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**DIFFERENT INTERPRETATIONS OF THE AUTOMOTIVE
INDUSTRY AND ITS ROLE IN THREE
SEMI-PERIPHERAL REGIONS OF THE EU**

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Different interpretations of the automotive industry and its role in three semi-peripheral regions of the EU

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Abstract

The paper investigates the role of the automotive industry in the Baltic, Visegrád and Iberian region, summarizing the relevant literature. In the analysis of each country, the study discusses the importance of the automotive industry in the national economy and the role of individual countries in the global trade.

Based on the literature there are different approaches regarding the activities belonging to the automotive industry. The vehicle production is vertically integrated, therefore the industry involves many other activities that sell their products to other industries as well. On the other hand economic contribution of the automotive industry can be interpreted in a broad way including downstream activities related to the use of the motor vehicle, and the socioeconomic employment as well. The broader definition of automotive industry in this paper is based on this previous approach. The study defines the automotive spillovers on the basis of the NACE nomenclature to show how these activities contribute to employment, production and value added in the examined countries.

JEL: F1, F62, L62

Keywords: automotive industry, spillovers, external trade, Baltic countries, Central Europe, Iberian countries

Introduction²

Concerning the economic contribution of the automotive industry, generally there are two kinds of approaches. On the one hand, the activity based interpretations use economic activity classification (among others the statistical classification of economic activities in the European Community (NACE), Standard industrial classification (SIC), Harmonized System (HS)). On the other hand, there are product based approaches using

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the Standard International Trade Classification (SITC) or Combined Nomenclature (CN). There are differences not only in the interpretation of the automotive industry but the goals of the examinations are different as well. The activity based analyses focus mainly on the employment, production, value added or research and development activities of the sector as long as the product based classifications on the foreign trade. To give a holistic picture the paper first takes into account the activity based analyses than the product based approaches.

Literature background and methodology

Based on the literature there are different approaches regarding industrial activities of the automotive industry. Based on the vertical integration of the vehicle production, the industry involves many other activities that sell their products to other industries as well. The question arises that besides the common used division of *manufacture of motor vehicles, trailers and semi-trailers* which other activities belong to the automotive-related industries. Different analyses take into consideration various economic activities illustrating the significance of the automotive industry. The most common used nomenclatures are the NACE Rev 1.1 Division 34³ or later the NACE Rev. 2 Division 29 (see among others Heneric and his co-authors 2005), or in the SIC 371⁴ where the activities include manufacturing of passenger and truck bodies as well as parts and accessories related on the vehicle production. Pavlínek (2017) defined the automotive industry in the case of employment and foreign direct investment broadly using not only NACE Rev. 2 29 but NACE Rev. 2 30. The European Trade Union (IndustriAll 2014) in its analysis similarly combines the two activities. The authors broaden the scope of the investigated activities, namely the manufacture of other transport equipment contains ships and boats, railway locomotives and rolling stocks, air and spacecraft and related machineries and furthermore military fighting vehicles.

³ The NACE Rev 1.1 division 34 is included three groups: 34.1 - Manufacture of motor vehicles; 34.2 - Manufacture of bodies (coachwork) for motor vehicles; manufacture of trailers and semi-trailers; 34.3 - Manufacture of parts and accessories for motor vehicles and their engines.

⁴ The SIC 371 i.e. Motor Vehicles and Motor Vehicle Equipment comprised five subsections: SIC 3711 - Motor vehicles and passenger car bodies; SIC 3713 - Truck and bus bodies; SIC 3714 - Motor vehicle parts and accessories; SIC 3715 - Truck trailers; SIC 3716 - Motor homes.

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In term of automotive industry Lengyel (2014) takes into consideration eight NACE Rev. 1.1 classes, namely: the 25.11 (Manufacture of rubber tyres and tubes), 25.12 (Retreading and rebuilding of rubber tyres), 31.61 (Manufacture of electrical equipment for engines and vehicles n.e.c.), 34.10 (Manufacture of motor vehicles), 34.20 (Manufacture of bodies (coachwork) for motor vehicles; manufacture of trailers and semi-trailers), 34.30 (Manufacture of parts and accessories for motor vehicles and their engines), 35.41 (Manufacture of motorcycles), and the 35.50 (Manufacture of other transport equipment n.e.c.).

Eurostat gives a broader definition of the automotive industry adding the related activities. In addition to the NACE Rev. 2 division 29, (manufacture of motor vehicles, trailers and semi-trailers) Eurostat (2008) listed 12 other activities (see Table 1) connected to the automotive production. These rank from the manufacturing industry to the service sector. The four digit NACE classes included also other activities not related to automotive production, therefore there are activities with considerable relevance and there are some with hardly any relevance. Table 1 shows the five activities that have relevance to the automotive industry. In the case of partly and no relevance the contribution of these industries cannot be measured. It shows the problem of statistical counting that for instance NACE 27.40 including residential and non-residential lighting (commercial, industrial and street lighting), represents about 80 percent of all electric lighting product sales (McKinsey & Company 2012). Demand for electric lighting for motor vehicles and manufactured goods represents only a smaller market segment (about 20 percent). The other automotive related industry is the manufacture of batteries and accumulators (NACE Rev. 2 27.20).

At this point we have to go into details about manufacturing of batteries and accumulators. In the last decade, between 2000 and 2010 the manufacturing of Li-ion batteries has grown more than 10 times (Pillot 2012) giving the 73 percent of the built-in output. The main driver is the growing production of cellular phones, PCs and road vehicles that are the most important users. The automotive sector is the biggest consumer of the industrial and automobile batteries⁵, giving 10 percent of the total sales

⁵ According to the directive of European Commission (2006/66/EC) accumulators can be distinguished into portable, industrial and automotive batteries.

in 2012. Due to the technological change, replacement of internal combustion engines, rising demand for automotive batteries in OEM (Original Equipment Manufacturer) and aftermarket segments, the role of battery production will be increasing. At the same time due to the increasing efficiency of cordless household and professional appliances (including telecommunication tools) manufacturing of portable batteries also show significant growth.

Table 1, A broader interpretation of the automotive related industries by Eurostat

NACE class	activity	automotive related activity	relevance
22.11	Manufacture of rubber tyres and tubes; retreading and rebuilding of rubber tyres	Manufacture of tyres	there are some household consumption products but – considerable relevance: close to 100%
22.19	Manufacture of other rubber products	Manufacture of rubber hoses and belts and other rubber products	most of the products are for household consumption (apparel industry) – weak relevance
27.11	Manufacture of electric motors, generators and transformers	Manufacture of electric motors (except starting motors)	mostly for industrial solutions, there is relevance only in the case of the hybrid and full electric vehicles weak relevance
27.20	Manufacture of batteries and accumulators	Manufacture of batteries for vehicles	lead-acid, advanced lead, NiMH and Li-Ion batteries – partly relevance, 10% of the total sales in 2012
27.40	Manufacture of electric lighting equipment	Manufacture of lighting equipment for motor vehicles	residential and nonresidential lighting represents over 70% of all sales – partly (some 30%) relevance
28.11	Manufacture of engines and turbines, except aircraft, vehicle and cycle engines	Manufacture of pistons, piston rings and carburettors	partly relevance (not quantifiable)
28.13	Manufacture of other pumps and compressors	Manufacture of pumps for motor vehicles and engines	partly relevance (not quantifiable)
28.30	Manufacture of agricultural and forestry machinery	Manufacture of trailers and semitrailers specially designed for use in agriculture	considerable relevance
28.92	Manufacture of machinery for mining, quarrying and construction	Manufacture of off road dumping trucks	considerable relevance
30.40	Manufacture of military fighting vehicles	Manufacture of tanks and other military fighting vehicles	considerable (100%) relevance
30.99	Manufacture of other transport equipment n.e.c.	Manufacture of vehicles drawn by animals: sulkies, donkey-carts, hearses etc.	weak relevance
45.20	Maintenance and repair of motor vehicles	Maintenance and repair of motor vehicles	considerable (100%) relevance

Source: author, based on Eurostat 2008

According to other interpretations, these classifications do not cover the whole circle of the automotive-related industries. McAlinden and Smith (1993) investigated the U.S. automotive parts industry and emphasized that the size and complexity of auto parts

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manufacturing lead to difficulties in defining the range of the automotive companies (i.e. automotive-related industries). Therefore, their research tried to focus on industries that specialize in manufacture of products for automotive use as well as other automotive parts and components. Using SIC nomenclature, they specified nine supplier industries related to automotive industry (see Table 2).

Table 2, Major Supplier Industries

SIC Code / Title	Product Description
SIC 2396 / Automotive and apparel trimmings	Textile trim for automotive use, men's and boy's apparel and printed garments
SIC 3011 / Tires and inner tubes	Pneumatic tires and inner tubes for all uses.
SIC 3465 / Automotive stampings	Job stampings for automotive use
SIC 3519 / Internal combustion engines, nec	Non-automotive gasoline engines, automotive diesel engines, engine parts
SIC 3592 / Carburetors, pistons, rings and valves	Carburetors new and used, piston rings and pins, and valves
SIC 3691 / Storage batteries	Lead and nonlead acid storage batteries
SIC 3694 / Vehicular lighting equipment	Headlamps and taillamps
SIC 3694 / Engine electrical equipment	Ignition harness and cable sets, alternators, generators, regulators, starters, spark plugs, and other engine electronic equipment.
SIC 3714 / Motor vehicle parts and accessories	Gasoline engines and engine parts for motor vehicles, engine filters, exhaust systems, drivetrain components, wheels, brake parts and assemblies, other new and rebuilt parts for motor vehicles not included in shipments of other industries.

Source: McAlinden – Smith 1993, p. 5.

During the investigation of the U.S. automotive sector, McAlinden and Smith (1993) and Chung and his co-authors (2003) called the attention to some accounting issues. First, among the above mentioned nine supplier industries (see Table 2), there are branches that make nonautomotive products as well. For instance in the case of the companies producing internal combustion engines (SIC 3519: non-automotive gasoline engines, automotive diesel engines, engine parts), only one third of their output is destined for automotive use. The observation of Chung and his co-authors (2003) also included companies whose primary activity was not the vehicle components production, but automotive parts or stampings (SIC 3714 or SIC 3465) gave more than 10 percent of their sales. Second, in the turnover of the automotive-related companies the aftermarket sales have also an important role. Manufacturers of tires and inner tubes (SIC 3011) sale

most of their products “aftermarket”. Therefore the retail trade sale of the automotive parts gives a significant part of their production. Or if we take into consideration the SLI⁶ battery market, 68 percent of their turnover stemmed from aftermarket sales in 2015 (Girardi 2016).

