

Insight into the Hungarian Automotive Industry in International Comparison*

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The paper examines the features of the Hungarian automotive industry¹ in international comparison, in the form of a descriptive analysis. The comparison focuses primarily on the automotive industry of the Visegrád region, Germany and Austria, as well as on processes in the EU. The analysis reviews the academic background of the sector, and then provides an insight into the history of the automotive industry of the Visegrád region, focusing on the socialist past of the automotive industry and the consequences thereof. In the last part of the analysis, we compare contemporary Hungarian industry trends with the features of it in the Visegrád countries and Europe, based on the statistics of Eurostat, by company size and ownership structure, as well as on the corporate income tax return database of the Hungarian tax authority (NAV). The main conclusion of the paper is that the automotive industry shows outstanding productivity within the Hungarian national economy, but on the other hand, the SMEs of the sector are less productive than large enterprises and this difference is the highest in Hungary within the region. In order to change the situation, large foreign enterprises should outsource their higher value added activity in the region and raise wages accordingly, and on the other hand, it would be necessary to strengthen and advance Hungarian-owned SMEs within the value chain.

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¹ Hungarian automotive industry is the term for the entirety of the automotive undertakings operating in Hungary. For this purpose the governing criterion is category C29 of the Eurostat NACE Rev. 2 nomenclature. According to the definition, this category also includes the manufacture of trailers and semi-trailers, as well as motor vehicle parts. On the other hand, the category does not include the activities related to the manufacture of other transport equipment (shipping equipment, rail transport equipment, air transport equipment, military vehicles, motorcycles and bicycles). In the analysis part, we apply the Eurostat Structural Business Statistics (SBS) rules, by separating foreign-owned and Hungarian-owned companies: a foreign company is a company in which a foreign country's resident shareholder exercises more than 50 per cent of the voting rights or the shareholders' ownership right.

1. Introduction

The analysis intends to provide an insight into the current situation of the Hungarian automotive industry, comparing it, from a macroeconomic aspect, with the Visegrád region and the German-speaking countries, as well as with the trends across the European Union. The choice of this paper's topic follows from the outstanding economic role of the sector in the Visegrád region and in Hungary, the current labour market and labour productivity challenges in Hungary and in the region, as well as from the need to publish up-to-date data and calculations that take account of recent years' automotive industry investments. The paper primarily analyses the factors responsible for the lower labour productivity of the Hungarian (and regional) automotive industry compared to the EU average and that of Western Europe.

The issue is examined, on the one hand, through a detailed academic review of the sector, which tries to find out why and how multinational companies outsource some of their activities and to identify these processes. Thereafter, the paper also touches upon the historic analysis of the automotive industry in the Visegrád region. In addition to applying the qualitative method, two different empirical analyses, based on own calculations, also provide assistance for the further analysis of the research topic, after reviewing the global trends of the automotive industry. One of them draws conclusions, in an international comparison, with regard to automotive industry labour productivity according to enterprise size and ownership (foreign or Hungarian), based on the Eurostat SBS statistics. The other one formulates statements with regard to the current domestic trends of the sector, based on the corporate tax return database of the Hungarian tax authority (NAV).

2. Academic background of the automotive industry

With the rise of globalisation in the 20th century, the automotive industry also underwent fundamental structure changes, including the development of global production systems and the organisation of cross-border market structures (*Dicken 2007*). The development of global production chains was fostered by the expansion of liberalised commercial and investment activities, the institutionalisation of economic integrations and the appearance of a political environment which supports FDI (*Torlak 2004*). The OEM (original equipment manufacturer) companies in the developed countries became multinational and global industry players wished to exploit a broad range of potentials in the developing countries (*Chanaron – MacNeill 2005; Humphrey – Memedovic 2003*).

In relation to the aforementioned process, *Florida and Sturgeon (2000)* separate the internationalisation process and the globalisation process, defining the former as the cross-border nature of the economic activities, and latter as the creation of institutionalised, functionally integrated systems. From this aspect,

internationalisation appears as a quantitative change, whereas globalisation represents a qualitative improvement, in the course of which the activity of the individual economic actors becomes part of an internationally coordinated scheme of processes.

In an industry survey, *Florida and Sturgeon (2000)* specified four different types of deployment in the area of automotive localisations, based on the motive of the activities and the qualitative assessment of the localisation (*Table 1*). Based on the model, the Central and Eastern European automotive industry centres, and particularly the automotive industry centres of the V4 region, correspond to location type 3, the key deployment factor of which is the cheap labour force and the established infrastructure, while the motive of deployment is the rationalisation of manufacturing processes and minimisation of its costs. The degree of integration in the value chain remains at a low or medium level; production is typically made for external markets, and thus a substantial part of the sales revenue comes from the settlement between the foreign parent and the domestic subsidiary. According to the theory, in model type 3 the activities representing low value added are outsourced, while development almost completely remains the competence of the parent company.

	Type 1	Type 2	Type 3	Type 4
Direction of strategy	Closeness of markets, corporate competitive advantages	Closeness of markets, corporate competitive advantages	Cost reduction, rationalisation, efficiency	Market coverage
Capacity level	High	High	High	Low
Wage costs	High	High	Low	Low
Development	Yes	Occasionally	No	No
Degree of integration	High	High	Medium	Low
Supplying industry base	High	Medium to high	Medium	Low
Export	Low (except for Japan)	Low	High	Low

Source: Edited based on Florida – Sturgeon (2000:13).

