2 The European Automotive Industry in a Global Context

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2.1 Economic Importance

2.1.1 Overview

The automotive industry is one of Europe's biggest industries. It contributes about 6% to total manufacturing employment and 7% to total manufacturing output in Europe making it a major driver of the European economy. Employment in the EU motor vehicle industry amounts to 1.9 million employees and annual value added produced is about EUR 114 bn. The US automotive industry produces about the same volume (in value added at current exchange rates). However, employment figures are only 60% of the European level thus exhibiting a significantly higher level of labour productivity per employee. Japan's automotive production volume is about 65% of that of the EU-15 or the US; with only 56% of the US employment level, the Japanese industry boasts even higher labour productivity levels than the US.[2] However, labour productivity growth has been consistently higher in the EU-15 since the early 1990s, so that European automotive manufacturing productivity is in a continuous process of catching up with the US and Japan. Catching up has continued since 1995, contrary to evidence about a relative European slowdown since the mid-90s in total manufacturing. However, the relative sizes of the three big regions of automotive production have not changed very much during the last decade or so.

In addition to its own size, the automotive industry generates more economic activity through various backward (to supplier industries) and forward linkages (to customers). A comparison of total production, value added, production volumes and imports for the EU-15, the USA and Japan, puts imports and value added, respectively, at roughly a quarter of total production. This is evidence for upstream inputs of up to two times the volume of value added in the automotive industries. Inspection of input-output tables supports these findings. E.g. in Ger-

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[2] Employment figures in automotive industry vary significantly according data source. E.g. OECD/STAN data reports about 950,000 employees for the USA whereas US BLS (the original data source) reports around 1.2 million employees. Similar differences can be found with respect to Japan. Even more, there seem to be differences with regard to the (detailed) definition of what belongs to the automotive sector, and it seems that in some countries different definitions of the sector are employed with regard to output figures (production value, value added, etc.) and labour input figures. Hence, one should be extremely cautious when comparing productivity figures (level) across countries.

many, backward linkages provide products worth about EUR 1.3 for every euro in final demand for automotive production.

Probably due to differences in outsourcing behaviour along the value chain, the domestically generated value added component in total vehicle production has increased in the EU-15 while it was about stable in Japan and fell in the US. This might have been exacerbated by a relatively high decrease in total manufacturing relative to GDP in Europe and the introduction of domestic content requirements following NAFTA in the US.

It is noteworthy that the EU-15 automotive industry is highly concentrated with Germany alone accounting for close to half of total value added generated. The six largest national industries, i.e. Germany, France, the United Kingdom, Italy, Spain, and Sweden account for over 90% of total value added generated.

Nevertheless, since the total manufacturing sector is shrinking relative to the service sector in advanced economies, i.e. total manufacturing is less than one third of total domestic product, the automotive industry accounts for less than 2% of GDP in the USA, Japan and the EU-15. Likewise, the automotive industry provides less than 1.5% of total employment in these regions. Hence its importance follows to a large degree from linkages within the domestic and international economy.

While the automotive industry is not a high-tech industry in the strict sense, it is a major driver of new technologies and of the diffusion of innovations throughout the economy. Almost 20% of all R&D in manufacturing is undertaken by car manufacturers. Its close links to many other manufacturing sectors (such as chemicals, plastics, electrical and electronic parts, etc.) contribute to the rapid diffusion of new technologies. Moreover, the industry is an important demand source for innovations from other industries, including high-tech sectors such as ICT.

Finally, motor vehicles are one of the most important consumer goods in terms of total household expenditures. As motor vehicles are the largest durable consumer goods in terms of expenses (next to housing), demand for motor vehicles is highly correlated with and contributes to general growth and business cycle movements.

2.1.2 Value Added

The automotive industry contributes about 6% to total manufacturing employment and 7% to total manufacturing output in Europe. Employment in the EU motor vehicle industry is in excess of 1.9 million and annual value added produced in excess of EUR 114 bn.

Table 1. Value added in motor vehicles in EU, USA, Japan

		2000	2001	2002
EU-15	EUR mn	117,154	118,156	114,170
USA	USD mn	120,400	109,334	120,800
	EUR/USD	1,086	1,118	1,062
	EUR mn	110,866	97,794	113,748
Japan	JPY bn	8,129	8,753	9,254
	1000 JPY/EUR	0.1078	0.1215	0.1253
	EUR mn	75,408	72,041	73,855

Source: VDA, International Auto Statistics 2003. OECD/STAN and own calculations.

Total value added produced in the motor vehicle industry in the EU-15 was about the same in 2002 as in the USA – roughly EUR 114 bn at current exchange rates. A similar calculation for Japan puts that the country's motor vehicle value added about 35% lower at EUR 74 bn.

Within the EU, the largest national motor vehicle industries by percentage of total EU-15 value added in 2002 were Germany (45%), France (17%), the United Kingdom (11%), Italy (7%), Spain (7%) and Sweden (6%). Together, these six countries account for about 93% of motor vehicle production within the EU-15.

Table 2. Value added in motor vehicles in the EU by country in 2002

Year	EUR mn	% of EU total
Austria	2,223	1.95
Belgium	2,774	2.43
Denmark	345	0.30
Finland	344	0.30
France	19,047	16.68
Germany	51,490	45.10
Greece	75	0.07
Ireland	145	0.13
Italy	7,967	6.98
Luxembourg	n/a	n/a
Netherlands	1,766	1.55
Portugal	968	0.85
Spain	7,665	6.71
Sweden	6,840	5.99
United Kingdom	12,521	10.97
EU-15	114,170	100.00

Source: VDA, International Auto Statistics 2003.

Value added[3] in motor vehicles as a percentage of value added in total manufacturing has been stable since 1991 in Japan and the EU-15 but increased signifi-

[3] Source: OECD/STAN data.

cantly in the US. In 1991 it was about 8% in Japan, 4% in the US, and 6% in the EU-15. Up to the year 2000, this percentage grew to 9% in Japan, 8% in the US and 7% in the EU-15.

Within the EU, motor vehicles are most prominent as a percentage of manufacturing value added 2002 in Sweden (15%), Germany (13%), France (10%), Spain (7%), Belgium (7%), Austria (6%), UK (5%) and Italy (4%). All other EU member countries have percentage rates of below 4%.

This supports the notion of an industry concentrated in a few countries. Since in the EU-15 as a whole, automotive value added accounts for less than 2% of total GDP, it follows that it is rather negligible in about half the EU countries. More precisely, this ratio is less than 0.5% in Denmark, Finland, Greece, the Netherlands and Portugal. Note that it is also less than 0.5% in the US.

2.1.3 Employment

In the year 2002, the motor vehicle industry employed 1.91 million workers in the EU-15, 1.15 million in the USA, and 0.65 million people in Japan, respectively. From 2000 to 2002 employment in the USA decreased by about 12%, whereas it fell more moderately in EU-15 (by 2%) and in Japan (by 5%).

Since the ratios of value added and employment suggest much higher labour productivity levels in Japan and the US than in the European Union, the relative employment dynamics of the US and the EU indicate a slowdown in the catching-up process of the European auto industries since the turn of the millennium.

Table 3. Employment in motor vehicles in EU, USA, Japan (thousands)

	1999	2000	2001	2002
EU-15	1,901	1,944	1,933	1,907
USA	1,312	1,313	1,212	1,151
Japan	705	683	664	646

Source: VDA, International Auto Statistics 2003. OECD/STAN and own calculations.

Employment in the motor vehicle industry as percentage of employment in manufacturing[4] in Japan, the USA and the EU-15 increased by about one percentage point from 1991 to 2000. The highest percentage in both years was in Japan, where it grew from about 6.5% in 1991 to 7.5% in 2000. This is followed by the EU with an increase from 5.5% to 6.5% during the same period. The USA exhibits the lowest levels over the same period, moving from 4.5% to 5.5%. However, since industrial production is only a fraction of total production in these three regions, this translates into less than 1.5% of total employment in the respective economies. Between 1995 and 2000, this percentage remained roughly stable at 1.4% in Japan, 0.7% in the USA, and 1.1% in the EU-15. The table also shows that the automotive industry is in a critical situation in all three regions. Since

4 Source: OECD/STAN data.

2000 a significant drop in the number of employees can be observed in the US. Also, Japan and the EU show a trend towards lower employment figures in recent years. However, looking at the long-run trend employment in the EU automotive industry is still increasing.

Within EU-15, 45% of employment in vehicle manufacturing was in Germany in the year 2002. Other major employers are France (14%), the United Kingdom (11%), Italy (9%), and Spain (8%).

Table 4. Employment in the motor vehicle industry in the EU by country 1999-2002 (thousands)

Country	1999	2000	2001	2002
Austria	28.2	29.1	30.7	30.2
Belgium	52.7	53.9	53.2	51.0
Denmark	8.1	7.5	7.1	6.5
Finland	7.3	7.5	7.2	7.1
France	273.9	277.3	276.8	273.2
Germany	835.5	855.6	867.6	866.6
Greece	1.7	n/a	n/a	n/a
Italy	181.0	178.8	175.8	163.9
Ireland	3.3	3.4	3.7	3.5
Luxembourg	n/a	n/a	n/a	n/a
Netherlands	28.0	28.0	26.8	26.8
Portugal	24.4	28.2	20.9	20.0
Sweden	72.3	77.5	79.1	80.6
Spain	159.5	165.6	161.9	158.5
United Kingdom	224.7	231.3	222.4	219.2

Source: VDA, International Auto Statistics 2003.

Within the EU, percentages of manufacturing employment in the motor vehicle industry in the year 2000 are largest in Germany (11%), Sweden (10%), Belgium (8%), Spain (7%) and France (7%). These numbers have increased since 1991 by about half to one percentage point in all those countries with the exception of France, where that percentage rate remained stable.
A similar picture emerges when looking at individual EU countries' employment as a percentage of total employment in the respective national economies. In the year 2000, this percentage was the highest in Germany (2.4%), Sweden (1.8%), Spain (1.3%), Belgium (1.2%), France (1%), and Italy (0.75%).

2.1.4 Production, Backward and Forward Linkages

In addition to its own size, the automotive industry generates more economic activity through various backward and forward linkages. A first indicator of backward linkages is the ratio of total production to value added, since the difference between production and value added are inputs. Generally, value added in motor vehicles is about one quarter of total production in motor vehicles.