The above mentioned authors emphasised that the production of parts and accessories is not only for new motor vehicles, but for the aftermarket (repairs and parts supply) as well. Therefore, if we want to specify the contribution of the automotive-related industries within the automotive industry, first we should take into consideration the structure of the automotive supply chain. Their role at the production and after sales period must be distinguished, as the whole life circle of the vehicle production the value system of the automotive industry can be separated to upstream and downstream activities (Lung 2004). Upstream activities of the automotive value system are organized hierarchically where automotive-related companies have linkages with the OEMs. At the downstream level automotive-related activities are involved in distribution, after sales services and recycling where the linkages are established among the automotive-related industries, traders and consumers (end users).

In the subsequent analyses of McAliden and his co-authors (Fulton et al. 2001 and McAliden et al. 2003) this wider interpretation is applied in order to give a comprehensive picture about the contribution of the automotive industry to the U.S. economy. To estimate the employment and income contributions of the U.S. automotive sector, they take into account the spin-off effect of the sector. The spin-off effect includes the expenditure-induced effect in addition to the indirect effect. Therefore the scope of related activities became quite wide, from the construction, trucking, credit and finance, wholesale trade, retail trade until the other services as well (see Table 3). Just to illustrate the difference between SIC 371 – that employed 1.01 million people in 2000 – and the data supplemented by the industry’s spin-off effect, 1 direct job in the automotive assembly generates additionally 6.6 spin-off jobs i.e. 2.9 further jobs at the

⁶ SLI means starting, lighting and ignition. These batteries are responsible for powering the starter motor, the lights, and the ignition system of a vehicle’s engine. These lead-acid type batteries gives most of sales.

supplier industries and further 3.7 expenditure-induced employment⁷ in general. In this context, McAliden and his co-authors (2003) applied the holistic approach of the automotive production, and handled the upstream and downstream sides of the industry. They separated the upstream side to commodities (e.g. metal, plastics and rubber) and functions (e.g. heating and cooling, trucking and warehousing). For instance “in 1998, 4 percent of all U.S. workers employed in the Trucking and Warehousing industries were engaged in producing automotive products, amounting to 70,700 jobs” (McAliden et al. 2003, p. 25.).

Table 3, Private nonmanufacturing sectors related to automotive industry

Industry division	SIC Code
Construction	15-17
Trucking	42
Credit and finance	61, 62, 67
Wholesale trade	50-51
Retail trade	52-59
Services	70-89
<i>Business services</i>	73
<i>Professional services</i>	81, 87, 89
<i>Nonprofit services</i>	83, 84, 86

Source: Fulton et al. 2001, p. 38.

On the other hand, the downstream industries contribute to maintenance and the use of the vehicle. This means that the downstream activities are beyond the common used aftermarket approaching (see Table 3), not only related to maintaining, but using the motor vehicles. Heneric and his co-authors take into consideration the following as downstream activities (2005, p. 160): motor vehicle retail enterprises (NACE 50.1), motor vehicle maintenance and repair enterprises (NACE 50.2), the sale of motor vehicle parts and accessories enterprises (NACE 50.3), the sale of motor bikes, motor bike maintenance and accessories enterprises (NACE 50.4) and the retail sale of automotive fuel (NACE 50.5).

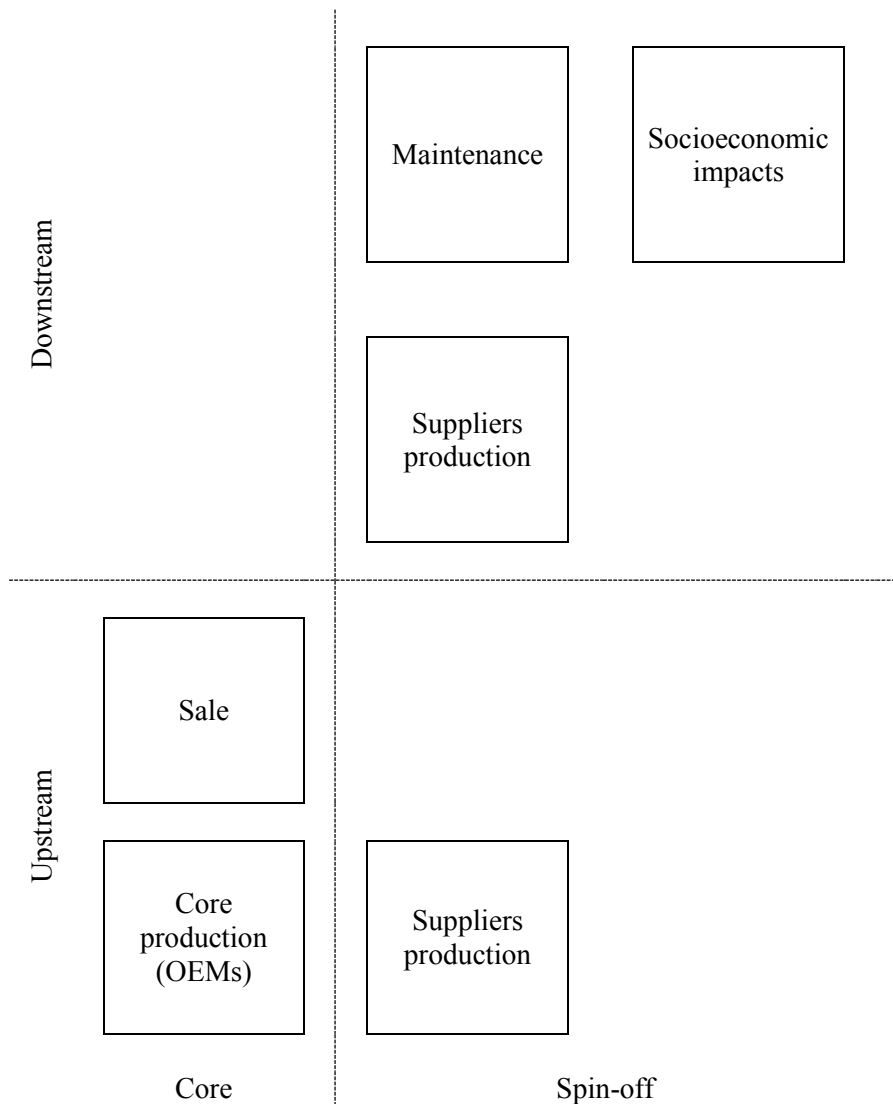
To take into account the total spin-off effects of the industry McAliden and his co-authors (2003), expanded the impacts of the industry. They separated downstream

⁷ The expenditure-induced employment or job is those that is a result of direct or indirect employee's spending money in the community.

economic contributions provided by support activities to maintain the motor vehicles, and the socioeconomic contributions resulting from the employment opportunities that make integral use of a road vehicle. The downstream industries employed 3.2 million people in 2000, among others used vehicle dealers, automotive repairs, carwashes, gasoline traders, oil and gas field manufacturers, highway and street construction workers or automotive recyclers. The other side of the downstream industries, the so called socioeconomic impact is related to the public's sense of personal freedom i.e. the mobility in space. The socioeconomic impacts affected 3.9 million employees working as a taxicab- truck- and bus drivers. According to McAliden and his co-authors (2003) along with the socioeconomic impacts, vehicle related employment represented almost 9.8 percent of U.S. employment in 2001.

Based on the idea of McAliden and his co-authors (2003) the automotive industry can be separated on the upstream and downstream side the following automotive-related activities (see Figure 1). Concerning the employment figures the downstream side exceeds the upstream side. In addition, taking into consideration the value added along the supply chain (Mudambi 2008), the "smile curve" both has a high added value on the upstream and downstream site.

Figure 1, The spin-off contributors of the automotive production



Source: author based on McAliden et al. 2003

Main characteristics of the automotive industry in the Iberian-, Central European- and Baltic countries

Concerning the examined countries only Spain, Czech Republic and Poland had remarkable automotive tradition before the intensive appearance of foreign capital in the 70s and 90s. Both in Spain and Poland the biggest automotive companies concluded a partnership with the Italian FIAT in the 50-60s. The Slovak automotive industry was only a supplier to the Czech companies (for Škoda, LIAZ and Tatra) and from the 1970s there was a small-scale production at the Bratislava Automobile Factory and the Trnava

Automobile Factory (Jakubiak et al. 2008). Hungary was specialized on the large-scale production of buses and partly truck production before 1990.

There were two waves of massive automotive production in Europe. One was in the late 70s and one was during the 80s, after the consolidation of the political situation in Southern Europe. Portugal and Spain attracted a number of new vehicle assembly plants (Klier – McMillen 2013). The noticeably lower wage levels in European comparison, attracted automotive assembly capacities in the Iberian countries. The second wave was the outsourcing in the early 90s when the automotive production expanded eastward. A potential market (market-seeking motives) of some 100 million consumers attracted Western automotive companies to invest in the newly democratized countries. Almost every main carmaker and their suppliers, which account for 80% of world production, are present in the Central European region. It will come as no surprise that given the developments in the 2000s, the region has been labelled the “new Detroit” (Unicredit 2007). The novelty in these new assembly capacities is that among the pioneers there were not only European companies but Japanese (Suzuki Motor Corp.) and Korean (Daewoo Motor Corp.) ones as well. This diversity will make the region’s global production more complex in the future. Despite the market presence of the automotive multinationals these Central European subsidiaries have only a “supply role” (Sturgeon and Florida 2000, Humphrey and Memedovic 2003, Nunnenkamp 2005, Barta 2012), into the worldwide corporate networks (i.e. global value chains). Based on the gross value added per employee, it is clear that the region has generally more labour-intensive activities (Barta 2012, 57; Vass 2005, 5; Tirpak – Kariozen 2006). The region has its biggest advantage in production costs. Comparing labour cost levels between Western Europe and the Central and Eastern European countries we can see that the difference is fivefold, benefitting the CEE countries (PWC 2013). Geographical proximity to the main markets is also a crucial factor investing into the new EU member states (Schmitt and Van Biesebroeck 2013).

The position of the Central European countries within the global production networks was examined by several authors (see among others Sturgeon and Florida 2000; Pavlínek 2002, 2016; Humphrey and Memedovic 2003; Molnár 2009, Barta 2012). Regarding the global position of the Southern European and the Central and Eastern

European economies, according to Lung (2007) and Pavlínek (2015) the automotive value chain in Europe is characterised by two hierarchical structures. On the one hand the *assembly-based hierarchy* resulted a centrum-periphery geographical pattern where France and Germany are the core area and the rest of the European countries belong to the peripheral states. The high-end model being assembled in the core countries while mainly the smaller vehicles⁸ in the periphery like Spain and Portugal and the Central and Eastern European countries. The position of Spanish automotive industry within the global production networks was confirmed by Aláez-Aller and his co-authors (2015), the country's role in the European value chain has been limited to the assembly of vehicles with medium/low added value. Central European subsidiaries of the multinational companies have strong linkages to production sites and markets in Western Europe, addition the "supply role" of the Central European region was mentioned earlier.

On the other hand the *function-based hierarchy* means that strategic functions like R&D centres are concentrated in the home countries of the automotive companies and the supplier as well (see detailed in Sturgeon et al. 2008; Pavlínek 2012). The assembly functions were more widely scattered following the above mentioned assembly-based hierarchy.