In his eclectic paradigm theory, *Dunning (1988)* examines the owner-specific and location-specific benefits, as well as the internalisation benefits of international capital investments. Combining this with the classification of deployments, *Dicken (1998)* created a general classification of direct capital investments (*Table 2*). According to Dicken’s theory, the automotive investments in the V4 region, initially –

after the political transitions in the 1990s – were clearly implemented with the aim of utilising local resources, but later on, with rationalisation of the already existing investments, they moved to the efficiency-improving phase. The proximity of the European markets also places the market-oriented phase at a reachable distance, and thus, according to the concept, a kind of mixed model of investment motives may appear in the region.

Table 2				
General classification of foreign direct investments				
	Enforcing strategic advantages	Market-oriented	Efficiency-improving	Exploiting local resources
Ownership-specific advantage	Long-term strategic goals, preserving international competitiveness	Increasing market success, controlling the local market	Rationalisation of already existing investments	Increasing competitiveness
Localisation advantage	Competitiveness of the above factors and the given regional level	Differences in costs, size and nature of market, government policy	Production specialisation and concentration of the national economies	Differences in the costs of the production factors
Internalisation advantage	Competitive and strategic advantages, risk mitigation, market control	Reduction of transaction costs, adjustment to the local requirements	Vertical corporate integration, corporate value chain	Price controls, market control

Source: Edited based on Dicken (1998:185).

The basis for the exploration of the deployment motives of direct capital investments in the automotive industry is presented by Porter’s competitive evolution theory (*Porter 1998*). According to this theory, each sector of a national economy can be placed in a phase of the evolution model, while the position fundamentally determines the deployment motives and the range of deployment factors considered during decision-making. When progressing in the model, the determinant factors change from price-sensitive input factors into human capital representing higher value added, and then – after a decline in the innovation motive – it points to the disappearance of the sector, to be replaced by the dominance of other sectors.

In the (1) factor-driven phase, the competitive advantage of the enterprises and the region originates from the general production factors, such as natural resources and unskilled, cheap labour force: the industries obtain a cost advantage. The enterprises usually have no relation with the end-users of the products, and thus the monitoring of market changes is also limited. In the (2) investment-driven phase, the basis of the competitive advantage is also represented by investments in general production factors and the resulting cost reduction, but knowledge and technology transfer also appears. The technology to be invested comes from abroad and is usually widely available in the world market. The duty of the economic policy

pursued by the general government is to improve the infrastructure background, provide skilled labour and spread entrepreneurial literacy and knowledge.

In the (3) innovation-driven phase, high, rising domestic demand urges companies to innovate, which then makes them capable of selling in the external markets with economies of scale advantages. The economy can no longer be characterised by isolated companies, as they are replaced by geographically concentrated vertical, and later, horizontal clusters. In the innovation-driven phase, the government policy is pushed into the background and the private sector's investments in factors of production start to dominate. In the (4) wealth-driven phase, enterprises lose their willingness to innovate, investors no longer invest in research and development to the necessary degree, and thus in the medium run the sector's world market position decreases. As a result of the risk-averse attitude, the region's economy moves to the stagnation phase, where only sectors with historic roots are able to remain globally competitive.

The group of the former Central and Eastern European socialist states appears in the automotive competition as a single market, where the competing national economies form a homogenous community with similar competitive advantages and disadvantages. During the deployment decisions of the sector, the sequence of strengths within the region is determined by the current deployment motives, the proximity of markets and suppliers, as well as the glut of the market (primarily the labour market), which is materially influenced by the governments' investment incentives. After the political transition in the region, the automotive manufacturers typically deployed the assembly of low value added, outgoing models to the V4 countries, for which it employed the labour force characterised by low wage level, and disciplined work culture.

According to the competitive evolution theory, in this period the region was clearly in the factor-driven phase, which after the turn of the millennium moved to the investment-driven phase as a result of the infrastructure developments and government policies. In the years that preceded the 2008 crisis, the OEM parent companies already also deployed certain innovation functions in the region, but this process ended as a result of the recession and it remained in the headquarter regions. Currently, in Porter's competitive evolution theory, the automotive industry of the V4 countries is moving from the investment-driven phase toward the innovation-driven phase, but the speed of the transition depends much more on the delegation of functions by the investor companies than on the host country's policy.

3. History of the automotive industry in the V4 countries

In a large part of the V4 region, industrialisation started with a delay and achieved limited results. The Czech Republic and Poland had major industrial production capacities, while industrial output and employment in Hungary and Slovakia were negligible. In the first half of the 20th century there was an intense period of industrialisation throughout Europe, which resulted, mostly due to central pressure, in pushing agricultural production to the background and focusing on industry. In Western Europe, one of the key sectors of industrialisation was the automotive industry, the development of which appeared as a priority in certain national economies. World War I and II diverted the automotive industry as well to serve war needs, but in the period of peace between the wars and after World War II, the sector focused on the needs of households and the private sector.

In the CEE (Central and Eastern Europe) region, the focus on the automotive industry was less prevalent in the process of industrialisation at the start of the century; the industrial centres focused much more on other sectors (e.g. heavy industry, textile industry, mining), while demand for vehicles were satisfied by import (*Lefilleur 2008*). In the second half of the 20th century, the manufacturing of cars became a priority in socialist countries, first based on Western licences, which was followed by production based on the internally enhanced licences (*Radosevic – Rozeik 2005*). Manufacturers primarily wanted to serve their own markets; sales outside the socialist bloc were rare and of low volume. Due to this, production volumes remained low, and the limited absorbing capacity of the markets and the cooperation among the member states also entailed the postponement of developments (*Lung 2004*).

After the political transition in Eastern Europe, the automotive industry lost its market and started to decline, and the inflow of foreign capital was necessary to turn the process around. By developing their own production capacity, the socialist countries created an opportunity for the assembly sector to strike roots in the region after the privatisation. The companies that invested during the privatisation were often already present in the region beforehand, and by expanding and restructuring their activity, initially they procured the assembly of their lower category and outgoing models, partly for the market of the region and partly for export (*Pavlínek et al. 2009*).