Measured in current USD and using OECD purchasing power parities[5], production in motor vehicles[6] has remained roughly constant in Japan at about USD 250 billion. In the US production increased from USD 200 billion in 1991 to USD 400 billion in 2000. In the EU-15, production increased during the same time frame from USD 300 billion to USD 550 billion.

Between 1991 and 2000, value added as a percentage of total production in motor vehicle manufacturing[7] has been between 20 and 30% in Japan, the USA and EU-15. While this percentage has increased in Japan (25% to 27%) and the USA (22% to 30%), it has dropped in the EU-15 (30% to 22%) from the beginning to the end of that time period.

In comparison, between 1995 and 2000, value added as a percentage of total production has increased by about 10% in Japan while it fell by about 10% each in the US and the EU-15. Since automotive value added as a percentage of manufacturing total was slightly increasing in all three regions, the different directions of trends seem to reflect general trends in manufacturing.

The explanation for the different movements in value added relative to production in Europe and the US might therefore be found in two recent developments. Firstly, outsourcing has recently been developed to a higher degree in the EU than in the US. Secondly, the introduction of domestic content requirements in the US following the ratification of NAFTA may have contributed to the observed trend in the USA.

This gives a first rough estimate of backward linkages, i.e. production of inputs demanded by motor vehicle manufacturers. Since a part of these inputs are foreign imports, they have to be subtracted to obtain the domestic backward linkage effect. As imports account for approximately 25% of total production on average, this results in a backward linkage effect of a magnitude of 2. Consequently, each dollar, euro or yen of value added in motor vehicles demands approximately two more dollars, euros or yen of domestic inputs for production. A similar effect would be expected for employment relationships.

A more precise way of quantifying the magnitude of backward linkages is through input-output tables. We restrict the analysis to the latest available input-output tables for Germany (published by the Statistical Office in December 2003) as EU-wide input-output tables are not available. Figure 1 shows the impact of a EUR 1 increase in final demand for cars on production values and imports (in EUR) of goods produced by the automotive sector itself and other sectors. It is important to bear in mind that the coefficients presented there also account for indirect effects including the additional demand for cars as response to an increase in the induced output of other sectors. The interpretation is straightforward. The main impact of an increase in final demand for cars is visible in the automotive sector where the production of automotive products (including parts) increases by EUR 1.4. Not surprisingly, an increase in the demand for cars has a large impact

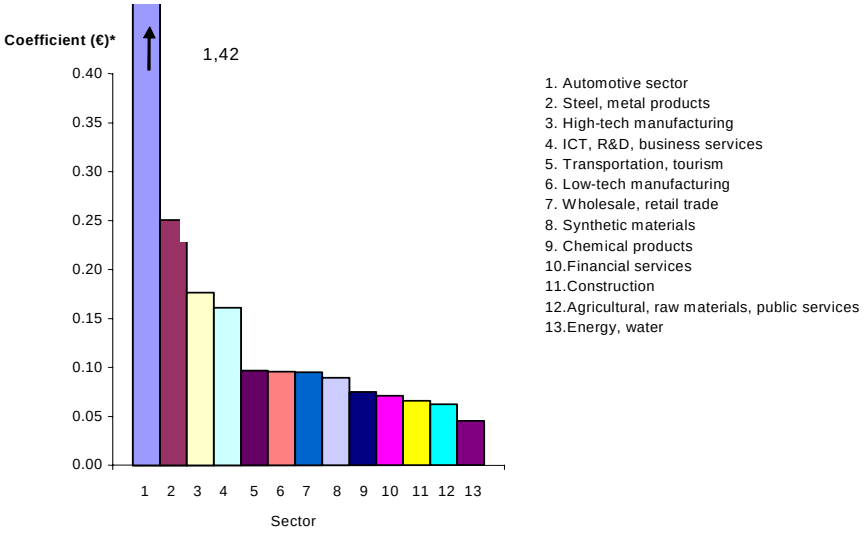
5 Note that this results in European production being relatively higher when compared to using industry association data with current nominal exchange rates.

6 Source: OECD/STAN and own calculations.

7 Source: OECD/STAN and own calculations.

on steel production, the metal working industry, high-tech manufacturing (i.e. mechanical and electrical engineering, measurement and control, electronics, etc.), chemical products and rubber.

Fig. 1. Backward linkages of final demand for automotive products in Germany



* The coefficient shows the impact of a EUR 1 increase in final demand for cars on production values and imports (in EUR).
Source: ZEW calculations using data from the Federal Statistical Office Germany.

Surprisingly, there are strong links between car production and several service sectors namely business services (including R&D and IT services), financial services, transport and trade. In sum, service sector output is raised by nearly EUR 0.5. Low-tech sectors are also linked through the supply chain to the automotive sector, however. These links through the value chain also demonstrate the importance of the automotive sector as an engine for growth and employment. Although this data only refers to the German automotive sector, the results probably hold for other EU countries as well. In a recent study Garel Rhys (2000) reports various estimates linking employment in the automotive industry and the rest of the economy. He concludes that one should expect an “employment multiplier” between the automotive sector and the rest of the economy in the magnitude between 1:0.6 and 1:1.4. These estimates are in line with the estimated link which indicates a 1:0.9 relation between automotive and other products and other sectors. However, note that this link is not a national one. Given the international nature of the automotive value chain the reported numbers also show a large potential for linking the European economies (from which the bulk of automotive part imports stem) through the car industries value chain.

At first glance, domestic production and employment effects through forward linkages outside of vehicle manufacturing seem to be rather insignificant. However, the structure of the input-output tables masks major downstream effects for

the automotive repair and maintenance services industries, since these services are contracted through final users of vehicles. Domestic demand for these services originates from the total stock of new and used vehicles owned by domestic firms and consumers and is fuelled by the about 25% of total turnover demanded by domestic consumers and firms. Another major downstream effect within the EU-15 is given by intra-EU exports, which are in the order of magnitude of 35% of total production.

2.2 Capital Stock and Investment

Motor vehicle manufacturing is an investment-intensive industry. This is borne out by consistently high levels of investment in fixed capital like plants and equipment. The aggregated level of investments in the motor vehicle industries of the EU-15 countries was EUR 30.5 bn in the year 2001. The largest investing national industries were in Germany (39% of EU-15 motor vehicle industry investment), France (21%), United Kingdom (14%), and Spain (7%). The German motor vehicle industry alone invested EUR 11.6 bn in 2001. Germany and France together contributed roughly 60% of total EU-15 industry investments.

Table 5. Investment levels in the motor vehicle industry by country in 2001

	EUR mn 2001	% of EU-15 total 2001	ECU mn 1995	% of EU-15 (1) total 1995
Austria	424	1.39	215	1.27
Belgium	926	3.03	n/a	-
Denmark	44	0.14	62	0.36
Finland	35	0.11	43	0.25
France	5,129	16.81	3,649	21.48
Germany	11,642	38.16	6,565	38.65
Ireland	31	0.10	n/a	-
Italy	4,209	13.79	1,957	11.52
Luxembourg	n/a	-	n/a	-
Netherlands	162	0.53	n/a	-
Portugal	224	0.73	307	1.81
Spain	2,874	9.42	1,143	6.73
Sweden	1,041	3.41	710	4.18
United Kingdom	3,771	12.36	2,335	13.75
EU-15	30,512	100.00	(1) 16,985	(1) 100.00
Japan	n/a	-	12,497	-
USA	n/a	-	15,813	-

(1) No comparable data available for Belgium, Ireland, Luxembourg and the Netherlands. Hence EU-15 figures exclude those countries.
Source: VDA, International Auto Statistics 1999 and 2003.

The investment rate, i.e. investment relative to value added[8], ranged between 7 and 38% for individual EU countries in the year 2001. Similarly, investment per worker employed in 2001 varied between 3 and 18 EUR/employee. By both measures, the lowest investment levels were those in Finland (note that these are values from one year earlier, though).

Highest investment rates were achieved in Spain (38%), Portugal (32%), the United Kingdom (29%), and France (29%). Highest investment levels per employee were exhibited by France, Spain, and the United Kingdom (all three close to 18%). The latter three countries seem therefore to have been major contributors to the recent productivity increases in the European automotive industry.

Trends in investment activity[9] in the motor vehicle industry are, again, similar to trends in total manufacturing. Investment levels as percent of value-added and production tend to remain stable.

Table 6. Investment ratios in the EU motor vehicle industry by country in 2001

	Investment per person employed (in EUR)	**Investment per value added (in %)**
Austria	13.2	18.8
Belgium	10.9	18.0
Denmark	9.0	17.8
Finland	3.2*	6.9*
France	17.9	29.3
Germany	13.5	20.3
Greece	n/a	n/a
Ireland	8.0	19.5
Italy	10.7	26.5
Luxembourg	n/a	n/a
Netherlands	6.0	9.2
Portugal	12.0	31.6
Spain	17.8	37.9
Sweden	15.0	23.4
United Kingdom	17.5	29.4

*) Value for the year 2000.
Source: Eurostat, New Cronos, March 2004.

2.2.1 Special Focus on the New Member States

The new member states (NMS) are small but highly specialised road vehicle producers in the European context. The automotive industry is also growing much faster in these countries than in the old member states (OMS). A new automotive industry ‘axis’ is emerging, comprising the Czech and the Slovak Republics,

8 Source: OECD/STAN and own calculations.
9 Source: OECD/STAN data.

Southern Poland and Western Hungary, based on skilled workers, low labour costs and large potential demand. Although this will enhance the international competitiveness of the EU automotive industry, global overcapacities may lead to companies moving out of the OMS.

2.2.1.1 The Relative Size of the NMS Automotive Industry

When comparing production values in the NMS with those in the OMS, one has to take into consideration the still undervalued currencies of the NMS. Converting output with purchasing power standards (PPP) instead of market exchange rates brings the share of the NMS automotive industry in EU-25 production up from 5% to 10%, the truth may be somewhere in the middle. The share in EU-25 employment is 11% (Table 7).