If we look at the figures concerning the vehicle assembly, there are quite large differences among the observed economies.⁹ The half of the countries is big producer the other half in absolute terms has lower figures (see Table 4).

⁸ In some cases not only small or economy vehicles are assembled in the region. Large SUV vehicles, i.e. Volkswagen Tuareg and Audi Q7 went into production in Volkswagen's Bratislava plant in mid of 2000's.

⁹ According to International Organization of Motor Vehicle Manufacturers, European Automobile Manufacturers' Association and the United Nations' List of Industrial Products, road vehicle assembly does not exist in Estonia, Latvia and Lithuania.

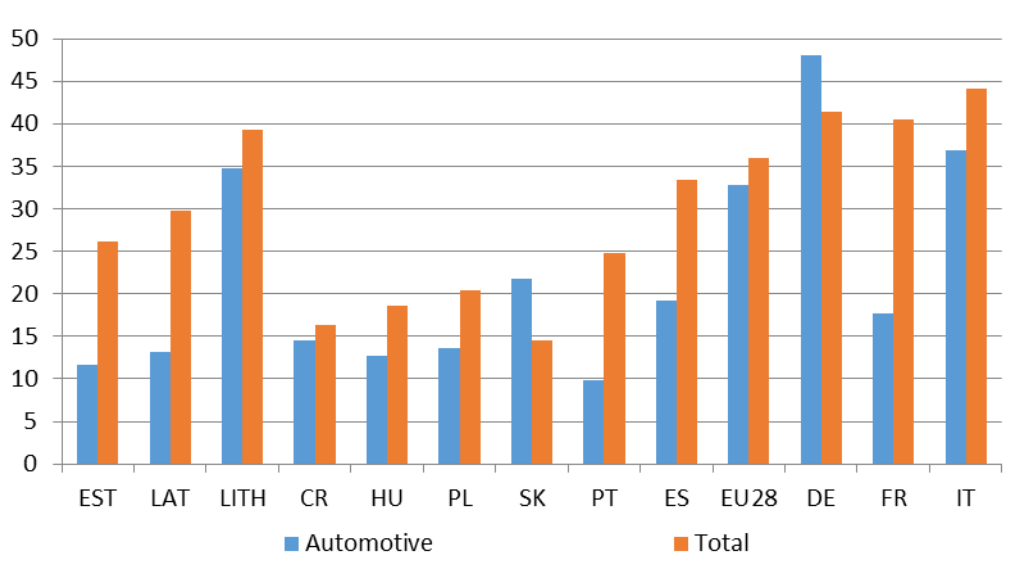
**Table 4, Automotive production
(1000 vehicles)**

	Czech R.	Hungary	Poland	Slovakia	Portugal	Spain	EU28	Total
2005	602	152	613	218	221	2 753	18 802	66 720
2006	855	191	715	295	227	2 777	18 992	69 223
2007	939	292	793	571	176	2 890	19 956	73 266
2008	947	346	953	576	175	2 542	18 604	70 730
2009	983	215	879	461	126	2 170	15 388	61 762
2010	1 076	211	869	562	159	2 388	17 173	77 584
2011	1 200	214	838	640	192	2 373	17 623	79 881
2012	1 179	218	655	927	164	1 979	16 364	84 236
2013	1 133	321	590	975	154	2 163	16 424	87 596
2014	1 251	438	594	971	162	2 403	17 253	89 776
2015	1 304	495	661	1 000	157	2 733	18 406	90 781
2016	1 350	472	682	1 040	143	2 886	18 943	94 977

Source: OICA production statistics

Spain is the largest, Portugal is the smallest producer, but if we take into consideration the size of the economies, Slovakia and the Czech Republic are the biggest players.¹⁰

Figure 2, Share of the extra EU export
As a percent of total automotive export and the total export in 2016



Source: authors' calculations based on Eurostat 2017

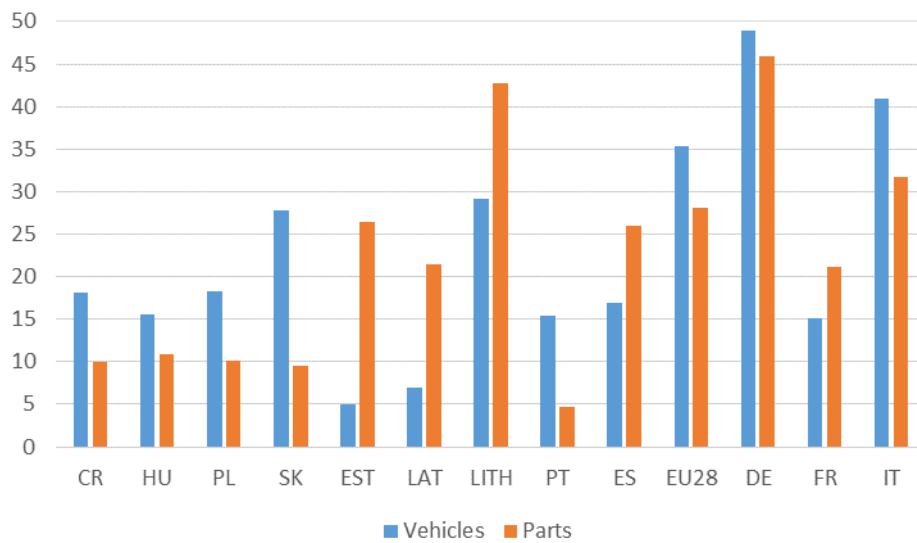
¹⁰ Automotive production per capita is the biggest in Slovakia and the Czech Republic.

Regarding the global embeddedness of the automotive industry in the Iberian, Central European and the Baltic countries, we primarily examine the volume of extra-EU trade, to see how far these economies go beyond the framework of internal EU trade. In addition, as a consequence of the fragmentation and offshoring of production to the European semi-peripheral countries re-export of the “traditional” automotive producing countries in Europe increased (Dudenhöffer 2005; Sinn 2006). Therefore we have to take into account that some part of the intra-EU export of the examined countries is sold again on the global market.

Based on the figures the automotive industry is integrated into the global trade (extra-EU) at a lower level than the national economy (see Figure 2). Comparing the total exports to automotive exports to non-EU direction we get a surprising result, namely the automotive sector (except for Slovakia) is more intra-EU oriented in all examined semi-periphery countries. The main automotive producer countries, (except for France) are more active on the extra-EU export markets. The differing values of the Baltic countries are caused by the trade with Belarus and Russia. As we distinguished the automotive output in the previous part of the study as vehicle assembly and component production (Manufacture of parts and accessories), we can separate export of vehicles and parts as well. In the European Union (EU28) two-thirds of the automotive export made up of vehicles. Is almost the same in Slovakia and Spain, but in the rest of the countries (except the Baltic countries where used car trade distorts the data) trade of components and parts have bigger share. In Hungary 59% and in Poland 57% and in Portugal the 52% of the automotive export came from components in 2016.

Looking at the direct global linkages (extra-EU) of the automotive trade by main commodities, in almost all countries (except for the Baltic countries) the extra-EU export of vehicles is directed more towards external markets than to the EU itself (see Figure 3). 28% of the Slovak car export oriented towards extra-EU countries. The picture in Spain is the opposite, because export of parts and components are more extra-EU oriented as the export of vehicles.

Figure 3, Extra EU export by main commodity groups in 2016



Source: authors' calculations based on Eurostat 2017

Impacts of the global crisis and the future prospects of the automotive industry

The automotive industry was one of the activities most affected by the crisis (OECD 2009). The global road vehicle production declined by 3.5% in 2008 and by 12.7% in 2009 (OICA 2017). Right after the crisis years, the world production grown by 25.5% in 2010, but due to global market turmoil the growth slowed down later and was only 1.1 percent in 2015 (OICA 2017). The consequences of the crisis hit the industry's extensive vertical network (through strong linkages with other automotive-related industries). In addition the crisis has highlighted the structural problems of the industry (overcapacity, globally uncompetitive production, modest sales development in the matured markets). The solution was postponed through indirect (car scrapping schemes) and direct (firm restructuring measures) government interventions. The crisis transformed not only the consumption of the vehicles that shifted from the matured markets to the emerging markets (Brazil, India and China) but the geographical pattern of the production as well. As long as China contributed in 2005 with 8.5% and in 2008 with 13.1% of the world production, in 2009 already gave 22.3% and in 2016 29.6% of the output (OICA 2017). In addition from 2005 the share of the core regions (North America, European Union and Japan) in the world production dropped by one third, they represented only 42.5% in 2016.

Spain was the second largest automotive manufacturer in the Europe Union in 2016 with a production of 2.9 million vehicles, ahead of the former second largest country, France. The second position of Spain is due to the crisis when the decrease of output was tremendous in France. One quarter of the production disappeared from the European production after 2007, because the output fell down from 20 million to 15 million in 2009. The decline has affected the European economies differently. While the traditional producers suffered, in the emerging economies like the Central and Eastern European countries the setback was moderated. Therefore, the dynamism of the after-crisis recovering was bigger in the Iberian country than in Central Europe.

The figures of the output development between 2005 and 2016 show that most of the European production shows a declining trend, including Portugal and Poland. Czech Republic and Slovakia show dynamic growth while Hungarian and Spanish figures are moderated. On the one hand it is because of the automotive output is quite heterogeneous, as earlier mentioned. A dozen car manufacturing companies from Japan to the U.S. and another half dozen automotive firms (in the bus and truck industry) currently have almost three dozen production sites throughout Iberian and Central and Eastern European countries. On the other hand, as a result of the bankruptcies, mergers and acquisitions the role of these offshore production places has been changing.

Analysing the export figures during the after-crisis recovery, almost all countries have a structural difference from the developed and traditional automotive countries (Germany, France and Italy). After the year of deepest fall in 2009 the export figures of automotive parts showed higher growth than the vehicles even in Hungary where remarkable investment took place in the automotive assembly.

If we want to know how the value chains of the European automotive industry changed during the crisis, we must take into account that there is a tense competition between the Iberian and the Central European capacities. As mentioned, both regions specialized to small vehicles so the biggest competitors for Spain and Portugal are the Central European countries. The crisis also highlighted the competition among the less developed countries, because it contributed to relocate the production from traditional automotive countries to semi- and peripheral regions (Pavlínek 2015). Opening new assembly plants or increasing the volume of the production in the Central European

subsidiaries threatened existing production (Aláez-Aller et al. 2015), although empirical analysis showed that the automotive companies are unlikely to close their factories in Spain. During the crisis the biggest issue was not only to maintain the production in the Spanish factories but, how to reduce production costs and increase productivity in the short term (Aláez-Aller – Barneto-Carmona 2008). Making the country attractive became more important, because there is big competition among the peripheral countries for closed Western European capacities.