The presence in the new markets of the earlier industrial structures that were capable of adapting the manufacturing technologies, proved to be an adequate base for the Western European automotive companies' brown-field investments, as a result of which the automotive industry districts revived and started to develop. It can be stated that in the decade after the political transition, the industrial centres built on the socialist automotive industry base were one of the first to recover,

and – due to the exportable activity – to generate income and employment in the region (*Lux 2010; Bigos – Kiss 2005*).

Table 3 summarises the CEE region’s 20th automotive industry actors and sites until the political transition, inclusive. It can be observed that at several bases of the former socialist automotive industry, activities belonging to this sector are pursued at present as well; the industrial traditions clearly played a role in the deployment decisions after the political transition.

Table 3		
Socialist automotive companies in the V4 region		
	Settlement	Manufacturer
Czech Republic	Mlada Boleslav	Skoda
	Kvasiny	Skoda
	Liberec	Liaz
	Koprivnicka	Tatra
	Prague	Gottwaldov
Slovakia	Povazska Bystrica	Povazske Strojarne
Poland	Warsaw	FSO
	Sanok	Autosan
	Bielsko Biala	FSM
	Jelcz-Laskowice	Jelcz
	Lublin	FSC
	Tychy	Polski Fiat
Hungary	Győr	Rába
	Szentgotthárd	Rába
	Székesfehérvár	Ikarusz

Source: Own collection.

The Central and Eastern European automotive industry bloc appears as a kind of special production centre in the global manufacture of transport equipment, where after the political transitions, assembly subsidiaries of Western European OEMs were set up on the base of cheap labour force and automotive industry traditions. In 2015, 30 vehicle plants were operating in the V4 region, of which 15 were in Poland, eight in the Czech Republic, four in Hungary and three in Slovakia (*Table 4*). During the deployment processes, the proximity of both the markets and supplier networks was a determinant factor, as a result of which there is regional concentration in the sector.

Table 4			
Automotive industry centres in the V4 region			
	Settlement	Manufacturer	Brand
Czech Republic	Jablonec	Tedom	Tedom
	Kolin	TPCA	Toyota, Peugeot, Citroën
	Koprivnice	Tatra	Tatra
	Kvasiny	Volkswagen	Skoda
	Libchavy	SOR	SOR
	Mlada Boleslav	Volkswagen	Skoda
	Nosovice	Hyundai	Hyundai
	Vysoké Myto	Iveco	Iveco
Hungary	Esztergom	Suzuki	Suzuki
	Győr	Volkswagen	Audi
	Kecskemét	Daimler	Mercedes-Benz
	Szentgotthárd	Opel	Opel
Poland	Bielsko-Biala	FCA	Fiat, Lancia, Alfa Romeo
	Bolechowo (Poznan)	Solaris	Solaris
	Gliwice	Opel	Opel/Vauxhall
	Gliwice	Toyota	Toyota
	Niepolomice (Krakow)	Volkswagen	MAN
	Polkowice	Volkswagen	Volkswagen
	Poznan	Volkswagen	MAN
	Poznan	Volkswagen	Volkswagen
	Slupsk	Volkswagen	Scania
	Starachowice	Volkswagen	MAN, Neoplan
	Tychy	FCA	Fiat, Lancia, Ford
	Tychy	Opel	Opel/Vauxhall
	Walbrzych	Toyota	Toyota
	Wroclaw	Volvo	Volvo
	Wroclaw	Jelcz	Jelcz
Slovakia	Bratislava	Volkswagen	Volkswagen, Audi, Porsche, Skoda, Seat
	Trnava	PSA	Peugeot, Citroën
	Zilina	Hyundai	Kia

Source: Edited based on OICA (2015).

4. Position of the V4 member states in the global automotive industry

In the 21st century, the market of the automotive industry was fundamentally rearranged; the production hubs moved from Europe and North America to the developing regions, particularly to China and the BRICS countries. While at the turn of the millennium the aforementioned developed regions accounted for almost two-thirds of the output, by 2015 their share in production had fallen to 43 per cent. The outsourcing of production was partly attributable to market pressures (due to cost and production optimisation) and partly to the realignment of the markets, as a result of which the formerly closed Japanese and Korean producers also opened their production chain (*Gauselmann et al. 2010*). It is apparent that the 2008 global economic crisis fundamentally rearranged the automotive industry's output map as well; the advance of China was partially attributable to the OEMs' contingency measures (*Table 5*).

	2000	2005	2010	2015	Change 2000 vs. 2015 (percentage points)
China	4%	9%	24%	27%	+23
Europe	34%	31%	25%	23%	-11
North America	30%	25%	16%	20%	-10
Japan, Korea	22%	21%	18%	15%	-7
South Asia	4%	7%	9%	9%	+5
South America	4%	4%	6%	3%	-1
Middle East, Africa	1%	2%	3%	2%	+1

Source: Edited based on ACEA (2016).

In 2015, the automotive industry produced approximately 91 million vehicle (*Table 6*), which already exceeds the pre-crisis output level. One-third of the EU's total volume is produced by Germany; the 6 million vehicle produced annually makes the national economy the fourth largest – after China, Japan and the United States – automotive manufacturer of the world, and the largest in Europe. The V4 states account for approximately 19 per cent of the EU's total volume, which means the production of 3.5 million units. Slovakia, as the most dynamically expanding automotive producer of the region, reached an annual output of 1 million units by 2015; however, the Czech Republic is still the largest player of the sector in the region.