Table 7. Overview of number of establishments, production and employment 2002 in motor vehicles, trailers and semi-trailers (NACE 34)

	No of enterprises	Production[1]					VAD[3]			Employment[2]		
		EUR millions		% of manuf.	% of EU-25		EUR millions		% of manuf.	People (thousands)	% of manuf.	% of EU-25
		at exch.rates	at PPP		at exch.r.	at PPP	at exch.r	at PPP				
Cyprus	46 [3]	18.3	24.6	0.6	0.0	0.0	7.5	10.1	0.8	0.4	1.0	0.02
Czech Rep.	385 [3]	9.093.6	17663.5	16.2	1.7	3.2	1620.7	3148.1	10.9	87.0	8.4	4.08
Estonia	20	74.0 [3]	145.5 [3]	2.2 [3]	0.0	0.0	24.3	47.8	2.5	1.5 [3]	1.2 [3]	0.07
Hungary	399	6.813.6	12901.3	14.5	1.2	2.4	1166.3	2208.4	10.1	36.1	4.8	1.70
Latvia	21	10.7 [3]	23 [3]	0.3 [3]	0.0	0.0	5.8	12.4	0.4	0.6 [3]	0.4 [3]	0.03
Lithuania	32	9.0 [3]	21 [3]	0.1 [3]	0.0	0.0	1.2	2.7	0.1	0.3 [3]	0.1 [3]	0.01
Malta	16	3.1	5.6	0.1	0.0	0.0	1.3	2.3	0.2	0.1	0.2	0.00
Poland	1092 [3]	7.242.3	13708.4	6.4	1.3	2.5	2044.5	3869.9	4.5	78.0	3.5	3.66
Slovak Rep.	74	2.939.8	6976.2	17.2	0.5	1.3	321.4	762.7	8.2	18.2	4.8	0.85
Slovenia	144 [3]	1.329.9	1888.9	9.7	0.2	0.3	133.6	189.8	3.3	7.0	3.0	0.33
NMS-10	2229	27.534.2	56612.4	10.3	5.0	10.3	5326.6	10951.9	6.2	229.1	4.4	10.76
EU-15[4]		520.000.0		10.7 [5]						1.900.0	6.9 [5]	
EU-25		547.534.2		10.7						2.129.1		

VAD = value added, PPP = purchasing power parity. 1) at current prices; 2) employees only; 3) 2001; 4) Eurostat (2004: 240), rounded values; 5) year 2000.
Source: wiiw Industrial Database; Panorama of Czech Industries, Eurostat, New Cronos, SBS.

2.2.1.2 'Big' and 'Small' Producers

In terms of production value and employment, the 'Big Three' automotive producers among the NMS are the Czech Republic, Poland and Hungary – followed by the Slovak Republic and Slovenia (See Table 7 and Figure 2). However, in terms of the *number of vehicles* produced, Slovakia ranks third, before Hungary, indicating a lower unit value of cars produced in the former than in the latter country.

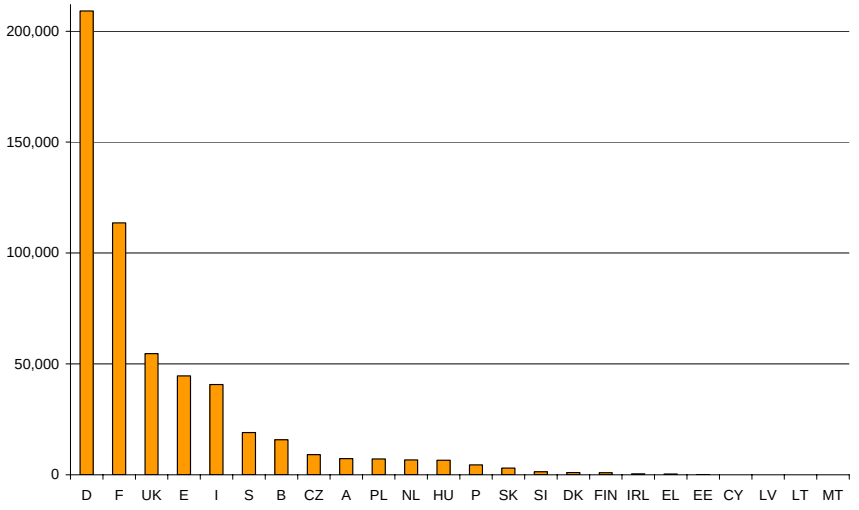
Comparing individual countries, the automotive industries in the Czech Republic, Hungary and Poland – and probably Slovakia in the near future as well – are similar in size to that of Austria and the Netherlands and rank in the lower middle field of European automobile producers, while the other NMS belong to the group of minor producers in the EU, such as Denmark, Finland, Greece and Ireland.

Specialisation

Although rather small in the overall European context, the automotive industry plays a very important role in these NMS and is a major driver of their economies. The most specialised NMS countries are the Czech Republic, Slovakia and Hungary.

In 2002, the share of the automotive industry in total manufacturing output reached 17.2% in Slovakia and 16.2% in the Czech Republic and 14.5% in Hungary (see Table 7 and Figure 3). In these countries, the share of the automotive industry is in fact higher than in the big West European car producing countries, such as France, Italy, UK and Spain, ranging between 5 and 14%, except Germany (17%).

Fig. 2. Motor vehicle production in the old and in the new member states (2001/2002) in EUR mn



Source: Eurostat, New Cronos, SBS, Panorama of Czech Industries 2003.

However, while the automotive industry is the most important manufacturing sector in the Czech and the Slovak Republics, indicating a clear specialisation in this field, it ranks just third in Hungary, with the electrical equipment and the food industry taking the lead there. Notably, in Slovenia where the automotive industry is very small in absolute size, it nevertheless has a relatively high share in manufacturing (9.7%), while in Poland, which ranks second in car production after the

Czech Republic, the role of the industry is relatively small (6.4%), due to the large size of the overall economy.

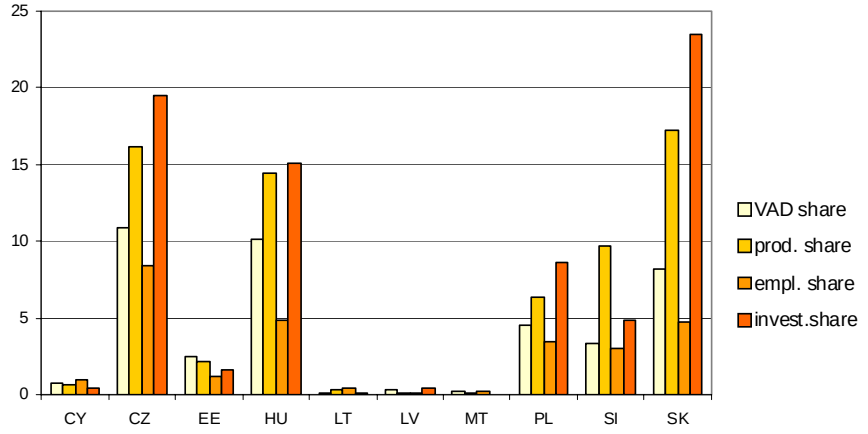
Comprising many assembly plants, the value added shares of the automotive industry in the NMS are typically lower than the production shares, but the investment shares are generally higher, driven by foreign direct investment and pointing to the dynamic development of the industry. Employment shares are relatively low due to the capital intensive character of the industry (see Figure 3).

2.2.1.3 A Small but Fast-Growing Automotive Industry

The automotive industry in the NMS is small measured by EU standards, but has been developing very dynamically and much faster than in the old member states and also faster than total manufacturing in the NMS. This outstanding growth can be attributed to the high inflow of foreign direct investment (attracted by skilled and cheap labour which makes the industry internationally very competitive), by investment promotion by local governments, and the expectation of expanding domestic markets.

Between 1995 and 2002, average annual growth of output (at constant prices) reached an impressive 28% in the Slovak Republic, 25% in Hungary, and 20% in the Czech Republic, surpassing average manufacturing growth in these countries by 15 to 20 percentage points per annum. Only minor automobile producing countries such as some Baltic states showed below average growth in this sector. In Poland, the automotive industry developed rapidly until the year 2000, but has performed poorly ever since (Figure 4 and Figure 5). This is partly due to specific problems such as the Joint Venture between Daewoo and the Polish government

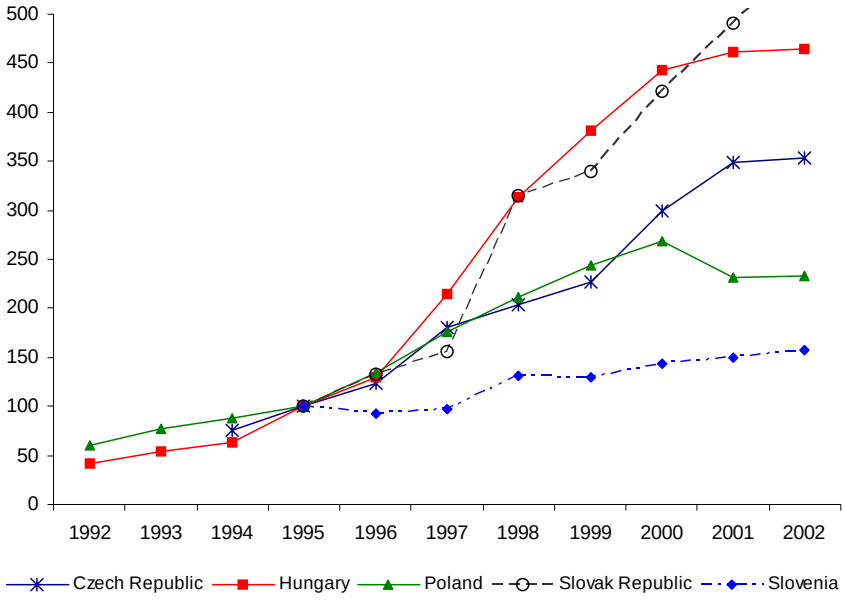
Fig. 3. NMS automotive industry: VAD, production, employment and investment percentage in total manufacturing, 2002



Source: See Table 7 and Eurostat, New Cronos, SBS.

and the indirect impact of the 1997/1998 Asian economic crisis, but there are signs of overall weakness in the automotive industry in Poland as well – probably linked to demand which has developed less well than expected and a relatively high wage level compared to other NMS competitors.[10]

Fig. 4. Industrial production index for the automotive industry (NACE 34) in major car producing NMS