Besides these, it is also important to emphasize that production figures does not always show the automotive performance of that country. For instance as a consequence of the global crisis Ford restructured its European production. As the output fell in Spain, the local subsidiary took over many model assemblies from discontinued Western European sites (Aláez-Aller et al. 2015). During the crisis when the engine production decreased by 27 percent between 2008 and 2009 the Hungarian Audi affiliate Audi Hungaria Motor announced a number of new activities (Czakó 2014). The investments proved to be useful, because the production recovery was already visible from 2010 not only in the developed regions but also the integrated peripheral markets (Pavlínek 2015).

Except for one or two cases (in Portugal), car makers have been striving to handle the decline in foreign demand in a flexible way. As mentioned earlier, taking advantage of the efficiency of production in the region, they enhanced their global competitiveness. As an impact of the crisis in the European Union between 2008 and 2011, the total number of employees decreased by 4.7%, approximately by 150 thousand employees (European Trade Union 2014). The hardest decline was in Lithuania by 46%, but in Poland and Latvia was also relatively high by 20%. On the other hand the 2011 figures are higher than in 2008 in Estonia (+24%) and Hungary (+17%). The automotive companies tried to handle the decline by launching the implementation of flexible work arrangements (changes in working hours and hourly wages) in order to keep their employees. However the statistical data do not reflect the measures down by the automotive-related companies. Despite the crisis according to aggregated data, wages per hour in European automotive sector showed an upward trend compared to other sectors between 2008 and 2011. Regarding country data there are significant differences among the counties:

the biggest decrease was in Lithuania (-55%) and the biggest increase was Poland by 35%. The excess capacity was used by the automotive companies by introducing reduced working hours. Between 2008 and 2011, the total number of working hours in the automotive industry in the European Union decreased by 7%. The sharpest decline was again in the Baltic region in Lithuania and Latvia the number of working hours reduced by 54% and 24% respectively.

Iberian countries

Despite a remarkable internal market in **Spain** (in 2016 1.347 thousand new registered vehicles) the output of assembly plants is destined mainly for export. In 2016 exports accounted for around 84% (2.43 million vehicle) of the total production (ANFAC 2017). This means that with a production of 2.89 million units in 2016, every third car sold comes from Spain.

Due to the high export share of the European and North American markets the crisis has severely affected the Spanish automotive industry. Taking the long recovery of the European vehicle markets into consideration, the corresponding figures between 2007 and 2013 show that Spain had the worst figures with a 32 percent decrease compared to 18 percent in EU28 market (OICA 2017). At the same time, because of different market orientation and product structure, the crisis affected companies differently. While the German automotive firms (Daimler and Volkswagen Group) showed the best performance – better than the EU28 average – among the European companies (PSA and Renault-Nissan) French ones were the worst. But U.S. based companies also reported a decline in production over the European companies during this period. Volkswagen was the biggest producer in 2016, 746 thousand vehicles were produced in the Spanish factories (Seat 2017; Volkswagen Navarra 2017a). The German Volkswagen has two factories producing SEAT Audi and Volkswagen vehicles. PSA, Renault, Nissan, and Iveco have also two factories, while Daimler, GM-Opel and Ford have one factory each.

Due to the global financial and economic crisis, sales of the automotive vehicles between 2007 and 2009 decreased by more than 5 million. According to OICA data, in 2007 18.8 million new vehicles were registered in Europe (EU28 + EFTA), while in 2010

when global figures started to grow again European sales were only 15.6 million and in 2013 it fell to a historical low of 14.1 million.

It is important to emphasize that the decrease of the vehicle assembly during the crisis was not homogeneous for individual manufacturers. The performance of the German-based assemblers with plants in Spain (Volkswagen and Daimler) is better than the general average trend for the European Union. The French-based assemblers with plants in Spain (PSA and Renault) were worse in terms of output than the general average for vehicle production in the EU. The U.S.-based assemblers had the worst figures during the crisis, with the number of vehicles assembled dropping by more than half between 2007 and 2013 (Aláez-Aller et al. 2015).

In the after-crisis development period the market growth of a wide range of non-EU export markets –from Turkey to North America and Southeast Asia - had positive effect on the increase of production (ANFAC 2016). Relying on future growth the Volkswagen Group announced a 4.2 billion euro investment in 2015 in the Spanish affiliate SEAT (SEAT 2015), to begin the production of new models.

In 2015, 157 thousand vehicles were produced in **Portugal**. Most of them are personal vehicles (115 thousand). There are four car manufacturers, the German Volkswagen is the biggest producer (assembly Volkswagen and SEAT brands), while the French PSA concern is the biggest commercial vehicle producer. The two Japanese company Mitsubishi and Toyota produce only commercial vehicles. The export ratio is very high, 150 thousand vehicles are exported.

Since 2014 when the fourth largest automotive producer Isuzu/VN Automóveis moved the assembly to Italy, there are four automobile factories in Portugal In 2016, 143 thousand vehicles were assembled mostly cars (Volkswagen Sharans and Sciroccos, Seat Alhambras and Citroen Berlingos) but even busses and light and heavy commercial vehicles. In 2016 the largest one is the Volkswagen AutoEuropa produced over 85 thousand units what is the one of the worst figures since the funding in 1995. The France PSA products 50 thousands and the Japanese Toyota and Mitsubishi output were below 10 thousand vehicles in 2016.

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Due to global market crash, output of the export based Portugal automotive industry felt by 28% in 2009. In the next year, production reached the level of the previous years, but the volatility over the coming years has highlighted the vulnerability of the export-oriented automotive sector. In addition analyses (aicep Portugal Global 2016b) pointed out some structural problem in the sector. Domestic supplier companies face a significant competitive disadvantages against multinationals, for instance in terms of qualification of labour force or capitalization of the enterprises, which makes their export opportunities more difficult. The average size of the component companies, mainly SMEs and family-based companies, limits R&D investment and productive capacity. On the other hand lack of autonomy of OEMs and local integrators in supply chain management makes the catching up more challenging.

According to the latest figures, in 2015 the automobile industry comprised 4 per cent of all enterprises in Portugal (15,000 enterprises), accounting for 7 per cent of turnover. The importance of the automobile industry is shown by the fact that only in the automotive components sector there are about 200 companies, representing 42,000 jobs in Portugal (aicep Portugal Global 2016a). According to the data of Associação Automóvel de Portugal (ACAP) the export share of the vehicle production was 95.3 in 2016. Regarding the automotive sector (vehicles and components) the main markets are the members of the European Union i.e. Spain, Germany, France and the United Kingdom. In terms of the vehicle export (cars, LCVs, busses and HCVs) the Portugal automotive sector is embedded globally, China is the third largest trade partner. Due to its high export share, Portuguese automotive vehicles account for 2.7 percent of the local market.

The auto component industry also has high export ratio (in 2015 84 percent). Therefore among the partners are not only Portuguese OEM subsidiaries but others like BMW, Daimler, Fiat-Chrysler, Ford, GM and Volvo. The main trade destinations are Spain and Germany with almost the half of the export value.

The future prospect of the Portuguese automotive industry is the supplier industry. It means not only conventional products but there is development potential at the new technologies changing the internal combustion engines. There is an opportunity in the

battery industry because Portugal is the leading lithium producer in Europe and has the fifth largest resource in terms of the known reserves (aicep Portugal Global 2016b).

There is a gap between multinational suppliers (like Bosch, Delphi, Faurecia, Visteon) and the indigenous companies. Portuguese suppliers are relatively small (Leal et al. 2002 Product Development in the Autoparts Industry), in addition because of cost pressures and thin profit margins they lack capital to invest. Because of the competition some companies had to cease activity and sell themselves to other companies mostly for multinationals.

Central and Eastern European countries

Concerning the automotive sector there are lots of similarities between the Iberian and the Central and Eastern European countries. On the one hand the global embeddedness causes strong external trade linkages and high export ratio (see Figure 4). On the other hand, although there is a large number of multinationals in the regions, in some countries (like Portugal, Czech Republic and Hungary Slovakia) the Volkswagen Group plays a decisive role. At the same time Volkswagen is also significant in Spain, it gives 21 percent of the total personal vehicle production (Volkswagen Navarra 2017b). This concentration of the production highlights a dependency not only by the automotive industry but from certain firms. Because of the dominance of the multinational companies in the automotive production (Pavlínek et al. 2009), global mergers and acquisitions or bankruptcies brought changes in the position of the foreign subsidiaries. Although Pavlínek (2015) emphasized that the crisis caused low number of bankruptcies, plant closures and relocations in the Czech Republic and Slovakia, but in long term the fall in demand causes structural changes (reposition of some brands) within automotive companies. One example of that is the General Motors that did not finance its European subsidiary Opel's losses, instead focused its resources to the North American and Chinese markets and also to technology development.¹¹ General Motors sold Opel to the French PSA concern in early 2017. The acquisition affected two production places in Poland one in Hungary and Spain and altogether the future of 9410 employees in 2016. There are vehicles assembly capacities and there is even engine

¹¹ Automotive News (March 6, 2017), Why GM is selling Opel to PSA
<http://www.autonews.com/article/20170306/OEM/170309866/why-gm-is-selling-opel-to-psa>

assembly in Hungary and Poland. On the other hand irrespective of the crisis, manufacturing and technology co-operation of independent car manufacturers can also strengthen or change cooperation between countries. An example of this cooperation is between Japanese Suzuki and General Motors' Opel that in the early 2010's increased the production of the Hungarian Suzuki factory.¹²

Between 2000 and 2016 road vehicle production in the Central European countries became almost three times higher (from 1.2 million to 3.5 million cars), while global production increased only by 20% (OICA 2017). The outsourcing of production to the semi-peripheral regions (Nunnenkamp 2005) caused an increasing role of the region in the last decade. The Central European output reached the 3.7% of the world and 18.7% of the European output until 2016. Central Europe is popular among automotive investors. Besides the market seeking motives, the geographical proximity to the main (Western) markets is also a crucial factor investing into the Central European countries (Schmitt – Van Biesebroeck 2013). Basically, Central European production capacities are export-oriented investments and production is almost entirely exported (Túry 2014). The statistical figures confirm the relevant literature about the position of the region within the global value chain (see: Lung 2007; Pavlínek 2015). While direct automotive related employees in the Central European countries account for 20% of European (EU28) workers in 2015, up to 18% of European road vehicles are produced in the four countries (ACEA 2017), that shows a labour intensive production.

There are almost three dozen OEMs assembly and production plants in the Central European region, 16 in Poland, 8 in the Czech Republic, 4 in Slovakia and 5 in Hungary at the end of 2016. The most important manufacturer is the German Volkswagen Group producing passenger cars, commercial vehicles (LCV, HCV, buses) and also main parts (engines, gears, brake drums and brake wheels etc.) in all Central European countries. The German Daimler produces cars in Hungary and engines in Poland. These two companies strengthen the position of the German supply chains that dominate in the region (Hanzl-Weiss 2014). The French companies are also very active in the region. PSA has one production plant in Hungary and two in Poland. The vehicle is assembled in two

¹² Népszabadság (July 5, 2011), Francia motorok kecskeméti Mercedesekbe, http://nol.hu/gazdasag/kinek_kell_a_pazarlo_onallosag_-1119611

other PSA factories in Trnava (Slovakia) and a joint venture with Toyota in Kolín (Czech Republic). Beside the European manufacturers the overseas companies from Japan and South Korea and India have local affiliates in all countries. Japanese Suzuki in Esztergom (Hungary), Toyota in the Czech Republic and Poland has assembly and engine production, and South Korean Kia-Hyundai has production in Žilina (Slovakia) and Nošovice (Czech Republic). The region's commercial vehicle production is also significant. Iveco has one of the leader European bus factory in Czech Republic (Vysoké Mýto), and Swedish Volvo and Volkswagen owned Scania and MAN also have notable output in Poland.