After the crisis, Poland's automotive industry capacities showed a gradual deterioration, while Hungary – following an opposite path – was able to increase

its output in the sector due to the continuous developments. Although the value added of Austria’s automotive industry represents a substantial ratio in the country’s gross domestic product, its final product volume significantly falls short of that of the V4 countries. This is attributable to the fact that the Austrian national economy is typically responsible for support activities of higher value added, while the manufacturing of final product remains in the regions offering lower input costs.

Table 6
Output of automotive original equipment manufacturers
(2015)

	Quantity	
	(thousand)	(EU %)
Czech Republic	1,303	7.2%
Poland	660	3.6%
Hungary	495	2.7%
Slovakia	1,000	5.5%
Austria	125	0.7%
Germany	6,033	33.2%
EU	18,177	100.0%
World	90,780	-

Source: Edited based on Eurostat (2016).

5. Position of the automotive industry in the V4 member states

In the following section, we analyse the Hungarian automotive industry in an international comparison. We primarily compare the sector’s value added, wage and labour productivity characteristics in the countries of the Visegrád region (Hungary, Poland, the Czech Republic and Slovakia), Germany and Austria, and of the European Union, based on the Eurostat’s SBS database and the records of the corporate income tax database.

Performance measurement at the company level is usually interpreted through successfulness (whether the determined objectives are realised) and economic efficiency (whether the objectives are realised through the economical use of the available resources), although the international specialist literature does not have a common position with regard to the measurement methods. At the micro level, the quantification of business productivity is usually captured by management accounting methods (e.g. activity-based life cycle or target cost calculation) and the Balanced Scorecard strategic indicators (*Wimmer 2002*).

Building on, among others, Porter's idea, according to which the competitive advantage often originates from the relation of the activities that form the value chain rather than from the independent activities (*Porter 1986*), we approach the automotive industry's performance measurement from a macroeconomic aspect. The most tangible indicators of these include the assessment of the enterprises' gross value added (GVA), labour cost and labour productivity.² According to a study on Hungarian labour productivity (*Palócz 2016*), the productivity of domestic enterprises, as regards the national economy as a whole, lags behind that of foreign enterprises to a larger degree than in the case of the neighbouring countries, and this gap does not narrow when examined based on time series.

The paper of *Gelei (2006)* comments on the situation of the Hungarian automotive industry, examining the supplier types and the basic competences of those in the domestic automotive industry's supply chain. The paper deals with the capability structure of automotive industry suppliers, according to which we can categorise domestic suppliers as those with capacity, product, adaptation, network and innovation competences. The key finding of the paper is that the development of corporate competitiveness can be fostered not only among the various supplier types, but also by internal quality improvement within the individual supplier groups, the key factors of which are the available capital and knowledge. Based on that, as a recommendation the author formulates that in relation to the competitiveness of the domestic SME sector it is of key importance that economic policy should support domestic enterprises in the acquisition of capital and knowledge.

The analysis by *Gelei – Venter – Gémesi (2011)* also draws a similar conclusion, according to which, it should be a priority for Hungarian economic policy to support domestic suppliers in developing competences and capabilities that help them satisfy more complex customer expectations and thereby move higher in the automotive industry pyramid. According to the study, Hungary already has a competitive supplier base, within which there are also a few innovative, complex domestic enterprises capable of complying with the customers' needs. Providing stronger economic policy support for these may have several positive impacts (*Gelei – Venter – Gémesi 2011:225*).³

In relation to the current domestic and regional challenges faced by the automotive industry, the specialist literature puts special emphasis on dealing with the situation of automotive industry clusters. In his essay, *Dominek (2012)*, highlights the heterogeneity of automotive industry clusters in the Central and Eastern European

² Labour productivity (in this paper this corresponds to productivity, i.e. the short version of the term) means the gross value added of the enterprises operating in the automotive industry divided by the number of employees. The value added originates from the Eurostat's SBS statistical database, and means factor cost-based value added. Calculation of the value added: gross operating income – operating subsidies and taxes.

³ The purpose of briefly presenting the specialist literature analysing the domestic and regional automotive industry is to provide additional sources for immersing in the topic and to describe the scientific background of the empirical examination. Due to limitations on length, we refrain from giving an international outlook, describing foreign case studies in detail and elaborating on the regional features.

region. While in Germany and Austria automotive industry clusters have a longer history and operate as network-oriented regional and business development tools, in the Central and Eastern European countries the biggest problem for the operation of clusters is the shortage of capital and the implementation of the various quality assurance systems, since these represent too big investments for the SME sector.

In the CEE region, both cluster management⁴ education and the legal regulation of clusters are still at an early stage (*Dominek 2012:212*). These findings are also corroborated by the paper of *Grosz (2012)*, according to which, the automotive corporate sector is not yet mature enough for the application of the cluster-oriented and network-oriented development tools. Reasons for this immaturity may include the absence of trust in each other and the low presence of independent products and developments, as a result of which clusterisation would represent an advantage for the participating companies only through the reduction of costs (*Grosz 2012:238*).

The sector in the economy of Germany, the largest European producer, represents a contribution weight of 4 per cent, providing 2 per cent of the employment (*Table 7*). Automotive industry in the V4 member states appears as a priority national economy sector. It accounts for more than 3 and 2 per cent of the gross value added (GVA) and employment, respectively, in all Visegrad states except Poland, thereby being twice the European average. The key motive for relocation is confirmed by the figures, according to which the V4 region, appearing as a more or less uniform region, is below 40 per cent of the EU's automotive industry wage average, and thus the unskilled labour force with low wages is still the largest competitive advantage in the region, serving as a basis for the deployment motives.