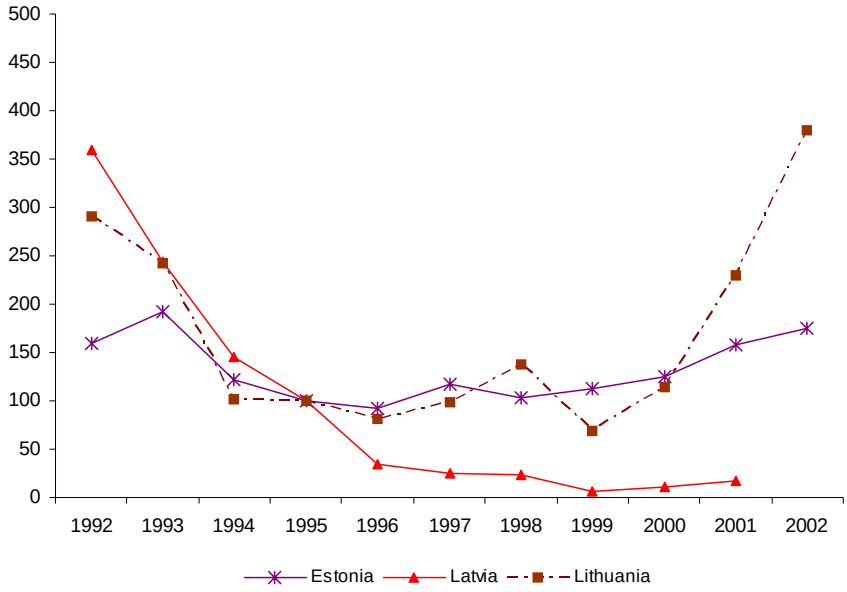
At constant prices 1999, national currency; 1995=100.
Source: wiiw Industrial Database; Panorama of Czech Industries, Eurostat, New Cronos, SBS.

Output in the vehicle industry is also decelerating in Hungary, although it is important to bear in mind that 2002 was a bad year for the automobile industry all over Europe due to a fall in overall demand which hit the car industry in particular. The recent data indicating very high production growth in Lithuania must be interpreted with care as the level of production is very low and fluctuates strongly; this is probably due to changes in the classification of automobile parts which can, for example, be assigned to the automobile industry one year and the electrical industry (wires, electronic components) or the plastic & rubber industry (bodies,

[10] The production of Fiat Auto declined from 340,630 cars in 1999 to 178,044 in 2002. Production of FSO Polonez (Daewoo) came down from 18,891 cars in 1999 to just 1,444 in 2002 – the number of trucks produced fell from 7,625 to mere 350 during the same period (Ward, 2003).

components) the next. But there is no doubt that the supplier industry is developing rather well in Lithuania[11].

Fig. 5. Industrial production index for the automotive industry (NACE 34) in secondary car producing NMS



At constant prices 1999, national currency; 1995=100.
Source: wiiw Industrial Database; Panorama of Czech Industries, Eurostat, New Cronos, SBS.

2.3 Industry Profile

2.3.1 Automotive Production

The automotive industry is a key strategic industry within the European economy. A considerable number of the leading automotive companies have their origins in Europe. The industry is characterised by large internationally owned manufacturers and suppliers as well as a number of small and medium-sized companies which meet the criteria of component suppliers (tier 1 to tier 3, see below). Manu-

[11] Lithuania produces mainly bodies (NACE 34.2) and parts (NACE 34.3), but is supplying a wide range of components for the automobile industry from other industries, in particular electrical equipment and plastic parts (Ekonomines Konsultacijos ir Tyrimai UAB, 2002).

facturers and suppliers in this sector constitute a key source of R&D and innovation. A major labour force consisting of almost two million people is employed in the manufacturing sector alone. At the same time, Europe is also the world's largest automotive market. Exceeding half of worldwide turnover, Europe reveals its extraordinary position within this industry. In the following, the automotive industry will be described in terms of its segments and players. In order to obtain an overview of the industry, we describe the car, truck and bus sector. Each sector will be discussed in a global and European view. The major league of operating companies will be presented in terms of output for each sector. We also add a digest of the supplier industry to point out its importance for manufacturers. For the purpose of this study, the European automotive industry is defined as the production of light vehicles, heavy-duty vehicles i.e. trucks, including the manufacture of parts, systems and technical units (in statistical terms, the industry corresponds to NACE 34) taking place within the EU-15, and as far as is possible EU-25.

The following definitions[12] provide an overview of the automotive related terms. These terms are used throughout the report.

The Original Equipment Manufacturer (OEM) or manufacturer is a company that manufactures and/or assembles a final product. For example, a car made under a brand name by a given company may contain various components, such as tires, brakes or entertainment features, manufactured by several different "vendors", but the firm doing the final assembly/manufacturing process is the OEM.

Supplier industry is structured in several groups of so-called component suppliers i.e. each component affects different parts along the value chain. Therefore the following distinction is widely used:

Tier 1 supplier is a component manufacturer delivering directly to final vehicle assemblers, responsible for the finished assembly, product development and continued technology innovation. Tier 1 suppliers work hand-in-hand with automobile manufacturers to design, manufacture and deliver complicated automobile systems and modules, such as significant interior, exterior or drive train units. Tier 1 suppliers in turn purchase from tier 2 and tier 3 suppliers, which rank below tier 1.

Tier 2 suppliers: These companies produce value-adding parts in the minor sub-assembly phase. Tier 2 suppliers buy from tier 3 and deliver to tier 1.

Tier 3 suppliers are suppliers of engineered materials and special services, such as rolls of sheet steel, bars and heat treating, surface treatments. Tier 3 suppliers rank below tier 2 and tier 1 suppliers in terms of the complexity of the products that they provide.[13]

Therefore the value chain could be described as follows. The starting point is the supplying industry which delivers parts to the OEM. After the production process which is more and more closely connected between OEM and suppliers, the retail channel forwards the products to the final customer.

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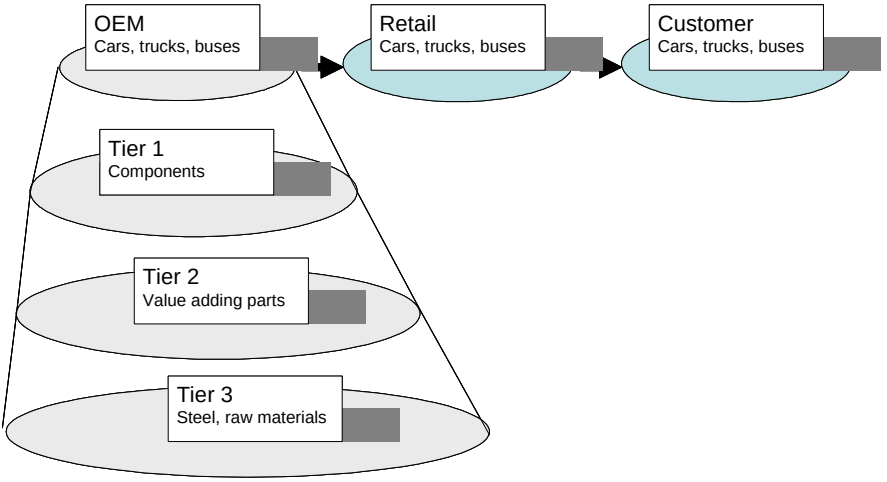
12 See Plunkett's Industry Almanac.

13 See Plunkett's Industry Almanac.

Fig. 6. Automotive value chain



Source: ZEW.

Taking a global view of the market (Figure 7) and its global production, it is possible to consider Europe[14], America[15] and Asia-Oceania[16] as the three pillars of the automotive industry. Each of these regions has a share of almost one third of global production volume.

Europe – which accounts for a market share of 33.8% benefits from the positive contribution of the Eastern European market. While Africa plays a minor role, America (31.8%) and Asia-Oceania (33.9%) are the counterparts of Europe.

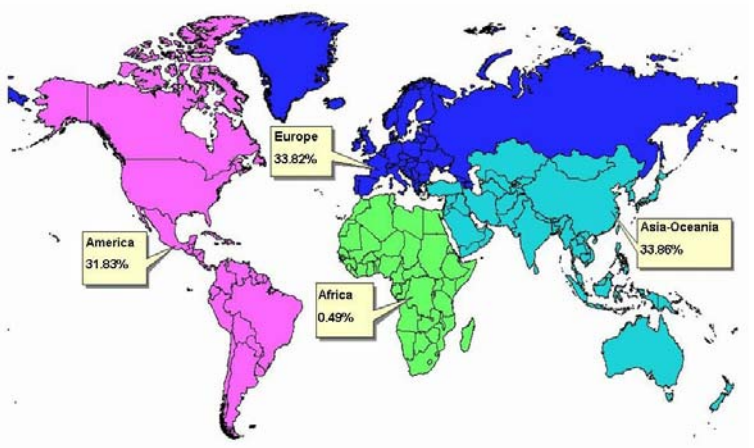
The manufacturers of the global vehicle production reflect this general pattern. A closer look at the TOP 10 manufacturers reveals that these are based in the three regions of America, Europe and Asia with companies from the USA, Germany, France, Japan and Korea. The strong European representation in this automotive league is emphasised even further if account is taken of the very close cross-ownership affiliation between Renault SA and Nissan Motor Co. (see Table 10).

14 Europe is defined as EU-15 plus the new member states (EU+10) and others.

15 America is defined as USA, Canada, Mexico, Brazil and others.

16 Asia-Oceania is defined as Australia, South Korea, Japan, China, India and others.

Fig. 7. Global vehicle production 2002



Source: OICA.