In the **Czech Republic** the global crisis hit the vehicle assembly less, only the growth rate was moderated (OICA 2017). However the demand on the main markets declined, OEMs intended to relocate assembly to foreign peripheral locations in order to reduce their production costs (Pavlínek 2015). However, the number of employees in the sector decreased significantly (by 13.5%) from 2008 to 2009, what shows a significant decline in the output of the automotive companies. Due to the increase in demand on external markets, the decline in employment stopped, but the number of employees has not yet reached the level of previous employees.

The global crisis affected the **Polish** output most. The declining and stagnant production figures remained until 2015. The Polish economy has been able to show growth in the years of the crisis due to the domestic demand (European Commission 2010), which, however, is not valid for the automotive industry, that depends on foreign markets. Due to the crisis, production data for the first time fell in 2009 (OICA 2017). As a result of the crisis, sales of heavy-duty vehicles fell significantly (PZPM 2014), while the downturn of passenger cars mostly took place at the biggest producer, the Italian FCA's (Fiat Chrysler Automobiles NV) production in Poland. The cause of the decline is the drastic drop in the European sales of the FCA since 2010 (FIAT 2011, p.100; FIAT 2013, p.71). Until the crisis did not hit FIAT assembled a record 605,800 cars in 2009 in its two factories in Poland, but produced only 302,600 units in 2015. (PZPM 2013, 2017). FIAT's share is still decisive in Polish automotive manufacturing, so the increasing investment and output of other companies cannot counterbalance the production of the Italian company. Despite the unfavourable production figures, as a

result of the large number of investment projects (into heavy-duty vehicle manufacturing and other light commercial vehicle production), employment in the automotive industry has been increasing steadily in recent years (PZPM 2017). The revival of the Silesian (in South Poland) automotive production practically eliminated the county's unemployment.

Hungary is the second smallest car manufacturer among the examined countries. Taking the export product classification of the automotive trade into consideration, the automotive output in Hungary consists of many main parts and accessories. Therefore the effects of the crisis appeared not only by the vehicle assembly and export but the employment figures as well, which shows the large number of automotive-related suppliers and main part producers. Vehicle assembly fell by 38%(!), automotive companies cut their employment by 17% in 2009 which is the highest figure among the Central European countries, and also export figures declined between 2008 and 2010.

Despite the decline in global and regional sales there were additional investments in the automotive sector during the crisis. Not only OEMs – Audi in 2010 and Daimler in 2008 – announced new investments, but tier 1 suppliers like Knorr-Bremse Magyarország¹³ and also Bosh¹⁴ announced the increase of its production in 2010. Due to the investments and the growth of the demand on foreign market, vehicle production was 36 percent higher in 2016 than the peak in 2008¹⁵. Thanks to investments, production capacities have increased significantly, but the earlier rate of growth in production cannot foreseeable be maintained.

Besides the global economic crisis, the Volkswagen's (diesel) emission scandal in the U.S. had been high on the agenda in Hungary since 2015. Some of the engines involved in fraud were assembled in the company's factory in Hungary. Audi Hungaria as the largest engine factory within the Volkswagen Group produces diesel and petrol engines in Győr. Due to the high export ratio, the Hungarian affiliate is one of the biggest exporters and a leading automotive company in the country. Global value chains linked the production to other European factories. One of these factories is the Volkswagen's Bratislava factory

¹³ http://hvg.hu/gazdasag/20100930_uj_knorrbremse_gyar_kecskemeten

¹⁴ <http://www.boschmediaservice.hu/pressRelease/Page/id/682>

¹⁵ Regarding the automotive production, there was a slight downturn in 2016, the figures in 2015 were 43 percent higher than in 2008 (OICA 2017).

where the SUV model of Audi is exclusively assembled. The scandal, along with the decline in production, also had a tangible impact here. In late 2016 Volkswagen announced that its brand Audi buys back 25,000 diesel Audi Q7 models in U.S.¹⁶ The model was assembled in Bratislava plant and the engines were assembled in Győr plant in Hungary. The scandal highlighted the mistakes of current technologies and raised the issue of the need to introduce future technologies, needed to preserve the current position of Hungary.

The crisis reached the **Slovakian** automobile industry during an intensive growth period. In the early 2000's two manufacturers – the French PSA and the South Korean Kia-Hyundai – arrived to Slovakia. As a result of the investments car production was to exceed 800,000 units by 2010 (Sario 2007). Due to the decline in demand on the major markets however, output growth stalled in 2009, automotive assembly dropped by 20 percent. Decrease of employment was the second highest here (15.6% in 2009) among the Central European countries. The recovery of the production was very fast, in 2010 the output grew by 22% (OICA 2017) and also export figures have shown dynamic growth from previous years since 2010. Crisis highlighted the unbalanced external dependency of the automotive sector in Slovakia. At the same time the geographical diversification of markets of the suppliers helped Slovakia to decrease dependence. (PWC 2014). Investments from existing OEMs have been made from 2012 and also new greenfield investments were announced. In 2012 Volkswagen started its new city car production in the Bratislava plant. At the end of 2015 Jaguar Land Rover (part of the Indian Tata Company) confirmed its plans to open a new factory in the town of Nitra in Western Slovakia. The capacity of the new factory will have an annual output of up to 300,000 vehicles. The factory will build its next-generation Land Rover Discovery.

The growth prospects of the industry are threatened by the extremely strong regional concentration of investments. The territorial unbalanced automotive investment was highlighted by several authors (see more: Jacobs 2017). The main OEMs are in the Western and North Western cities (Bratislava, Zilina, Nitra, Trnava), only suppliers moved to the Eastern part of the country.

¹⁶ <http://www.reuters.com/article/us-volkswagen-emissions-audi-idUSKCN12L1WD>

Baltic countries

According to OICA statistics (2017) and the United Nations' List of Industrial Products¹⁷, passenger car manufacturing does not exist in Estonia, Latvia and Lithuania. In the Baltic countries, the automotive sector is concentrating more on specialist component manufacturing, rather than the assembly of vehicles (ACEA 2012).

In Estonia some sub-sector companies (Silwi, Baltcoach, Respo Haagised) assemble special vehicles or trailers (Terterov and Reuvid 2009, p. 132) based on imports, whereas others produce various spare parts for vehicles and subcontract to large automotive companies (Volvo and Scania). In the supplier sector, there are plastic, rubber products, metal parts and automotive safety systems for automotive industry (Ministry of Economic Affairs and Communications, Ministry of Finance 2016).

The same applies to the automotive sector in Latvia, consisting of small and medium-sized enterprises (Amo Plant) mainly producing car components and trailers. In Lithuania, the situation is similar: the automotive industry focuses on the manufacturing of automotive components. More than 400 companies produce electrical and electronic, metal and plastic components to automotive industry to various OEMs (Invest Lithuania 2014). In Lithuania the automotive companies produce mainly bodies (NACE 34.2) and parts (NACE 34.3), in particular electrical equipment and plastic parts (Ekonomines Konsultacijos ir Tyrimai UAB, 2002).

Contribution of the automotive industry to the economies

For the analysis of the automotive industry this paper uses first the NACE division 29, although that does not provide a complete picture of the sector (see previous chapter). But at least these data are clearly related to the automotive industry. For the extended approach of the automotive sector – a broader interpretation will be used in the second part of this chapter.

The figures according to the NACE division 29 will be compared to the manufacturing industry (NACE C) and the industry as a whole i.e. manufacturing, mining and quarrying and other industry (NACE B, C, D and E), to show the automotive sector's position in the

¹⁷ <http://unstats.un.org/unsd/industry/commoditylist2.asp>

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national economy. Figures will also be compared to the main producers France, Germany and Italy.

Table 5, gives the main indicators for the automotive sector in the examined economies. In some countries the automotive industry has outstanding importance while in other economies the sector has only marginal role. At the same time, the automotive related companies are significant in each country, either in terms of employment, value added or production value. Regarding the number of enterprises and the employees relating to automotive industry the Czech Republic, Poland and Spain are the leading countries while the Baltic countries are at the last place. If we take into account the number of employees compared to the industrial employers, three Central European countries, the Czech Republic, Hungary and especially Slovakia have the highest figures (see table 5).

Table 5, Main indicators of the manufacture of motor vehicles, trailers and semi-trailers (NACE C29), 2005 and 2014

	Number of enterprises				Number of employees			
	number		% of manuf. industry		number		% of manuf. industry	
	2005	2014	2005	2014	2005	2014	2005	2014
Estonia	35	58	0.7	0.9	3,305	3,495	2.6	3.3
Latvia	27	55	0.4	0.6	988	1,698	0.6	1.4
Lithuania	34	47	0.2	0.3	4,046	3,722	1.6	1.9
Czech Rep.	1,066	1,125	0.7	0.7	140,770	146,542	11.8	13.6
Hungary	507	484	0.8	1.0	63,024	82,484	8.6	12.6
Poland	1,205	1,361	0.7	0.8	124,652	169,987	5.8	7.6
Slovakia	108 ¹	280	1.5	0.4	57,386 ²	61,172	13.1	14.8
Portugal	556	685	0.6	1.0	37,691	30,977	4.9	5.0
Spain	2,313	1,600	1.1	1.0	178,698	134,839	7.3	8.4
Germany	2,888	2,834	1.4	1.3	812,278	836,450	11.9	11.8
France	2,415	2,041	1.0	0.9	301,855	230,085	8.6	7.9
Italy	2,442	2,253	0.5	0.6	180,220	156,639	4.8	5.0
European Union (28) ³	21,000	19,653 ⁴	1.0	0.9 ⁴	2,465,700	2,355,000	7.7	8.4

Notes:

¹ 2006

² 2008

³ in 2005 EU27, in 2014/2015 EU28

⁴ 2015

Source: authors' calculations based on Eurostat 2017

The average size of the automotive related companies is the largest in the Central European countries, while in the Baltic countries and Portugal there are 50-70 smaller sized enterprises. Not surprisingly the biggest companies are in Germany, which are twice as bigger than the average size of some Central European companies. In term of the production value, the Central European countries have the highest figures both in absolute and relative terms (see Table 6). Spain has also high value, but compared to the industry as a whole, the automotive production in the Central European economies has the highest share in employment going far beyond Germany, Europe's largest automotive producer. Regarding structural industrial statistics there is no data about gross value added of the manufacture of motor vehicles, trailers and semi-trailers, only gross value added per employee. In that point the figures show a different rank compared to the earlier values highlighting a very important structural and technological difference between the industrial level of the core and semi-periphery areas. Except for Estonia and Lithuania the efficiency and the value added of the automotive industry is above the manufacturing industry. But in terms of absolute numbers there is a gap between the new EU members and the Spanish, German countries or EU average value added per employee. Hungary has the highest figures but it is still only 60 percent of the Spanish and 42 percent of the German figures. This shows that in the Central- and Eastern European region the automotive production is still characterized by lower value added and higher labour intensity activities (see Pavlínek 2002, 2016, Barta 2012). Anyway, in gross value added per employee the other Iberian country Portugal has the same level as the Central European countries.