Table 7
General indicators of the automotive industry
(2014)

	Automotive industry GVA (gross value added) (as a ratio of total GVA)	Employment (as a ratio of total employment)	Labour costs (EUR/person/month)
EU	1.5%	1.0%	3,998
Czech Republic	4.3%	2.9%	1,561
Poland	1.5%	1.1%	1,209
Hungary	3.9%	2.0%	1,430
Slovakia	3.5%	2.8%	1,562
Austria	1.3%	0.7%	4,981
Germany	4.0%	2.0%	5,918

Source: Edited based on Eurostat (2016).

⁴ Cluster management means the management of the business clusters, the representation of their interest and the institution of coordination.

The share of value added in the production value⁵ shows the role of the activities deployed in the V4 states in the value chain of the sector (*Table 8*). It can be observed that while the parent countries of the OEM companies produce values around 30 per cent in the indicator, the CEE region – and within that the V4 member states – performing assembly activities, hardly reach 20 per cent, i.e. they typically perform activities that represent lower value added.

The share of the value added, measured in the production value, is carried on to labour productivity indicators, and thus the value added per automotive industry employee ratio reflects a difference of similar degree. Germany shows a value of EUR 106,000, which is well above of the EU average, while the V4 members states, varying at half of the community average, hardly exceed one-third of the German efficiency. Austria’s labour productivity is identical to that of Germany, which assumes, in addition to the efficient utilisation of labour force, the performance of activities of higher value added and the competitive advantage arising from technological maturity.

Table 8
Production and efficiency indicators of the automotive industry
(2014)

	Value added (as a ratio of the production value)	Labour productivity	
		(EUR/person/year)	(EU %)
EU	25.5%	68,764	100.0%
Czech Republic	20.0%	43,694	63.5%
Poland	21.8%	31,963	46.5%
Hungary	17.9%	45,268	65.8%
Slovakia	12.7%	39,759	57.8%
Austria	28.4%	104,336	151.7%
Germany	32.1%	106,661	155.1%

Source: Edited based on Eurostat (2016).

In the Visegrád region, automotive industry has the largest role in the national economy in Hungary and in the Czech Republic. In the total value added of the national economy, the share of the automotive industry rose by almost 3.5 percentage points in Hungary between 1995 and 2014. Of this, growth of almost 1 percentage point occurred after 2012. While a similar process can be observed in the Czech Republic and Slovakia, in Poland the ratio of the automotive industry’s value added compared to the whole economy value added rose by less than 0.5 percentage point between the early 2000s and 2014, which lags behind the regional

⁵ Production value means the definition used in the Eurostat SBS statistics: production value is sales revenue adjusted for changes in inventories, aggregated at the level of the sector.

average. In Austria, the weight of the automotive industry within value added practically stagnated between the mid-1990s and 2014.

Among the countries reviewed, the presence of the sector in the value added was around 3 per cent in Germany already in the early 1990s (with that being the highest one among the countries under review); Germany was able to preserve the high ratio, and even increased it. On the other hand, among the countries examined on the basis of the value added, Germany has lost its leading role by now. Compared to the EU average, the automotive industry is overrepresented, in terms of value added, in the Czech Republic, Hungary, Germany and Slovakia.

Of the Visegrád countries, the highest contribution to the EU's automotive industry value added has been made by the Czech Republic since 2004. It is followed by Poland and Hungary, with Slovakia coming in last. This is also related to the size of the region's countries; nevertheless, the Czech contribution is still outstanding even if this aspect is taken into consideration. Between 2003 and 2014, the Czech Republic increased its share within the value added of the EU's automotive industry production by roughly 2 percentage points, which is attributable, among others, to its historic features (it is traditionally an industrial/engineering industrial country) and its closeness to Germany.

In 2014, Germany accounted for more than 50 per cent of the European automotive manufacturing value added. With this, Germany managed to increase its European weight in the sector by more than 10 percentage points compared to 2000. The strengthening of the German contribution may be attributable to the export orientation and successful business policy of the German automotive enterprises, as well as to the outsourcing of their activities to Central and Eastern Europe.

In Hungary, the automotive industry is highly productive compared to the national economy, but this is the result of the large companies' high productivity. The purpose of the size-based assessment criterion is to present the labour productivity, in the countries under review and in the EU, of the various enterprise sizes pursuing activity in the automotive industry and the relation of this to the intra-industry average and the general productivity of the national economy. In order to determine this, we compared the value added by the individual automotive enterprises to the number of their employees.

As regards the measurement of labour productivity, it should be noted that the difference between the individual countries in this area is attributable to the different degree of capitalisation and capital intensity, rather than to the quality of the labour force or organisational reasons. In Hungary, German-owned companies pursue activity of higher capital intensity than the Hungarian-owned companies, but lower than they would pursue in Germany. The automation that pays off in

Germany under a given capital and labour cost ratio, does not necessarily pay off in Hungary under different capital and labour force proportions.

Thus, when examining the case of the Visegrád region, it is the higher capital intensity that leads to the fact that – of the countries under review – usually the companies that pursue activity in the German automotive industry are the most competitive, while foreign-owned enterprises operating in the territory of the V4 region are of medium competitiveness, but they are more competitive than the domestic-owned ones, and the least competitive enterprises are those in the majority interest of one of the V4 countries. The phenomenon could be resolved by increasing the Hungarian automotive industry's domestic value added and innovation capacity, as part of a longer-term process.

As regards labour productivity, throughout the EU the automotive industry exhibits higher productivity than the productivity of the whole national economy, and the ratio of this is the highest in Hungary among the countries under review. It follows from this that the sector in Hungary has a preferred position within industrial production, which may also be taken into consideration when making investment and reinvestment decisions. On the other hand, the higher productivity advantage also highlights the fact that the Hungarian industrial structure is too concentrated and it would make sense to diversify it, to ensure that upon an eventual automotive industry “shock” the economy remains competitive without a large loss.