Table 8. Global vehicle production by manufacturer (cars and trucks) – output in units

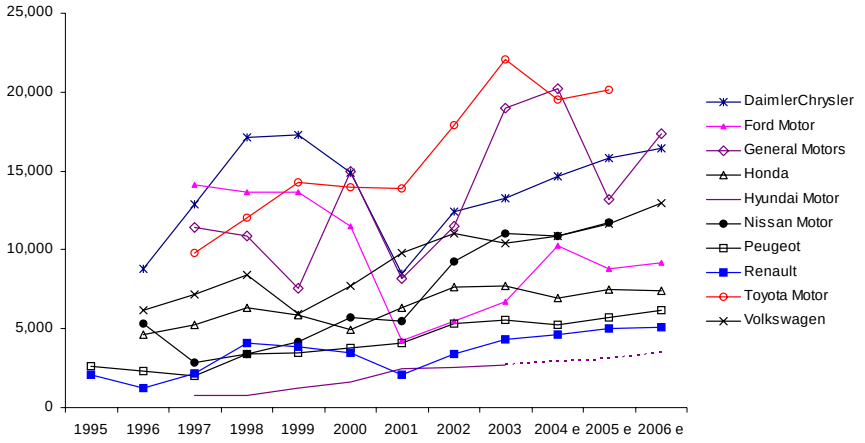
		2002	2001	2000
1	General Motors[17]	8,276,000	7,786,000	8,494,000
2	Ford Motor Co.[18]	6,973,000	7,008,000	7,424,000
3	Toyota Motor Co.[19]	6,309,616	5,848,094	5,888,260
4	Volkswagen AG[20]	5,023,264	5,107,945	5,156,455
5	DaimlerChrysler AG[21]	4,471,900	4,424,200	4,677,894
6	PSA/Peugeot-Citroen SA	3,262,100	3,136,300	2,877,400
7	Hyundai Motor Co. [22]	2,913,726	2,517,719	2,545,958
8	Honda Motor Co.	2,900,787	2,651,661	2,485,213
9	Nissan Motor Co.	2,690,295	2,466,995	2,605,155
10	Renault SA[23]	2,343,954	2,375,084	2,444,370

Source: PricewaterhouseCoopers Global Automotive Financial Review 2002.

17 Includes Holden, Opel, Vauxhall and Saab.
18 Includes Aston Martin, Jaguar, Land Rover and Volvo Car Corp.
19 Includes Daihatsu and Hino.
20 Includes Audi, Bentley, Bugatti, Lamborghini, Rolls-Royce, Skoda, Seat and Volkswagen.
21 Includes Chrysler group, Freightliner, Mercedes-Benz, Setra, Smart, Sterling, Thomas Built Buses and Western Star.
22 Includes Hyundai Motors and Kia Motors.
23 Includes Dacia and Samsung Motors.

Most manufacturers recovered in 2002 after the sales problems experienced in 2001 as a result of an unstable world economic situation. Comparing these companies by financial conditions, it is useful to have a closer look at the companies' earnings before interest, taxes, depreciation, and amortisation (EBITDA). This earnings measure is of particular interest in cases where companies have large amounts of fixed assets which are subject to heavy depreciation charges (such as automotive companies) or in the case where a company has a large amount of acquired intangible assets on its books and is thus subject to large amortisation charges (such as a company that has purchased a brand or a company that has recently made a large acquisition). EBITDA is often used to compare the profit potential between companies. This business ratio intended to be a measure of the amount of cash generated by a company's operations. Figure 8 reflects that the top ten of the automobile manufacturers got a very unequal trend taking the last couple of years. The profit potential of Toyota is remarkable. Their development is more or less continuous. General Motors, DaimlerChrysler and Ford did have some more problems to manage the situation which ended in pacing up and down. This development is not really mirrored by the output figures in Table 8.

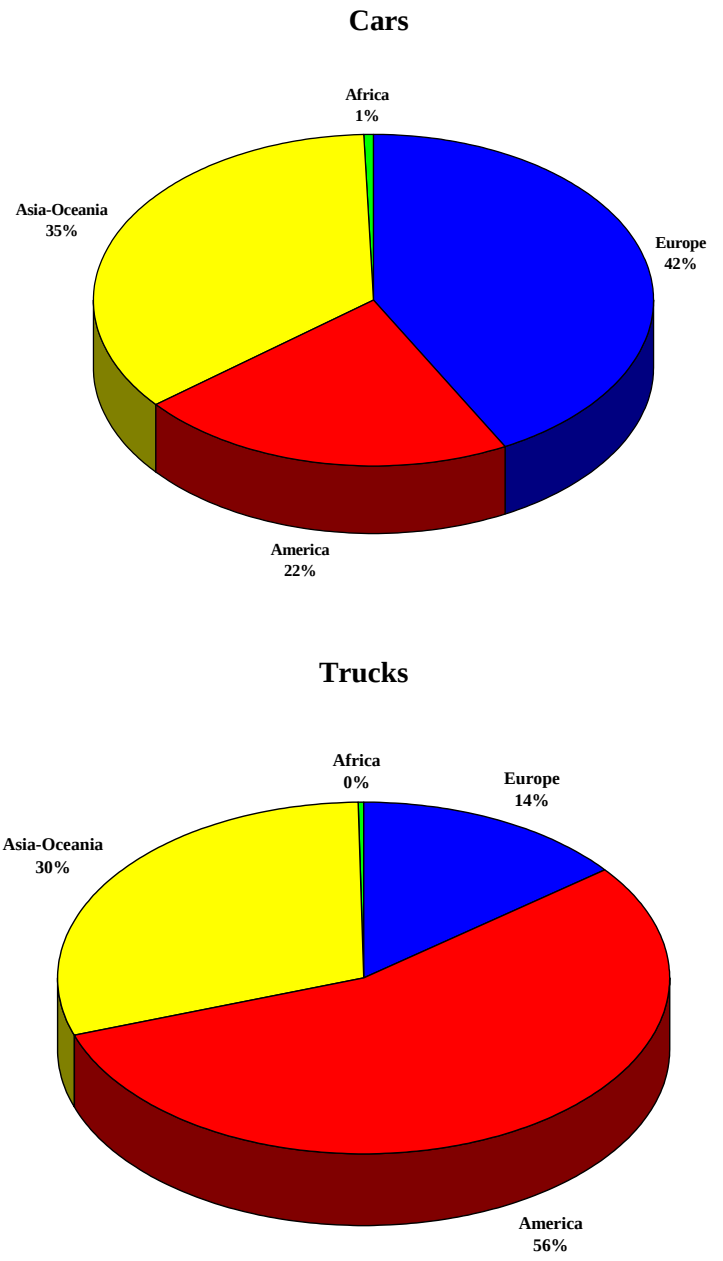
Fig. 8. Earnings before interest, taxes, depreciation and amortisation (EBITDA) by the top ten automotive manufacturers in 1995-2006, in USD mn



Source: ZEW calculation using annual reports and financial statements; estimates after 2003.

Global vehicle production consists of passenger cars, commercial vehicles and buses. In the following, each of these constituents will be analysed in a global view as well as in a more European context.

Fig. 9. Global car and truck production: world market shares of production in 2002



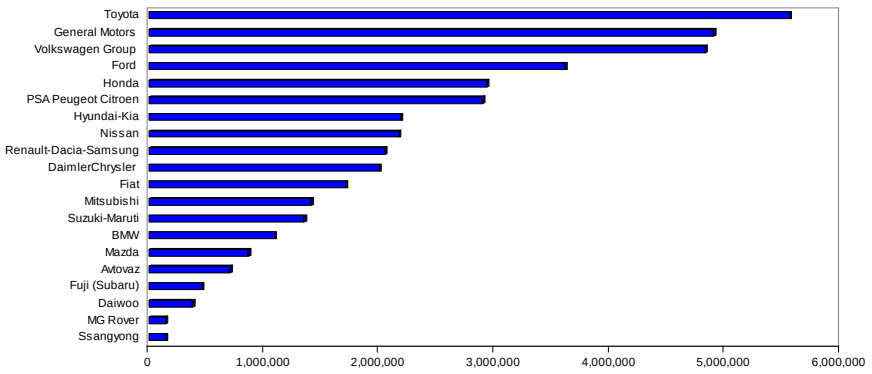
Source: OICA.

2.3.2 Manufacturers

2.3.2.1 Cars

The car[24] sector is strongly dominated by the European market. With a share of 42% of world production, Europe leads the triumvirate followed by Asia-Oceania with 35% and America with 21%. There are a number of different reasons for Europe's leading position one of which is the historical roots of the industry. Today at least 14 automotive company groups are represented in the market. Eight of these (BMW, Daimler; Fiat, PSA, Porsche, Renault, Rover and Volkswagen) originate in different European countries. Global production of cars increased by 3.1% in 2002 at a volume of 41,115,585 units. Traditionally the automotive industry measures company output in terms of motor vehicle production. The capability of different companies can be usefully reflected by their output performance. From a worldwide perspective the Japanese company Toyota is the leading top car manufacturer (Figure 10). In 2002 the company led the field producing more than 5 million units – followed by well known companies such as GM, VW, Ford, Honda and PSA. However, the significance of car production in Europe is illustrated by the fact that more than 15 million units, i.e. 37% of world production, originate in Europe. Taking all manufacturers into account, it is apparent that companies from China and Russia also appear on the list. Although these companies do not have anything like the major impact exercised by the leaders, they do underline the strategic focus on these emergent markets even if these companies are operating as partners for strategic alliances with firms such as GM or VW.

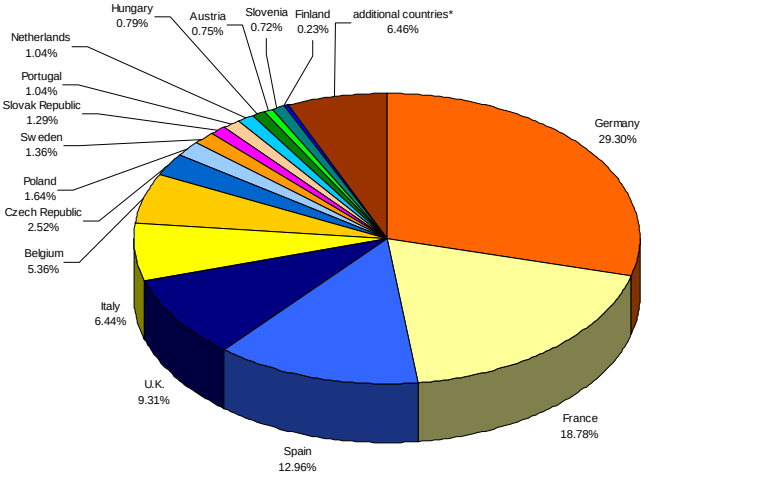
Fig. 10. Ranking of car manufacturers 2002 – output in units



Source: OICA; the typical unit perspective prevents some high value but low volume producers like Porsche (66.803 units in 2002) from appearing in the figure.

[24] Passenger cars.

Fig. 11. Car production in Europe – market share of production 2002, in %



Source: OICA.