Table 6, Main indicators of the manufacture of motor vehicles, trailers and semi-trailers (NACE C29), 2005 and 2014

	Production value				Gross value added per employee			
	m. euros		% of industry		ths. euros		% of the average of the manuf. industry	
	2005	2014	2005	2014	2005	2014	2005	2014
Estonia	132	290	2.3	2.7	14	25	113.1	100.0
Latvia	41	142	0.9	1.9	12	28	131.8	168.3
Lithuania	170	241	1.6	1.3	8	16	77.8	95.7
Czech Rep.	17,320	35,381	18.1	24.8	29.3 ²	44	114.0 ²	142.0
Hungary	11,040	21,623	16.3	24.9	34	45	153.6	149.0
Poland	16,070	27,566	10.7	10.8	26	32	118.6	124.3
Slovakia	7,757 ¹	20,812	22.0	32.7	17.7 ²	40	97.3 ²	143.2
Portugal	5,009	6,502	7.4	8.5	26	36	112.5	127.0
Spain	54,051	54,015	12.0	12.5	55.1 ²	73	98.9 ²	121.2
Germany	255,581	344,321	18.1	19.3	73.6 ²	107	112.5 ²	145.8
France	113,143	71,670	13.2	9.1	59.3 ²	65	90.0 ²	94.1
Italy	46,684	50,000	5.7	5.9	50.1 ²	59	88.5 ²	91.4
European Union (28) ³	844,038	781,975	13.2	12.0	61	77	117.3	126.2

Notes:

¹ 2006

² 2008

³ in 2005 EU27, in 2014/2015 EU28

Source: authors' calculations based on Eurostat 2017

Other studies tried to measure the significance of the industry by quantifying its contribution to economic growth measured the GDP contribution of the passenger car industry (see Tirpák and Kariozen 2006).

Despite the market-seeking motive of the automotive investments and the large internal market of Spain and Poland, the car industry has also high export intensity¹⁸, the production is mainly directed towards export markets.

In the following product classification SITC Rev.3 provided by the World Trade Organization is applied.¹⁹ Statistics show that in some countries the automotive

¹⁸ According to the data of the Association of Spanish Automobile Manufacturers (ANFAC) the export ratio of the automotive sector in 2015 was 85 percent while according to the Polish Association of Automotive Industry (PZPM) 98.7 percent of Polish passenger and light commercial car production was exported in 2013.

industry achieved excellent performance in exporting motor vehicles and their components²⁰. The global embeddedness and the importance of the automotive related products in the export shows different picture in the examined countries. Beside this the export figures of the sector highlight the still existing long term problems of the automotive industry in some countries. There is a significant downturn in Spain, and the one-sided growth of Slovakia's automotive exports has many risks not only in term of the economic development (Bank Austria 2007) and catching up (Pavlínek 2016) as well.

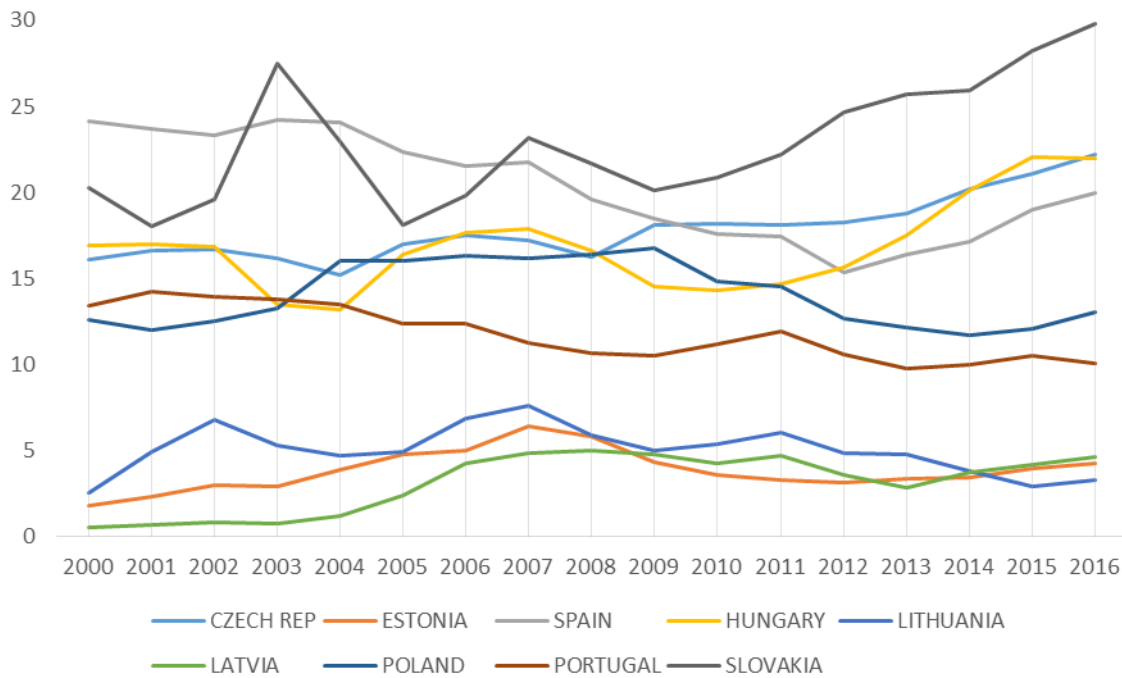
Regarding the volume of automotive export there are three groups. One is the Baltic countries with low (5-10 percent) export ratio of the automotive products. In the second group, most of the countries have an export ratio between 10 and 20 percent. The EU28 average is 10-13 percent. Portugal and Poland belong to this group during the whole examination period (i.e. between 2000 and 2016). Spain has been in this group since 2008. In the third group the countries most exposed to automotive exports are the Czech Republic, Hungary and Slovakia, with high export dependency above 20 percent. 29.8 percent (in 2016) of the Slovak export stems from automotive production. Based on long-term time series, we can see how vulnerable this growth is. In the year preceding the crisis, the share increased by 10 percentage points in one year and after the crisis it fell to the same extent in two years. The volatility of exports points to an important structural problem, that Slovakia is part of the global value chain as an assembler with labour-intensive activities.

From 2000 until 2012-2013 there is a strong decreasing tendency of automotive share in exports in Portugal, Poland and Spain. On the opposite side there is a rapid growth in the Czech Republic, Hungary and Slovakia.

¹⁹ <http://stat.wto.org/StatisticalProgram/WSDBStatProgramTechNotes.aspx?Language=E>

²⁰ Automotive products: motor cars and other motor vehicles principally designed for the transport of persons (other than public transport type vehicles) including station wagons and racing cars, motor vehicles for the transport of goods and special purpose motor vehicles, road motor vehicles, n.e.s., parts and accessories of motor vehicles and tractors, internal combustion piston engines for vehicles listed above, electrical equipment, n.e.s., for internal combustion engines and vehicles, and parts thereof (SITC groups 781, 782, 783, 784, and subgroups 713.2, 778.3).

Figure 4, Export of automotive products (see footnote 20) as percent of total export



Source: Eurostat 2017 (ComExt)

Regarding the product structure, main export products are vehicles (personal and commercial, light and heavy vehicles). The ratio of the vehicles is above 90 percent, only Hungary, Poland and Latvia were below this ratio. In Hungary and Poland the internal combustion engines (SITC 71322 and 71323) gave 30-50 percent of the automotive export at the beginning of the 2000s, which decreased constantly until today. In Latvia the picture is different from the other countries, the high share of electrical parts (SITC 77831, 77835 and 77834) can be observed.

Regarding foreign trade, the main linkages are influenced by the market proximity but also by the intra-firm position of the local subsidiaries in global production chains, their specialisation. Regarding export directions, the most “EU-related” countries were Portugal, Slovakia and Hungary in 2016, with 90.1 percent, 87.2 percent and 87.2 percent of all automotive exports respectively. On the other side the least “EU dependent” countries are Spain and Lithuania with 80.8 percent and 65.3 percent respectively. The Lithuanian figures show high volatility in 2014 the EU export share was only 36.3%. In addition regarding the main trade partners the market size/potential has also crucial role. Germany is the biggest market for almost all countries except for

the Baltic economies, where the neighbouring countries (Estonia, Latvia and Lithuania) dominate, and for Portugal Spain is the main trade partner.

As earlier mentioned, there are different interpretations of automotive industry's economic contribution. The broader definition of automotive industry in this paper is based on the approach of McAliden and his co-authors (2003). Although the authors provide a rather detailed analysis of the economic role of the sector, however didn't give any detailed statistical classification of activities related to manufacturing and use of the motor vehicles. That is because in some cases – for instance employment in the automotive related advertising – statistical data collection is not able to separate the aggregate records. On the other hand, the European nomenclature (NACE) nor does it go into details about recycling; oil and gas field machinery manufacturing; refinery of the oil products²¹; or urban and suburban passenger land transport²². As we can see from Table 7, because of the statistical severability problems some related activities were not taken into account. Therefore NACE Rev. 2. 19.2 and 49.31 activities were not included in the database.

²¹ There are different values based on different sources. According to the U.S. Energy Information Administration, of the approximately 7.19 billion barrels of total U.S. petroleum consumption in 2016, 48% was motor gasoline (includes ethanol), 20% was distillate fuel (heating oil and diesel fuel), and 8% was jet fuel. (<https://www.eia.gov/tools/faqs/faq.php?id=41&t=6>) The consumption of the road transit is 68% of the total. According to the International Energy Agency (<https://www.iea.org/oilmarketreport/omrpublic/charts/>) the demand of motor gasoline 31.2%, gasoline, diesel 28.2% as a total consumption of the oil products in April 2017. The sum is 59.4% but it is not only road transport but rail transport as well.

²² According to the Eurostat nomenclature and definition (Eurostat NACE Rev.2), urban and suburban passenger land transport includes different modes of land transport not only road transport. Namely next to land transport with motor bus, such as with tramway, streetcar, trolley bus, underground and elevated railways etc.