Based on the data, it can also be established generally that no matter which country we examine, the labour productivity of large companies will always be materially higher than that of any smaller enterprise, due to economies of scale reasons. However, in Hungary the productivity of SMEs lags behind that of the large companies to a greater degree, but in part this is the result of the larger enterprises' outstanding labour productivity.

Compared to the national economy productivity, apart from the outstanding Hungarian value, the automotive industry's productivity is higher by one and a half times only in Germany and Austria. In a comparison based on enterprise size, Slovakian SMEs are more productive than in other countries of the Visegrád region, and Austrian SMEs are the most productive in the group of countries under review. In the cluster of large enterprises, Polish companies are the least productive, but this is related to the fact that the domestic market is larger in Poland and there are a higher number of domestic large enterprises. When comparing smaller enterprises to the labour productivity of large enterprises, the Slovakian, Polish and Austrian business activities perform the best, while the Hungarian, Czech and German SME sectors are less productive than the EU average (*Table 9*).

Table 9
Labour productivity of certain enterprise sizes in the automotive industry
 (2014)

(EUR/person/year)	Micro	Small	Medium	Large	Automotive industry	National economy
EU	68,764	37,347	47,880	73,523	68,764	55,105
Czech Republic	11,079	19,730	24,872	47,556	43,694	27,712
Poland	12,178	19,369	23,671	34,057	31,963	23 171
Hungary	21,546	18,746	23,512	49,093	45,268	20 720
Slovakia	14,815	30,111	30,876	41,395	39,759	30,847
Austria	35,663	67,903	79,325	113,653	104,336	69,067
Germany	32,770	54,006	65,423	111,253	106,661	61,426
	Automotive industry / National economy	Micro / Large	Small / Large	Medium / Large	Labour productivity	
EU	125%	94%	51%	65%		
Czech Republic	158%	23%	41%	52%		
Poland	138%	36%	57%	70%		
Hungary	218%	44%	38%	48%		
Slovakia	129%	36%	73%	75%		
Austria	151%	31%	60%	70%		
Germany	174%	29%	49%	59%		

Source: Edited based on Eurostat (2016).

The productivity of the domestic enterprises is lower than that of the non-resident ones in all countries under review, but the difference is the largest in Hungary. The productivity of the automotive enterprises with domestic majority interest is the lowest in Hungary in the Visegrád region; here the labour productivity of the domestic automotive enterprises reach only 36 per cent of those under foreign control. In the region, the productivity of the automotive enterprises with domestic majority interest is the highest in Slovakia, where the labour productivity of domestic automotive enterprises reaches 67 per cent of those under foreign control. Of the countries under review, the productivity of the automotive enterprise in domestic majority interest is higher than that of the foreign-controlled companies only in Germany. However, this is a clear consequence of the German automotive industry’s position in Europe and globally (*Table 10*).

Table 10
Labour productivity of enterprises in resident and non-resident majority interest

(EUR/person/year)	Resident	Non-resident	Ratio ⁶	Ratio of non-residents in value added
Czech Republic	18,863	43,069	44%	92%
Poland	19,866	36,292	55%	87%
Hungary	17,553	48,124	36%	94%
Slovakia	24,657	36,604	67%	93%
Austria	66,469	102,163	65%	77%
Germany	105,410	55,153	191%	12%

Source: Edited based on Eurostat (2016).

6. Efficiency of the Hungarian automotive industry⁶

Although the Eurostat database does not link the aspects of resident versus non-resident ownership with the enterprise size, and therefore a simultaneous analysis of these two criteria is not possible, there may be a strong relation between the Hungarian ownership and the smaller size. Thus, the underlying reason for the different productivity may be also attributable to differences in size and economies of scale considerations rather than to the nationality of the ownership, also in the case of the ownership background criterion. On the other hand, it is not inevitable that the productivity of the Hungarian-owned and/or smaller size enterprises should lag behind that of their international and/or larger peers. To confirm this, below we present two innovative, Hungarian-owned automotive enterprises with relatively high productivity.

Hajdu Autotechnika is a medium-sized enterprise, while Csaba Metál limited company is a large enterprise. Both companies show that there are examples when the Hungarian-owned enterprises are almost able to match the maturity level, technology or productivity of the foreign-owned enterprises of identical size. In recent years, these two companies have substantially improved their position within the value chain as a result of the improved and available foreign language skills of the management, compliance with quality assurance systems and obtaining the certificates, the existence of personal relations with other companies and maximum utilisation of the opportunities arising from those (e.g. export or knowledge transfer), as well as the implementation and use of an adequate corporate governance system. In addition, Csaba Metál is making further efforts to raise its position in the value chain by the infrastructure development of its site, the improvement of its corporate relationship network and by expanding its team of experts.

⁶ Ratio of the labour productivity of enterprises in resident and non-resident majority interest.

With a view to making further progress, Hajdu Autotechnika has enhanced the company's learning capability and activity, separated the company's range of activities, organises courses and trainings, and by efficiently capitalising on market competition, taken over tasks from other suppliers.

As a result of the aforementioned efforts, Csaba Metál raised its labour productivity per employee from HUF 3.3 million to HUF 5.2 million between 2005 and 2011, while Hajdu Zrt. increased it from HUF 2.2 million to HUF 9.9 million; thus both of them can be regarded as large and medium-sized companies which have been successful in innovation (*Kazainé 2013; Kiss 2013*). Csaba Metál made a significant progress first of all compared to itself and improved its business organisation in an exemplary manner, while Hajdu's labour productivity exceeded the average of the Hungarian automotive medium-sized companies by HUF 3–4 million by 2011.