European passenger cars production is as follows: More than two thirds of the European market is accounted for by four countries. Germany has the biggest market share with 29% followed by France with 18%, Spain with 13% and the UK with 9%. As a result Germany plays an important role in this industry by providing the location of the majority of key European manufacturers. The sector is one of the largest employers in Germany. With approximately 866,000 people working in the industry (NACE 34), the automotive sector has a very strong labour force. Furthermore, output of German manufacturers totalled[25] 5,469,309 units in 2002 i.e. 5,301,189 passenger cars, 212,358 light trucks, 123,968 medium/heavy trucks and 9,745 buses. DaimlerChrysler, Volkswagen, BMW and Porsche are all companies with a German origin. Foreign brands such as Ford, Opel (GM) or Mitsubishi with plants in Germany are also driving forces behind the industry in Germany. One important factor is the new investment in East Germany. Six manufacturers (BMW, DaimlerChrysler, Mitsubishi, Opel, Volkswagen and Neoplan) have established assembly plants in this region. The automotive industry is also a key industry in France and the country's 21 assembly plants produce upwards of 3 million units. The sector employs 273,200 people. Even foreign brands such as Toyota or Mercedes-Swatch produce for the European market in France.[26]

25 Passenger cars, light trucks, medium/heavy trucks, buses.

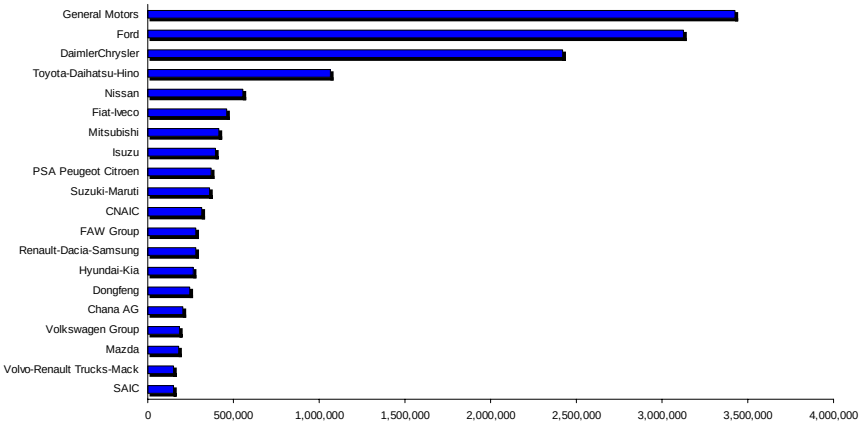
26 These figures should not be used to derive direct productivity differentials between Germany and France. Both countries are characterised by very different production structures and the recoverability of various stages of the value chain are different as

Spain and the UK profit from investment from foreign manufacturers. In both countries global manufacturers have established assembly plants which have had a positive impact on an upcoming supplier industry as well.

2.3.2.2 Trucks

The commercial vehicle sector also reflects the dominance of the big three – America, Europe and Asia-Oceania (Figure 12). The global perspective indicates in contrast to the car sector that America takes the biggest share of the market with 56% of production volume followed by Asia-Oceania with 30%. Europe is number three with just 14%. One reason for the strong positions of America and Asia are the long distances in countries such as the USA, Brazil, China or India. As a result, manufacturers such as DaimlerChrysler – which has a number of different assembly plants in North and South America – are endeavouring to benefit from these markets. DaimlerChrysler also has an investment in Asia in FUSO, an Asian commercial vehicle manufacturer. A closer look at the top manufacturers shows the strong position of American and Asian brands. DaimlerChrysler has also profited from the merger with Freightliner, originally an American commercial vehicle company which holds different brands in this sector and is therefore a strong player in this market.

Fig. 12. Ranking of truck manufacturers – output in units 2002, in %



Source: OICA.

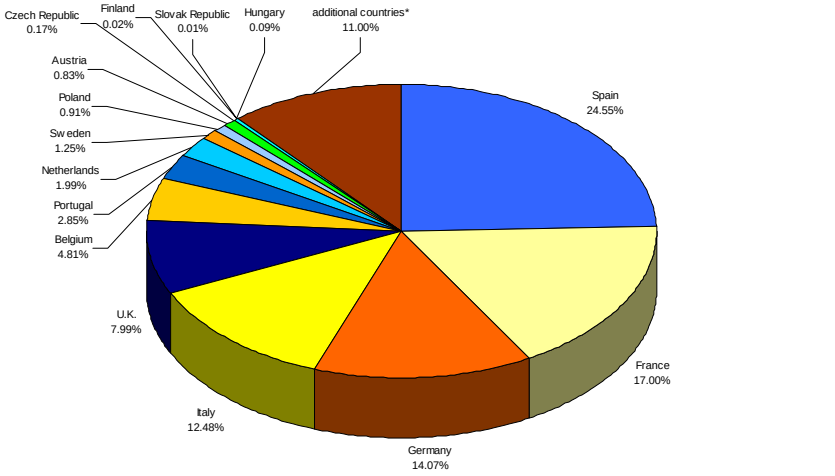
Asian companies are relatively more important in truck production than in car production with a couple of manufacturers outside of Japan. A small group of Chinese companies also play a significant role in this market. The company Dongfeng, for example, is the number three behind First Automotive Works (FAW) and

well. A closer look at the gross value added of NACE 34 in 2002 shows that Germany takes a lead with EUR 51.5 bn compared with France's EUR 19.1 bn.

Automotive Industry Corp in China. Among other things they are involved in joint ventures with Nissan, Peugeot and Kia which enable them to provide the commercial vehicle market with more than 240,000 units, or more than the output of Volkswagen or Volvo in this segment.

The EU distribution of truck production is similar to car production. As in the car section, four countries play a major role by producing commercial vehicles. In this case Spain, France, Germany and Italy have the biggest output in terms of units. The supreme position is taken by Spain with more than 580,000 units which determine a share of 24%. It is important to note that the majority of this output is accounted for by light commercial vehicles which are up to 3.5 t where French manufacturers have an extraordinary position. Manufacturers such as PSA, Renault, GM and DaimlerChrysler have established assembly plants in Spain. The leading company is PSA which produces 40% of Spain's entire commercial vehicle output. Production is not designated for the domestic market; 85% of all commercial vehicles are exported to the "rest of the world". Nevertheless, France takes the second position with a share of 17%, which is more than 400,000 units, followed by Germany with 14% corresponding to an output of more than 300,000 units. Italy with a share of 12% is dominated by the local industry of the Fiat-Group which comprises Fiat itself and the commercial vehicle manufacturer IVECO.

Fig. 13. Truck production in Europe – market share of production 2002, in %



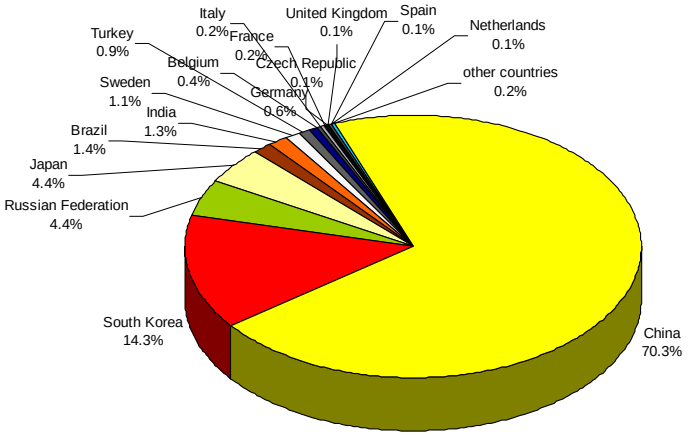
Source: OICA.

2.3.2.3 Buses

The bus sector (including minibuses and coaches) reveals a different picture compared with cars and commercial vehicles. This market is strongly characterised by

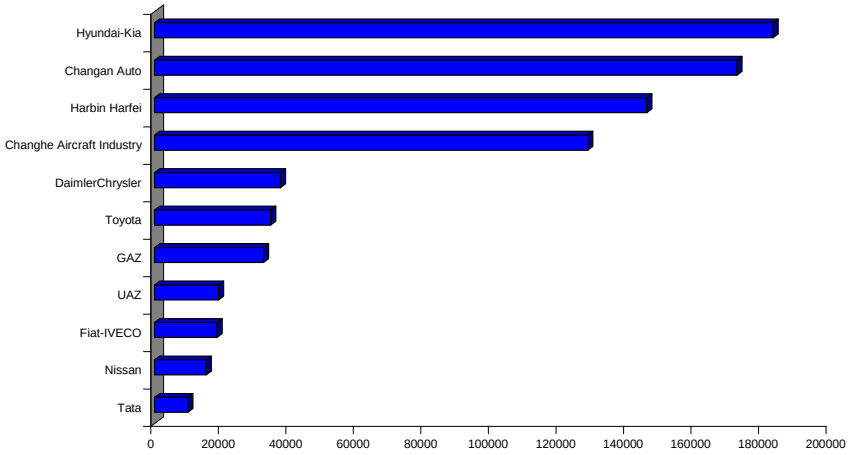
Asian manufacturers. The region of Asia-Oceania, and China in particular, constitutes a huge market for buses. China has a share of 70% of output i.e. a production volume of more than one million units in 2002.

Fig. 14. Global bus production – market share of production 2002, in %



Source: OICA.

Fig. 15. Ranking of bus manufacturer – output in units, 2002



Source: OICA.

Number two in this market is South Korea with a share of 14%. Interestingly, the Russian Federation is number three in this market. Russia steps ahead of European countries with a share of 4%. The Western European countries, headed by Sweden, trail behind.

This picture is underlined by the top manufacturer (Figure 15). The majority of the big bus manufacturers originate in Asia and primarily supply this region only. The biggest player is Hyundai and its affiliate Kia which has the highest output. The companies Changan Auto, Harbin Harfei and Changhe Aircraft Industry dominate production in China. DaimlerChrysler with its brands Evobus and Mercedes-Benz are strong in Europe. Furthermore one third of DaimlerChrysler bus production takes place in Brazil, which emphasises the importance of South America.

2.3.3 Special Focus on Manufacturers in the New Member States

The NMS have become an important field of activity for the EU automotive industry, with major European vehicle producers and suppliers establishing assembly and production plants in the region. In 2002, 83% of the 1.2 million vehicles produced in the NMS were produced by affiliates of EU companies, whereby the Volkswagen group enjoys a clear lead (720,000 vehicles) followed by Fiat (178,000 vehicles) and Renault (126,000 vehicles); for more detail see the yearly updated ACEA EU-15 Economic Report. With the big investments planned by Hyundai in Slovakia (200-300,000 vehicles) and the consortium Toyota/PSA Peugeot Citroen (300,000), the share held by European producers is set to fall somewhat but will remain high nevertheless. The picture in the supplier industry is similar. Motor vehicle manufacturers in the NMS produced 2.1% of the number of vehicles made worldwide, equivalent to 7.3% of EU-15 production and 6.8% of a fictive EU-25 in 2002.