Table 7, Economic contribution of the automotive industry: activities related to manufacturing and use of the motor vehicles

Motor vehicle related employment (partly based on SIC)	NACE Rev. 2 (definitions and codes)	
Automotive Manufacturing Related Employment	Automotive Manufacturing Related Activities	
Total Direct Employment + Manufacturing Supplier Employment (SIC 371: the motor vehicle and motor vehicle equipment industry)	Manufacture of motor vehicles, trailers and semi-trailers (C)	29
Non Manufacturing Supplier Employment	<i>Not specified</i>	-
Manufacturing and Extraction Spinoff Employment	<i>Not specified</i>	-
	Manufacture of rubber tyres and tubes; retreading and rebuilding of rubber tyres (C)	22.11
Downstream Employment	Downstream Activities	
New light vehicle automotive retail	Wholesale and retail trade; repair of motor vehicles and motorcycles: This class includes wholesale and retail sale of new and used vehicles (G)	45.1; 45.2; 45.3
Advertising	<i>Not specified</i>	-
Rail	<i>Not specified</i>	-
<u>Jobs related to the use of the motor vehicle:</u>	<u>Activities related to the use of the motor vehicle:</u>	
Used Vehicle dealers (cars and trucks)	Wholesale and retail trade; repair of motor vehicles and motorcycles: This class includes wholesale and retail sale of new and used vehicles (G)	45.1; 45.2; 45.3
Used Vehicle Operations and Off-Warranty Service Employees		
Automotive Repair (body, paint, and general repair)	Rebuilding or remanufacturing of machinery (C)	29.10
Carwashes		
Automotive parts and accessories	Wholesale and retail sale of parts and accessories for motor vehicles (G)	
Tire Dealers		45.3
Gasoline Stations with Convenience Store	Retail sale of automotive fuel (G)	
Other Gasoline Stations		47.30
Oil and Gas Field Machinery manufacturing	<i>Not specified</i>	-
Petroleum Refining	Manufacture of refined petroleum products (C)	19.2 (see footnote 19)
Passenger Car Rentals	Renting and leasing of motor vehicles (renting and leasing of cars and light motor vehicles and trucks as well) (N)	77.1
Automobile Parking	Parking facilities for motor vehicles (Service activities incidental to land transportation also included operation of terminal facilities such as railway stations, bus stations, stations for the handling of goods) (H)	52.21
Highway and street construction workers	Construction of roads and motorways (F)	42.11
Automotive Recycling (scrapyards)	Wholesale of waste and scrap (G)	46.77

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Socioeconomic Employment		
Taxicab drivers and chauffeurs	Taxi operation (H); Renting of motor vehicles without driver (N)	49.32; 77.1
Truck drivers	Freight transport by road (H)	49.41
Bus drivers	Urban and suburban passenger land transport (H) Other passenger land transport n.e.c. (H)	49.31 (see footnote 20); 49.39

Source: authors' calculations based on McAliden et al. 2003

Concerning the availability of data, there are detailed figures for the number of enterprises and the number of employees about almost all countries. In the case of the production value and gross value added per employee, more data are missing. The figures show a fairly mixed picture, but it is more or less in line with previous researches (see Fulton et al. 2001; McAlinden et al. 2003) which emphasize the outstanding importance of the downstream activities within automotive-related activities. This is confirmed by the number of enterprises, compare the automotive manufacturing related activities (see Table 7) to the extended interpretation (activities related to manufacturing and use of the motor vehicles) the latter figures are 48-155 times.²³ In the case of the employees the difference is 2-7 times. Along with this, the analysis contradicts to earlier researches at some points.

In the case of the number of enterprises (see Table 8) wholesale and retail trade, repair of motor vehicles and motorcycles (G) and the transportation and storage (H) and the administrative and support service activities (N) have high numbers, exceeding the automotive manufacturing related activities in all examined countries. The difference is the highest in the Czech Republic, Poland and Spain. In the case of the number of employees the significance of the aforementioned activities (G, H and N) is no longer so obvious (see Table 9) that is opposite as mentioned in the previous literatures. In the Czech Republic and Slovakia the number of employees in the manufacture of motor vehicles, trailers and semi-trailers and rubber tyres and tubes exceed the other three sections. Although employment of the automotive manufacturing related activities does not exceed the G, H, N sectors it is significant in Hungary, Poland and Spain as well.

²³ Because lack of considerable vehicle assembly, the Baltic countries have been omitted from observation.

Table 8, Automotive-related activities in the following sections

Number of enterprises in 2015

	Manufacturing (C)	Construction sector (F)	Wholesale and retail trade, repair of motor vehicles and motorcycles (G)	Transportation and storage + Administrative and support service activities (H+N)	Total
Estonia	79	199	3 174	4 076	7 528
Latvia	64	331	5 163	5 765	11 323
Lithuania	55	130	12 398	9 853	22 436
Czech Rep.	1 433	n.a.	32 891	34 505	68 829
Hungary	531	1 225	21 107	23 580	46 443
Poland	1 523	7 309	94 357	133 286	236 475
Slovakia	467	125	9 699	15 434	25 725
Portugal	706	444	29 398	19 813	50 361
Spain	1 748	1 356	76 738	65 404	145 246
Germany	2 814	3 038	115 337	66 568	187 757

Source: authors' calculations based on Eurostat 2017

Table 9, Automotive-related activities in the following sections

Number of employees in 2015

	C	F	G	H+N	Total
Estonia	3 406	3 468	13 723	20 756	41 353
Latvia	1 879	5 953	22 107	38 693	68 632
Lithuania	4 455	7 517	39 131	61 530	112 633
Czech Rep.	164 404	n.a.	66 130	99 405	329 939
Hungary	93 655	12 071	69 929	120 823	296 478
Poland	187 938	58 724	208 696	330 850	786 208
Slovakia	70 425	7 591	27 458	44 801	150 275
Portugal	35 496	12 160	90 789	92 634	231 079
Spain	152 724	48 895	282 760	87 569	571 948
Germany	873 625	81 338	810 885	660 621	2 426 469

Source: authors' calculations based on Eurostat 2017

Production value and gross value added per employee are not available for all countries, therefore no major conclusions can be drawn from these data. In the case of production value (see Table 10), except the Baltic States in all countries the automotive manufacturing related activities (see Table 7) have the highest figures. Concerning the

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gross value added per employee (see Table 11) the highest figures are in transportation and storage (H) and renting and leasing of motor vehicles (N-77.1)

Table 10, Automotive-related activities in the following sections
Production value (2015; m. euros)

	C	F	G	H+N	Total
Estonia	325	359	767	1 442	2 892
Latvia	141*	545	670	1 710	3 066*
Lithuania	249	593	1 060	3 571	5 473
Czech Rep.	42 593	n.a.	5 072*	8 676	56 341*
Hungary	26 109	1 575	3 068	5 941	36 693
Poland	32 441	7 487	10 612	23 819	74 359
Slovakia	25 504	1 644	1 594	3 604**	32 346**
Portugal	8 120	2 027	4 013	8 561	22 721
Spain	64 263	9 926	23 690	10 453*	108 331*
Germany	375 926	13 329	67 137	59 876	516 268

* some data are missing

** latest year available

Source: authors' calculations based on Eurostat 2017

Table 11, Automotive-related activities in the following sections
Gross value added per employee (in 2015; ths. euros)

	C	F	G	H+N	Total
Estonia	49	33	143	142	365
Latvia	25*	21	80	85	211*
Lithuania	26	23	75	103	227
Czech Rep.	155	n.a.	114*	327	596*
Hungary	131	42	93	183	448
Poland	82	28	108	328	546
Slovakia	162	36	115	164**	477**
Portugal	216	45	117	367	745
Spain	175	58	198	292*	723*
Germany	201	59	256	386	901

* some data are missing

** latest year available

Source: authors' calculations based on Eurostat 2017

Main characteristic of the automotive sector in the examined region

- concluding remarks -

The automotive industry has shown fundamental differences during and after market turbulences (i.e. the global crisis) that distinguishes the performance of the countries examined and their future development opportunities. In terms of the comparable output data (based on NACE classification) figures did not include other parts and accessories, we had mainly vehicle production figures about the automotive manufacturing related activities. Therefore we could compare only the number of vehicles assembled, figures did not permit a full comparison within the countries. In addition the export figures did not include components and main units used domestically as part of the supplier network.

Based on the empirical study and the statistical data, we can articulate some findings. As for a significant part of the production is sold on export markets, the production figures of the selected countries reflect also the performance of the company on these markets. The output of the industry is not just a matter of external demand but it depends on companies. Taking production data of the selected countries into account, in the case of Spain the French and the U.S. companies and in the case of Poland the Italian companies showed the worst figures. The poor performance of FIAT after the crisis continues, worsening the Polish export indicators. Overall, it can be stated that the German companies (Volkswagen Group, Daimler) showed the best performance in the countries surveyed.

Second, the number of investors and the concentration observed in the sector is also decisive in the development of the production volume and the future prospects of the industry. In the case of Poland, FIAT has a significant role in the automotive industry. On the other hand, the importance of the Volkswagen Group can be highlighted in Portugal or in Hungary, Slovakia. In case of Spain, the three dominant car manufacturers (Volkswagen, PSA, Ford) had greater latitude/variance in sector's price competition, appreciating the importance of the country.

Third, in the case of OEMs and suppliers, the product portfolio is relevant for production, export and employment data. The Czech Republic and Poland have

significant bus production and Poland also has remarkable heavy-duty vehicle assembly. These are labour intensive activities employing a significant number of workers, but cannot be compared with the production of passenger cars by the production numbers. This results in a unique situation, because while the automotive production in Poland is growing, the export share of the sector does not reflect the development of the output.

Finally, the specialization and characteristic of the industry has impact on trade relations. Export of parts and components are more EU-oriented than the trade of vehicles. Only in the case of Spain and the Baltic countries is the non EU trade higher than the trade within the European Union. This may be due to some company's production specialization, certain types/brands are assembled only at European sites.

The paper examined the economic contribution of the automotive industry based on previous interpretations. Not only the number of employees was analysed but the number of enterprises, production value and gross value added per employee as well. The research partly coincides with the previous results, that downstream, socioeconomic and employment effects are outstanding. Concerning the number of enterprises and gross value added per employee the figures confirmed the former conclusions but in the case of employment unlike the expectations, the role of the automotive manufacturing related activities in the Czech Republic and Slovakia exceed that of the other three sections (construction, wholesale and retail trade, repair of motor vehicles and motorcycles and transportation and storage plus administrative and support service activities. That shows that in these countries the automotive assembly and production of parts and accessories have above average significance within the national economy.