In our paper, we also conduct primary research on the domestic base of the automotive industry, as part of which, we analyse the corporate tax return database of the Hungarian tax authority (NAV). Our objective is to verify the Eurostat's macro data, constructing them from micro level, and to eliminate the statistical bias using our own methodology. We make enquiries on the corporate tax return for the enterprises with TEÁOR (Standard Classification of All Economic Activities) codes of 29 (manufacture of road transport equipment), and then estimate the production and value added from the profit and loss accounts, based on our methodology. We identify the production value roughly with the sales revenue (this time we ignore the inventory adjustments), while we interpret value added as the sum of personnel costs, operating profit/loss and depreciation charges. In order to ensure a more pure analysis, we eliminate from the received database the companies that have zero or negative operating profit/loss in the current year and those without employees.

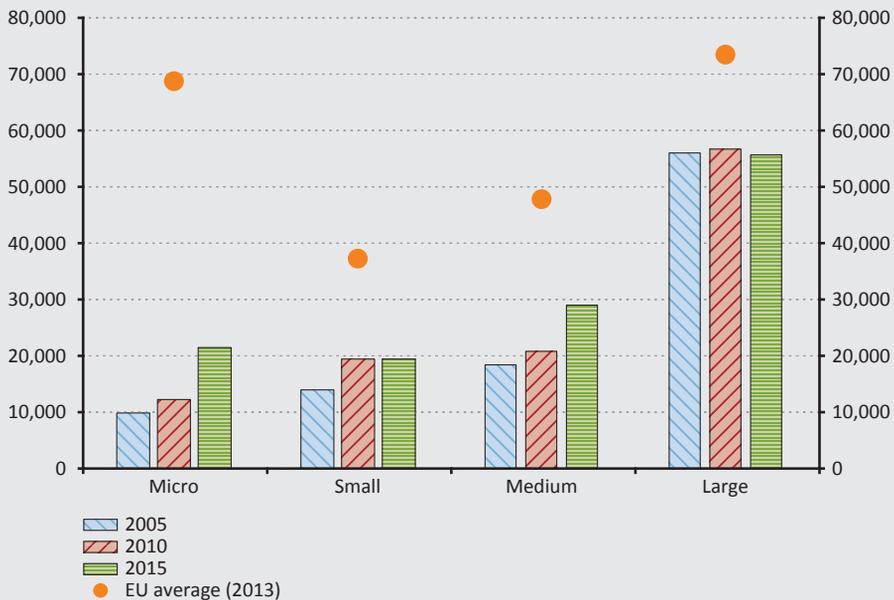
Our database identified 406 enterprises under the automotive industry TEÁOR codes in 2005, of which, after the eliminations (based on the current year's sales revenue, profit/loss or employment criteria), 246 companies were left for the analysis. Having differentiated this based on the number of employees, in 2005 the database contained 118 micro, 64 small, 33 medium and 31 large enterprises, representing a share of 48, 26, 13 and 13, respectively, in the sample. In the 10-year period under review, the number of the sector's actors and their distribution based on size was more or less the same, with a minor shift towards the large corporate sector.

In our paper, we interpret labour productivity as the value added divided by employment, and estimated it at the sector level from the Eurostat macro statistics in the countries involved in the analysis. In the case of Hungary, we also calculate the production efficiency from the aggregate data of the automotive enterprises, obtained from the NAV database, and then compare the results with the Eurostat data. The results obtained in the primary research somewhat differ from the Eurostat

figures, as the purpose of the different methodology and the database cleansing is to eliminate the accounting distortions. A further difference in the methodologies is that while the Eurostat-SBS data are available in euro, the NAV database contains forint data, which we convert to the single currency using the official MNB HUF/EUR exchange rate applicable to the period (2005: 248.05; 2010: 275.41; 2015: 309.90).

Based on the results obtained from the NAV database using our own methodology, it can be stated that according to the size-based differentiation the heterogeneity of the labour productivity can be identified in the Hungarian automotive industry (Figure 1). In 2005, the SME sector's productivity was roughly one-quarter of that of the large enterprises, but by the end of the period under review, the SMEs' productivity measured against that of the large enterprises rose to roughly 50 per cent. The reason for the narrowing of the gap is that while the micro, small and medium-sized enterprises substantially increased their efficiency between 2005 and 2015, the productivity of the large corporate sector decreased slightly. However, the increase in the labour productivity of the entire sector falls short of the SME sector's data, as due to the composition effect, mentioned earlier, the output weights shifted toward the large corporate sector.