Comparing the two broad product categories, namely *cars* and *trucks* (including buses), car production is dominant and production of trucks and buses plays a significantly smaller role in the NMS than in the OMS, having a share of total motor vehicle production of about 1% and accounting for just 0.1% of world production and 0.6% of EU-25 production in this field. The biggest producers of trucks and buses in the region were the Czech Republic (5,765 units) and Poland (4,163 units) in 2002. The production of trucks and busses has been far more prominent in the past in all NMS, but most existing local enterprises did not survive the transformational recession and foreign investors have shown little interest so far in investing in this particular segment of the automotive industry.

2.3.4 Suppliers

The supplier industry represents a vital element of the automotive sector. Enormous opportunities were created in the early 1990s by the new wave of Japanese transplants in Europe. Toyota, for example, took advantage of a multiplicity of

component suppliers in UK to establish an assembly plant in Burnaston, Derby. New production facilities continue to represent business opportunities for suppliers today in East Germany and the new member states. Over 700 suppliers are now located in Germany, the importance of which is underlined by the fact that these 700 suppliers include more than 50% of the top 100 group of suppliers. An analysis of the supplier industry in the new member states (EU+10) will be given later in this report. Value chains are also subject to a number of changes. The dramatic changes in the value chain of the automotive sector mean that manufacturer and supplier partnerships are now indispensable. Suppliers in this sector are assuming more responsibility for different parts of the value chain and this is indicative of the major roles these companies now play in the production process. This particular point will be stressed later in the report in a discussion of upcoming production trends.

A closer look at the distribution of different parts of the value chain in the automotive sector reveals that, in some cases, suppliers assume the lion's share of responsibility for production. This underlines the point of strategic options for these companies. According to a study of VDA/CAR focusing on the growth potential of the supplier industry, there will be at least three windows of opportunities: growth in terms of

- access to new markets,
- increased vehicle value, i.e. innovations in electronics,
- benefits from manufacturer's outsourcing strategies.

The changes referred to above represent sophisticated challenges for suppliers which demand major input in terms of manpower, R&D expertise, etc. Globally operative manufacturers demand globally operative suppliers, which also need to be able to finance their assembly plants all over the world. According to the top 100 league of suppliers, all of these companies are international operating firms with turnover of at least EUR 940 mn which indicates that growth in terms of new markets and innovation could be met by this industry.

The twenty biggest supplier companies fall into three geographical groups dominated by America, Europe and Asia as represented by the countries USA, Germany, France and Japan. The German supplier industry is reaping major benefits from growth potential in this area. The new business locations selected by German suppliers in the last five years (1997-2002) have a very strong focus on globalisation. Special attention should be paid to the new member states mainly in Eastern Europe[27] (Figure 16). 26% of all new locations were in Eastern Europe which strengthens the importance of this region. The rest of Europe and especially Germany is still a dominant region for business in the supplier industry.

[27] Poland, Czech Republic, Slovakia, Hungary.

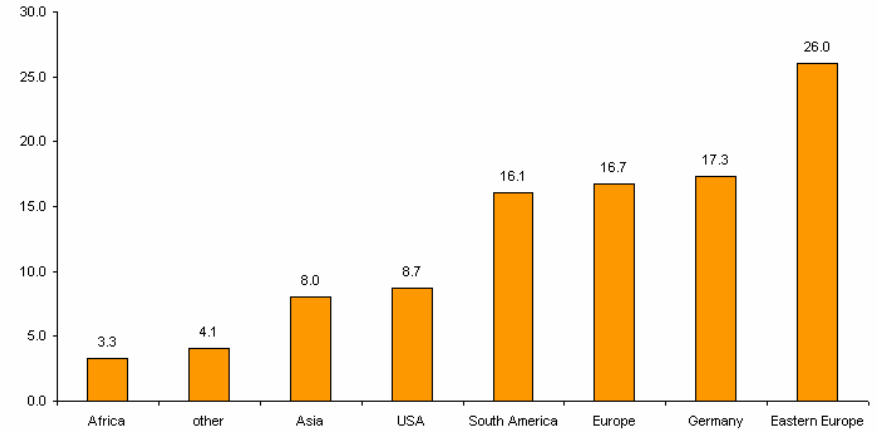
Table 9. Ranking of suppliers in the automotive industry by turnover in 2001

	Company	Country	Turnover, EUR bn 2001
1	Delphi	USA	28.7
2	Bosch	D	23.2
3	Visteon	USA	19.6
4	Denso	J	17.9
5	Lear	USA	15.0
6	Johnson Controls	USA	15.0
7	Magna Int.	CDA	11.6
8	Continental	D	11.2
9	TRW	USA	11.1
10	Faurecia	F	9.6
11	Aisins Seiki	J	9.3
12	Dana	USA	8.5
13	Valeo	F	8.1
14	ZF Friedrichshafen	D	7.8
15	Yazaki	J	6.8
16	Arvin Meritor	USA	6.4
17	Thyssen Krupp Automotive	D	6.2
18	DuPont	USA	5.7
19	Siemens VDO Automotive	D	5.7
20	Michelin	F	5.1

Source: AP.

It should be also pointed out that the supplier industry is traditionally much more local than OEMs. There also appear to be traditional links between US OEM and US first tier suppliers, French OEMs and French first tier suppliers, and between German OEMs and German first tier suppliers. As a rule Japanese OEMs prefer to use suppliers from their own conglomerates. These traditional links are in decline because of the discernible globalisation trend. OEM globalisation also poses a challenge for suppliers and, as a rule, big suppliers seem to be at an advantage when it comes to developing global activities. Large US and German based suppliers consequently enjoy a number of size-related advantages. In line with this argument increasing M&A activities are also observable in the supplier industry (see Sturgeons and Florida, 2000, for more details).

Fig. 16. New supplier locations (1997-2002)



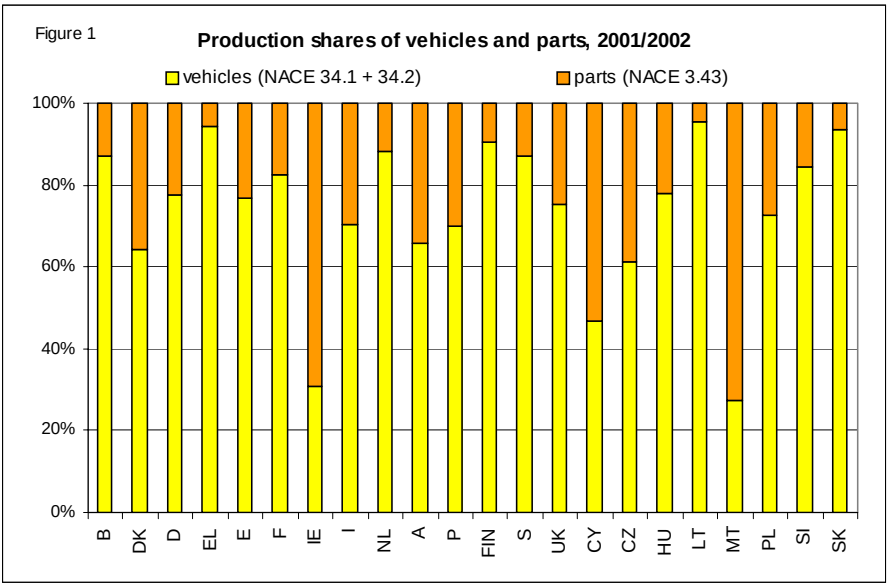
Source: VDA.

2.3.5 Special Focus on Suppliers in the New Member States

In the NMS, the distribution among the three important *sub-sectors* of the automotive industry representing different stages in the production chain, namely *vehicles* (NACE 34.1), *bodies for motor vehicles* (34.2) and *parts and accessories* (34.3), is on average quite similar to that in the OMS, with vehicle production taking the largest share (around 80%), followed by parts and accessories (around 20%) and bodies for motor vehicles accounting for just a few percent of total production. There is considerable variation across countries, however, with parts production playing a particularly small role in Slovakia (9%) and a relatively big role in the Czech Republic (45%), partly reflecting the special provisions made in the Skoda-VW deal concerning local supply, but also showing a certain specialisation of the Czech Republic in this field as well.[28] Notably, the production of parts and accessories has gained relative importance over the last couple of years in all NMS indicating that suppliers are hot on the heels of producers. Refer to the site map of important producers and suppliers in the NMS below (Figure 17). In addition, NMS profit from the ongoing reorganisation of the value chain by OEMs as well as by large first and second tier suppliers which outsource parts of their value chain to benefit from local cost advantages.

[28] In Lithuania, the dominant role is played by the production of bodies for motor vehicles.

Fig. 17. Production shares of vehicles and parts, 2001/2002



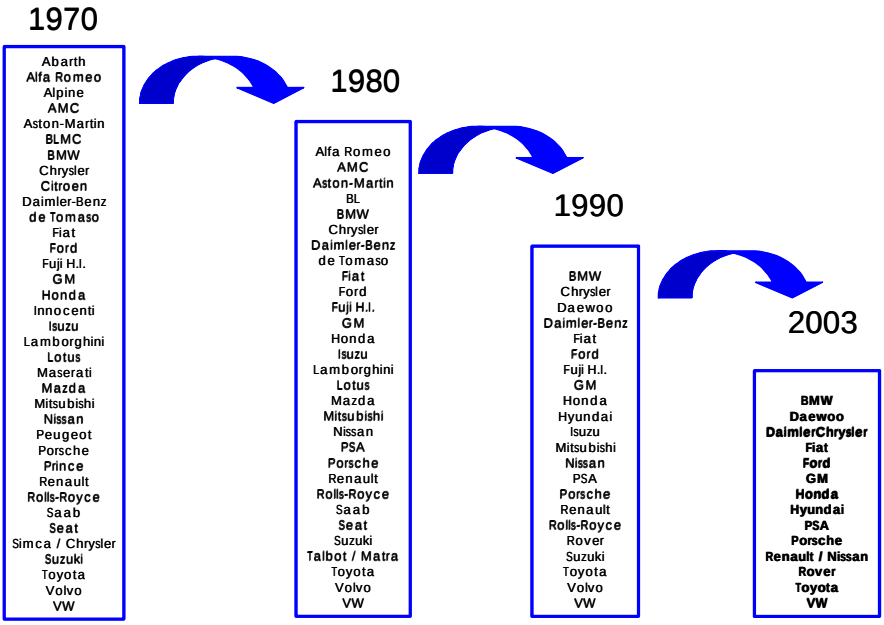
Source: Eurostat (2004); Panorama of Czech Industries 2003; VAD; Eurostat, SBS.

