trade* accounts for almost 65% of the total foreign consumption, followed by the service sector with 16.82%, other transport sectors (inland, water and air transport) with 8.98 %, and inter-

industry trade with up stream sectors that are responsible for 6.48% of the total foreign consumption. Top 10 foreign sectors (presented in Table 3) that consume transport equipment inputs originating in Romania correspond to over 90% of the total foreign consumption, but consumption distribution among them is significantly unbalanced between the major and minor consumers (a variation from 64.6% to 0.95%).

Table 3. Main foreign sectors with intermediate use of Romanian transport equipment products

Sector	Value of consumption (millions of US\$)	Share in Romania's total foreign consumption of transport equipment
Transport equipment	1167.98	64.60%
Public Admin and Defence; Compulsory Social Security	112.24	6.21%
Sale, Maintenance and Repair of Motor Vehicles and Motorcycles; Retail Sale of Fuel	102.87	5.69%
Inland Transport	76.29	4.22%
Air transport	72.98	4.04%
Machinery, Nec	39.61	2.19%
Electrical and Optical Equipment	32.52	1.80%
Wholesale Trade and Commission Trade, Except of Motor Vehicles and Motorcycles	29.61	1.64%
Basic Metals and Fabricated Metal	22.56	1.25%
Chemicals and Chemical Products	17.26	0.95%
Total	1673.92	92.58%

Source: Authors' calculation based on WIOD data

The value of domestic consumption of transport equipment (Table 4) was US \$838.76 mil., accounting for 31.69% of Romania's total output of transport equipment (except trade with the RoW). The general consumption hierarchy of the Romanian sectors is more or less similar to the foreign one, but the share distribution is rather different. The intra-industry share (41.16%) is once again the highest one, which comes naturally as Dacia Renault achieves more than 80% of locally produced components mainly from trade with six strategic suppliers localized near the production site (global and domestic).

A difference can be seen in the higher ratio registered by 'other transport sectors' share in total domestic consumption (18.6%) and a greater share of the upstream sectors (8.26%). The list of top ten sectors is characterized by the predominance of 'other transport sectors' consumption (18.21%), followed by

services (10.56%) and Agriculture, Hunting, Forestry and Fishing (5.44%). There are no upstream sectors that use Romanian inputs in top 10 sectors.

Table 4. Main domestic sectors with intermediate use of Romanian transport equipment products

Sector	Value of consumption (millions of US\$)	Share in domestic consumption
Transport Equipment	345	41.16%
Inland Transport	117	13.94%
Agriculture, Hunting, Forestry and Fishing	46	5.44%
Air Transport	36	4.28%
Renting of M&Eq and Other Business Activities	26	3.07%
Other Community, Social and Personal Services	25	2.93%
Sale, Maintenance and Repair of Motor Vehicles and Motorcycles; Retail Sale of Fuel	21	2.45%
Construction	20	2.33%
Financial Intermediation	18	2.11%
Mining and Quarrying	17	2.01%
Total	669	79.71%

Source: Authors' calculation based on WIOD data

5. Conclusion

The GVC analysis opens a research direction full of potential for in-depth searches of a country's or an industry's competitive position. Although it remains crucially dependent on the timing and accuracy of its databases, this analysis brings the competitiveness debate into new territories. The analysis of the flow of products split by domestic and foreign use is of great use in shedding light on the real proportion of national and external intermediate consumption of products and on the source of incomes for the Romanian transport equipment sector.

The sector is highly integrated in the global value chain and supplies most major automotive producers with intermediate inputs for final or intermediate use. In terms of countries purchasing Romanian transport equipment products, Germany, France and Russia are top consumers and income generators. A concentration of the consumption (87%) can be observed in the first ten economies that use transport equipment originating in Romania as intermediate products, making the sector liable to external shocks.

At disaggregate level, the sector provides inputs for all sectors, but most of supplies flow unsurprisingly within intra-industry networks both domestically and within the global supply chain (with 26 of the 40 economies and over 60% of the foreign consumption).

Targeting the automotive industry is especially important for its new role in Romania's economy and exports, and increasingly so in the EU productive networks. Within the limits of this research, we opened a fresh albeit tiny part of the Romanian automotive industry's global value chain. To round off the discussion, further analyses should add findings on the industry's foreign content and thus on the actual level of value-added created in the domestic market.

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Annexes

Table 1. Schematic outline of the World Input-Output Table (WIOT)

		Country A	Country B	Row	Country A	Country B	RoW	Total
		<i>Intermediate</i>			<i>Final domestic</i>			
		Industry	Industry	Industry				
Country A	Industry	Use of domestic output	Use by B of exports from A	Use by RoW of exports from A	Use of domestic output	Use by B of exports from A	Use by RoW of exports from A	Output in A
Country B	Industry	Use by A of exports from B	Use of domestic output	Use by RoW of exports from B	Use by A of exports from B	Use of domestic output	Use by RoW of exports from B	Output in B
Rest of World (RoW)	Industry	Use by A of exports from RoW	Use by B of exports from RoW	Use of domestic output	Use by A of exports from RoW	Use by B of exports from RoW	Use of domestic output	Output in RoW
		<i>Value added</i>	<i>Value added</i>	<i>Value added</i>				
		<i>Output in A</i>	<i>Output in B</i>	<i>Output in RoW</i>				

Source: based on WIOD, 2011

Table 2. List of countries in the WIOD-database

<i>European Union</i>	Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Romania, Slovak Republic, Finland, Slovenia, Spain, Sweden, United Kingdom
<i>North America and Latin America</i>	Canada, United States, Brazil, Mexico
<i>Asia and Pacific</i>	Australia, China, India, Indonesia, Japan, Russia, South Korea, Taiwan, Turkey

Source: WIOD, 2011