References

- ACEA (2012): Country profiles: Estonia
http://www.acea.be/index.php/country_profiles/detail/estonia
- ACEA (2017): Automobile Industry Pocket Guide 2017-2018. European Automobile Manufacturers' Association
- aicep Portugal Global (2016a): Indústria automóvel e componentes No.87 maio 2016, Lisboa: Agência para o Investimento e Comércio Externo de Portugal
www.portugalglobal.pt
- aicep Portugal Global (2016b): Automotive sector in Portugal 2016, Lisboa: Agência para o Investimento e Comércio Externo de Portugal <http://bomdia.eu/wp-content/uploads/2016/11/14-Ricardo-Silva-EUROMETAL.pdf>
- Aláez-Aller, R. – Barneto-Carmona, M. (2008): Evaluating the risk of plant closure in the automotive industry in Spain, *European Planning Studies*, 16 (1), pp. 61-80.
- Aláez-Aller, R. – Gil-Canaleta, C. – Ullibarri-Arce, M. (2015): Foreign investment in eastern and southern Europe. In: Béla Galgóczi, Jan Drahokoupil and Magdalena Bernaciak (eds.): *Foreign investment in eastern and southern Europe after 2008. Still a lever of growth?* Brussels: European Trade Union Institute, 2015, pp. 139-170.
- Anfac (2016): Informe Anual 2015. Madrid: Asociación Española de Fabricantes de Automóviles y Camiones, 2016.
- Barta, Gy. (2012): Central and Eastern European Automotive Industry in European Context. In: Rechnitzer J., Smahó M. (eds.) *Vehicle Industry and Competitiveness of Regions in Central and Eastern Europe*. Győr: Universitas-Győr Nonprofit Kft., 2012. pp. 33-70.
- Czakó, K. (2014): Az Audi Hungaria Motor Kft. hatása a helyi gazdasági és társadalmi folyamatokra. *Tér és Társadalom* Vol. 28, pp. 188-198.
- Dudenhöffer, F. (2005): Wie viel Deutschland steckt im Porsche? *Ifo Schnelldienst* 58(24)
- Ekonomines Konsultacijos ir Tyrimai UAB (2002): *The Automotive Component Industry in Lithuania, a Study Prepared for the Lithuanian Development Agency*, Vilnius 2002.
- European Commission (2010): *European Economy – 2/2010 – European Economic Forecast – Spring 2010* Luxembourg: Publications Office of the European Union

Gábor Túry / Different interpretations of the automotive industry and its role in three semi-peripheral regions of the EU

- European Trade Union (2014): Wages and collective bargaining during the European economic crisis. Developments in European manufacturing industry. Report to Collective Bargaining and Social Policy Conference Vienna, 12-13 June 2014 Düsseldorf/Brussels, March 2014
- Eurostat (2008): Statistical classification of economic activities in the European Community. Eurostat Methodologies and Working papers. Luxembourg: Office for Official Publications of the European Communities, 2008
- Eurostat ComExt database
- FIAT (2011): Annual report 2010. Turin: Fiat S.p.A.
- FIAT (2013): Annual report 2012. Turin: Fiat S.p.A.
- Fulton, G. A. – McAlinden, S. P. – Grimes, D. R. – Schmidt, L. G. – Richardson, B. C. (2001): Contribution of the Automotive Industry to the U.S. Economy in 1998: The Nation and Its Fifty States. Ann Arbor, MI: The University of Michigan Institute for Labor and Industrial Relations, The University of Michigan Transportation Research Institute, Office for the Study of Automotive Transportation, and the Center for Automotive Research, Winter 2001.
- Girardi, F (2016): Market Outlook - Update 2016. EUROBAT Annual forum Berlin, 16-17 June 2016
- Hanzl-Weiss, D. (2014): Key challenges of the Slovak automotive industry, Monthly Report No. 12/2014, wiiw Monthly Report, No. 12, Vienna, December 2014, pp. 10-13.
- Humphrey, J. - Memedovic, O. (2003): The global automotive industry value chain: What Prospects for Upgrading by Developing Countries, United Nations Industrial Development Organization 2003, Vienna
- Invest Lithuania (2014): Manufacturing industry: Truck and trailer fact sheet
http://www.investlithuania.com/wp-content/uploads/2014/03/Trailer-factsheet_2014-08-28_WEB.pdf
- Jacobs, A. J. (2017): Nested dependent city-regions: FDI, uneven development, and Slovakia's Bratislava, Nitra, Trencin, Trnava, and Zilina city-regions, Journal of Urban Affairs
- Jakubiak, M. – Kolesar, P. – Izvorski, I. – Kurekova L. (2008): The Automotive Industry in the Slovak Republic: Recent Developments and Impact on Growth. Working Paper No. 29. Washington: The International Bank for Reconstruction and Development / The World Bank

Gábor Túry / Different interpretations of the automotive industry and its role in three semi-peripheral regions of the EU

- Klier T. – McMillen, D. (2013): European automobile supplier industry. WP 2013-15. Federal Reserve Bank of Chicago
- Lengyel, B. (2014): Regional Clustering Tendencies of the Hungarian Automotive and ICT Industries in the First Half of the 2000s In: Welfens, Paul J.J. (ed.) Clusters in Automotive and Information & Communication Technology: Innovation, Multinationalization and Networking Dynamics. Springer Science & Business Media, 2014. pp 113-134.
- Lung Y. (ed.) (2007) Coordinating competencies and knowledge in the European automobile system - CoCKEAS, Luxembourg, Office for Official Publications of the European Communities.
- McAlinden S. P. – Hill, K. – Swiecki, B. (2003): Economic Contribution of the Automotive Industry to the U.S. Economy – An Update. A report for the Alliance off Automobile Manufactures. Center for Automotive Research. Ann Arbor, MI 2003
- McAlinden, S. P. – Smith, B. (1993): The changing structure of the U.S. automotive parts industry. University of Michigan Transportation Research Institute. UMTRI 93-6.
- McKinsey & Company (2012): Lighting the way: Perspectives on the global lighting market. New York: McKinsey & Company
- Ministry of Economic Affairs and Communications, Ministry of Finance (2016): Overview of economy 2015. Tallinn: Ministry of Economic Affairs and Communications, Ministry of Finance 2016
- Mudambi, R. (2008): Location, Control and Innovation in Knowledge-Intensive Industries. *Journal of Economic Geography*, Vol. 8(5), pp. 699-725.
- Nunnenkamp, P. (2005): The German automobile industry and Central Europe's integration into the international division of labour: Foreign production, intra-industry trade and labour market repercussions. Euroframe Publications. www.euroframe.org/fileadmin/user_upload/euroframe/docs/2005/session4/eurof05_nunnenkamp.pdf
- OECD (2009): Economic Outlook, Volume 2009/2 November 2009
- Pavlínek P. (2015) The impact of the 2008-2009 crisis on the automotive industry: global trends and firm-level effects in Central Europe, *European Urban and Regional Studies*, 22 (1), pp. 20-40.
- Pavlínek P. – Domański B. – Guzik R. (2009) Industrial upgrading through foreign direct investment in Central European automotive manufacturing, *European Urban and Regional Studies*, 16 (1), pp. 43-63.

Gábor Túry / Different interpretations of the automotive industry and its role in three semi-peripheral regions of the EU

- Pavlínek, P. – Ženka, J. (2016): Value creation and value capture in the automotive industry: Empirical evidence from Czechia. *Environment and Planning A* 2016, Vol. 48(5) pp. 937-959.
- Pavlínek, P. (2002): Transformation of the Central and East European passenger car industry: selective peripheral integration through foreign direct investment. *Environment and Planning A*, 34, No. 9, pp. 1685-1709.
- Pavlínek, P. (2012): The internationalization of corporate R&D and the automotive industry R&D of East-Central Europe. *Economic Geography* 88(3): pp. 279-310.
- Pavlínek, P. (2017): *Dependent Growth: Foreign Investment and the Development of the Automotive Industry in East-Central Europe*. Springer, 2017
- Pillot, C. (2012): The worldwide battery market 2011-2025. Conference "Batteries 2012" October 24-26, 2012 Nice, France. Avicenne Energy
- PWC (2013): *Automotive Industry in Central Europe and its Competitive Edge in a global World, 2013*: PricewaterhouseCoopers Slovensko, s. r. o.
- PWC (2014): *Automotive Suppliers Survey, 2014*. Bratislava: PricewaterhouseCoopers Slovensko
- PZPM (2013) *Automotive Industry Report 2012*, Warszawa: Polski Związek Przemysłu Motoryzacyjnego
- PZPM (2014) *Automotive Industry Report 2013*, Warszawa: Polski Związek Przemysłu Motoryzacyjnego
- PZPM (2017) *Automotive Industry Report 2016*, Warszawa: Polski Związek Przemysłu Motoryzacyjnego
- Sario (2007): *The Automotive Industry*. Bratislava: Slovak Investment and Trade Development Agency
- Schmitt, A. - Van Biesebroeck, J. (2013): Proximity strategies in outsourcing relations: The role of geographical, cultural and relational proximity in the European automotive industry, *Journal of International Business Studies*, Palgrave Macmillan, vol. 44(5), pp. 475-503. 2013
- SEAT (2015): *Corporate news*
- SEAT (2017): *Annual report 2016* Martorell: SEAT, S.A.
- Sinn, H-W. (2006): The Pathological Export Boom and the Bazaar Effect: How to Solve the German Puzzle. *The World Economy*, 29(9), pp. 1157-1175.

Gábor Túry / Different interpretations of the automotive industry and its role in three semi-peripheral regions of the EU

- Sturgeon, T. – Van Biesebroeck, J. – Gereffi, G. (2008): Value chains, networks and clusters: Reframing the global automotive industry. *Journal of Economic Geography* 8(3): pp. 297-321.
- Sturgeon, T. J. - Florida, R. (2000): Globalization and Jobs in the Automotive Industry. MIT IPC Working Paper 00-012
- Terterov, M. – Reuvid, J. (2009): *Doing Business with Estonia*. London: GMB Publishing Ltd., 2009 <http://bookzz.org/dl/941389/bbbb87>
- Tirpak, M. – Kariozen, A. (2006). *The Automobile Industry in Central Europe*. IMF Note, International Monetary Fund 2006.
- Túry, G. (2014): Automotive industry in the EU10 economies: developments in the past decade. In: Éltető A (ed.) *Mind the gap: integration experiences of the ten Central and Eastern European countries*. 145 p. Budapest: Institute of World Economics, Centre for Economic and Regional Studies, Hungarian Academy of Sciences, 2014. pp. 83-105.
- Vass, A. (2005): *Romania and the Trade and the Development approaches to CEE Convergence with the EU, under the competitive pressures of Integration*, Budapest 2005: Institute of World Economics, Working Papers No. 151
- Volkswagen Navarra (2017a): Volkswagen Navarra logra un beneficio de 74,5 millones de euros, un 22,5% más que en 2015. Volkswagen Navarra Noticias. <http://vw-navarra.es/volkswagen-navarra-logra-beneficio-745-millones-225-mas-2015/>
- Volkswagen Navarra (2017b): Quiénes somos. <http://vw-navarra.es/nuestra-fabrica/quienes-somos/>
- Wilbur Chung, W – Mitchell, W. – Yeung, B. (2003): Foreign direct investment and host country productivity: the American automotive component industry in the 1980s. *Journal of International Business Studies* (2003) 34, pp. 199-218.