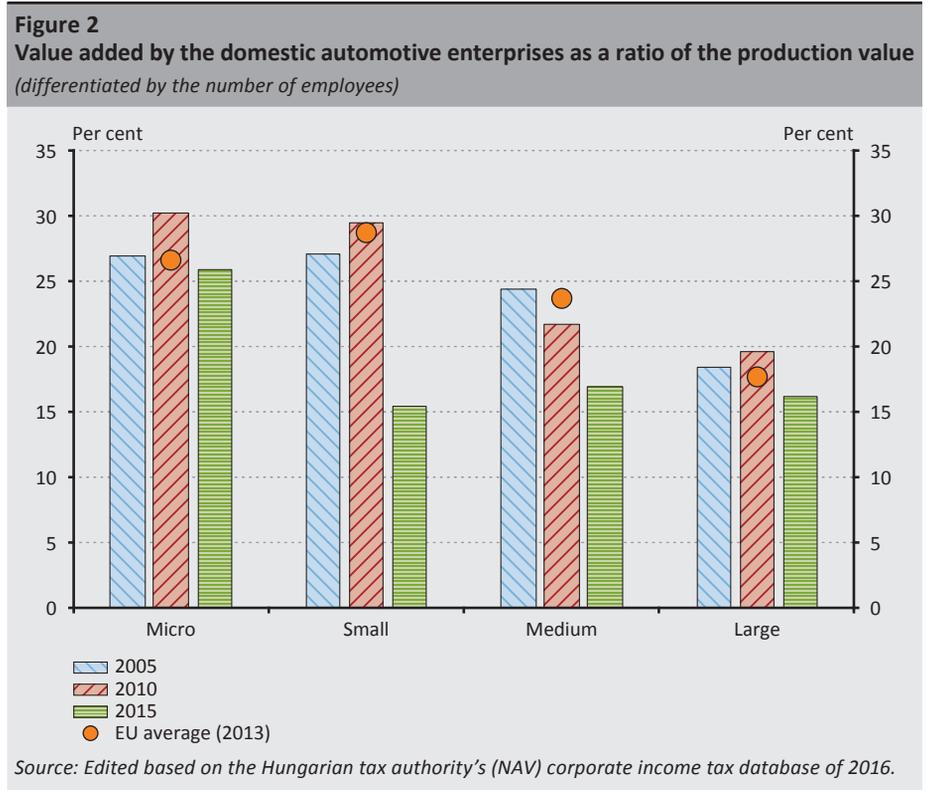
Figure 1
Labour productivity of the domestic automotive enterprises
(differentiated by number of employees, EUR/person/year)



Source: Edited based on the Hungarian tax authority's (NAV) corporate income tax database of 2016

The ratio of the automotive industry’s value added measured in the production value reflects the enterprises’ position in the sector’s value chain. The low value – calculated from the Eurostat statistics – presented before, is characteristic of the automotive industry, as a production sector (where the supplier value has a high share in the sales revenue) and it is also attributable to the low position of the domestic players of the sector in the value chain. On the whole, based on the NAV database it can be established that – at an aggregate level – the Hungarian automotive sector’s value added decreased in the production value during the period under review (Figure 2).

The values of the small, medium and large enterprise sector all decreased in the last 10 years, with drastic deterioration particularly in the position of small enterprises, which saw a fall of 10 percentage points. The decrease in the share of value added in the production value can also be identified as an industry trend, but to a much greater degree this is attributable to the failure to deploy functions with higher value added in the V4 region. The figures evidence that in the pre-crisis years Hungary was characterised by an increase in the share of the value added in the SME sector, but since 2009 we can see an opposite trend, except for the micro segment.



In the micro segment, if we take into consideration only companies with more than 5 employees, the effect of the owners' own contribution can be eliminated from the sample and their impact on the efficiency ratios can be minimised. It can be established from the results obtained that when we examine micro enterprises with 5 to 9 employees, there is a material shift in the efficiency indicators. When calculating with the new sample in the labour productivity, efficiency fell by 12, 18 and 16 per cent in 2005, 2010 and 2015, respectively, compared to the entire sample, and thus the elimination of the employers resulted in a decline in productivity. The narrowing of the sample also caused significant differences in the size of the value added measured in the production value, but the change is not one-way. There was growth of roughly 3 per cent in 2005 and 2010, while in 2015 there was a fall of more than 4 per cent.

On the whole, it can be stated that the results obtained in the primary research are in line with the Eurostat indicators, despite the methodological differences, and the research performed on the basis of the NAV database confirmed the earlier findings. In the productivity indicators we supported the primary research with the assumption that micro, small and medium-sized enterprises' productivity is roughly the same, currently at less than half of large enterprises' efficiency. However, the degree of the lag decreased substantially during the 10-year period reviewed, as the SME sector's productivity level is approximating that of the large enterprises which show stagnating productivity.

7. Summary

The automotive industry is a sector representing high and increasing weight both in Europe and globally, with different roots in the individual countries. In the CEE region, however, its weight has continuously increased since the political transition. From the end of the 20th century, a kind of relocation process has been observed in the automotive industry, as a result of which the West European original equipment manufacturers deployed certain segments of the production value chain to Eastern Europe. The implementation of the process came as an opportunity offered by the political transition in the former socialist countries and it also became a necessity due to cost-cutting pressure from the market.

The subsidiaries typically performed lower value added, manual assembling activities, while the development functions remained in the competence of the parent company. The motives of the relocation included cheap labour market and the proximity of markets, as well as the flexible labour market and labour market regulation, cheap industrial sites (property) and the favourable taxation. The region's cost and competitive advantage remained in place during the twenty-five years that elapsed since, but the extent thereof decreased in the global market.

In the V4 region (and thus in Hungary as well) the productivity of the automotive industry is well below the EU average and particularly the core areas (Germany, Austria). This is attributable to the fact that the domestic enterprises have technological and economies of scale disadvantages, and as a result of their position in the value chain, they perform low value added activities. Since the 2008 economic crisis, the automotive OEMs relocated a number of activities – of higher value added – to the core regions, and stopped the planned outsourcings to the periphery regions.

The future of the automotive industry in the V4 region has come to a junction, and the path forward essentially leads in two directions. One opportunity is that by the extensive development of the sector, the number and production volume of the assembly plants deployed so far may be expanded: this, however, would mean the continued performance of low value added functions and the absence of development activities, and the provision of cheap labour force which will be increasingly challenging for the host regions in the future. The other possible direction may be the intensive development of the industry, which involves the strengthening of the domestic supplier base and the integration of the development functions instead of the assembly activities. The intensive route diverts the companies toward the employment of qualified labour force, and may encourage the players of the sector to perform development activities. All of this requires the enhancement of the R&D infrastructure and the education of the human resources participating in the developments, which appear as future challenges for the V4 countries' governments and enterprises.

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