2.4 Globalisation and Restructuring

The international automotive industry is characterised by rapid changes. Mergers and acquisitions among manufacturers and suppliers are changing the global environment. Even the forecast that a major share of future demand will be generated by developing countries is of crucial importance for all multinationals. The design of international strategies is based upon the interplay between the comparative advantage of countries and the competitive advantage of firms (Kogut, 1985). For this reason, the automobile industry has been characterised by two ongoing developments over the last decade: globalisation and restructuring, both of which are closely related. Global output of automobile products has generated more exports and increased competition. A global profile i.e. selling and producing in all different segments all over the world, is a business prerequisite in today's world. Despite the benefits which globalisation offers, this process nonetheless poses business challenges for all the companies involved. Manufacturers and their affiliates respond to globalisation and restructuring with organisational changes. The restructuring process was designed to reduce the share of value added by automobile manufacturers. Many companies were unable to cope with the challenge of building up assembly plants and retail structures in different countries. For example, the internationalisation strategy of Japanese companies had an impact on the European market. In the late sixties and at the beginning of the seventies, Asian manu-

facturers began supplying the European and US market. Over the last three decades, the number of companies came down from 36 in the 1970s to 31 in the 1980s. This trend continued in the 1990s with the number of automobile manufacturers falling to 22. Since the turn of the century there have been only 14 automotive companies on the market (Figure 18). Some companies were unable to meet globalisation and restructuring demands, others were simply bought up by bigger companies.

Fig. 18. Restructuring in the European, U.S. and Japanese automotive industry[29]



Source: AP.

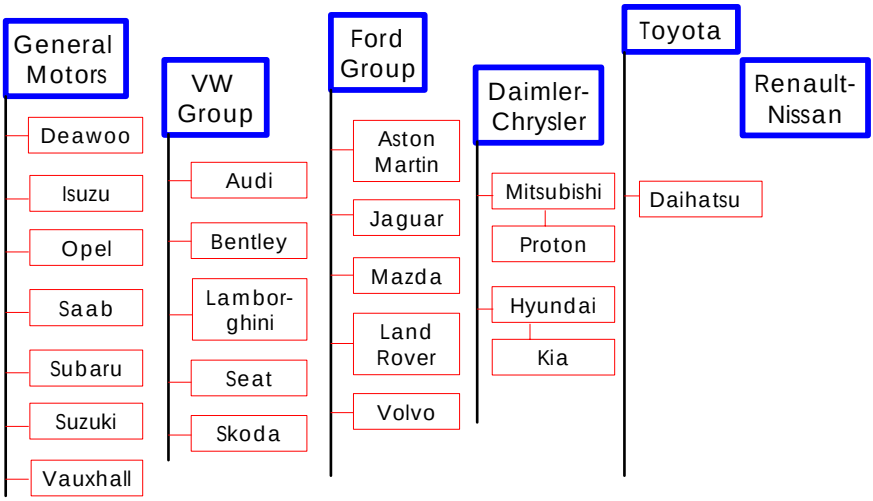
Despite the reduction in the number of car manufacturers, competition in regional and local markets has increased as larger companies have established a presence on all markets.

Competition forces manufacturers to be present in all kind of markets, including regional markets, and market niches. Takeovers serve both strategies. A closer look at automobile manufacturers clearly reveals that these firms are being transformed from automobile companies into automobile groups (Figure 19). The various companies now affiliated with these groups (GM, Volkswagen, Ford, DaimlerChrysler, Toyota or Renault-Nissan) are meeting the different requirements of

[29] A truly global perspective should certainly include producers from China, India and Russia. Given the focus of this study and the lacking availability of comparable historical information, narrowing the scope to the major producing areas Europe, Japan and the USA should provide useful insights.

regional market or market niche strategies. Ford, for example, acquired a number of firms for this purpose. The benefits derived from different regions such as Asia and Europe were generated by involving Mazda, Volvo and Rover. A market niche such as luxury cars was integrated into the company portfolio with the acquisition of Jaguar. The same pattern is recognisable in other automotive groups. DaimlerChrysler adopted a clear focus on regional strategy to tap the Asian market and established a distribution grid with companies like Mitsubishi, Hyundai and Kia to cover the whole region.

Fig. 19. From automotive companies to automotive groups – extract of major groups



Source: ZEW/AP.

Today global corporations can use a diverse array of organisational mechanisms to integrate dispersed operations (Govindarajan and Gupta, 2001). At the present time merger & acquisitions are still a prevailing topic. Particularly with regard to the latest deals in the automotive sector, manufacturers and suppliers are taking the path of growth to ensure the options of new markets and niches. An interesting deal among manufacturers is the financial involvement between Renault SA and Nissan Motor Co Ltd. After Renault acquired a 44% share in Nissan two years ago, Nissan is now in the process of buying a 15% stake in Renault which will accelerate them into the top ten league of global automotive manufacturers. GM is pursuing a regional market strategy by acquiring Daewoo.

The supplier industry is also taking advantage of merger and acquisitions (M&A) strategies to meet the demands made by manufacturers i.e. innovations and increased product responsibility. In this context it is interesting to note that a number of deals are being made between first and second tier suppliers. This could be interpreted as a first tier strategy to back up preliminary stages of the value chain. In fact this is apparent in the acquisition of Varta AG, a German battery manufacturer, via Johnson Controls Corp, one of the biggest first tier suppliers

worldwide. Company size is becoming increasingly important for achieving and guaranteeing further R&D capability. First tier suppliers are very keen to play their role in the industry with a global presence.

The motivation of mergers and acquisitions is manifold. The possibility of market access as well as fulfilling the product portfolio could be an incitement for preparing a financial involvement which sometimes ends with a merger or an acquisition. The event of M&A in the automobile industry is characterised by individual strategic reasons. It is not really predictable but there is sometimes an indication which has a lot to commend it. On the basis of the multifaceted linkages between different manufacturers it could be expected that some companies will recognise a strategic fit by taking over another manufacturer or supplier.

Table 10. M&A transactions 2002 – manufacturer

Target	Target Nation	Buyer	Buyer's Nation	Deal value (USD mn)	% Acquired
Daewoo Motor Co – Certain Assets	KOR	General Motors (& affiliates)/ Daewoo Creditors	INT	2627	100
Renault SA	FRA	Nissan Motor Co Ltd	JPN	1959	15
Nissan Motor Co Ltd	JPN	Renault SA	FRA	1620	7.6
General Motors Corp	USA	Undisclosed Investment Bank	USA	1160	5.7
Ferrari SpA	IT	Mediobanca (net 24%)/ Commerzbank (net 10%)	IT/D	760	34
Dmax - diesel engines	USA	General Motors Corp	USA	422	20
Maruti Udyog Ltd	IND	Suzuki Motor Corporation	JPN	285	4.2
Tianjin Automotive Xiali Co Ltd	CHN	First Automotive Works	CHN	171	51
Aixam	FRA	Norbert Dentressangle SA	FRA	129	100
Yantai Bodyshop Corp	CHN	General Motors/Shanghai Auto	US/CHN	109	100

Source: PricewaterhouseCoopers.

Multinational companies have a long history of leveraging their geographic roots to their competitive advantage (Doz et al., 2001). These roots or links have taken different forms. Links within the automobile industry go far beyond equity deals and a glance at all the affiliations which actually exist between automobile manufacturers reveals a complex system of varying forms of relationship which span the entire sector. These links may take the following forms:

- Equity
- Joint venture
- Interchange or buy-off of products
- Marketing or distribution agreement
- Technology or R&D agreement
- Assembly agreement.

Table 11. M&A transactions 2002 – supplier

Target	Target Nation	Buyer	Buyer's Nation	Deal value (USD mn)	% Acquired
TRW Inc	USA	Northrop Grumman Corp	USA	11,7	100
Edscha AG	D	Carlyle Management Group/Edscha Management	USA	605	98
Teksid SpA	IT	Questor/JP Morgan PE/PE Partners/AIG	USA	453	100
Donnelly Corp	USA	Magna International Inc	CAN	389	100
Varta AG (Auto Batteries Div)	D	Johnson Controls Inc	USA	308	100
FTE Automotive GmbH	D	Hg Capital Ltd	UK	198	100
Conti Temic Microelectronic GmbH	D	Continental AG	D	188	40
Unisia Jecs Corp	JPN	Hitachi Ltd	JPN	184	83.3
Cie Financiere Michelin	CHN	Michelin SA	FRA	175	6.3
Aetna Industries & Zenith Inc.	USA	Questor Management Co	USA	145	100

Source: PricewaterhouseCoopers.

The outline of the entire system of interrelationship within the automotive sector would go beyond the scope of this study. Therefore the example of the Italian manufacturer Fiat should give the impression of the huge grid of linkages in this sector.

The Case of Fiat and Its Different Types of Linkages with Other OEMs and First tier Suppliers (Source: AP)

GM has a 10% stake in Fiat. The Italian manufacturer has an option to sell the remaining 80% to *GM* by 2009. Both firms have pooled together their logistic activities in Argentina. *GM* took over the Mexican distribution of Fiat and Alfa Romeo in 2003 and started to assemble cars in Thailand.

Fiat is involved in a joint venture with *Ford* in the UK where they build commercial vehicles together with Iveco Ford Truck Ltd. Both companies have a share of 48%. A second joint venture concerning the commercial vehicle sector is built up with *GAZ*, to cover the Russian market. As a result, Fiat is also involved in a joint venture with the Russian manufacturer *AvtoVAZ***.** The object of production is the assembly of drive propulsion systems. In the range of new diesel engine for commercial vehicles Fiat is also taking part in a R&D agreement with *Nissan*. *DaimlerChrysler* participates in a R&D agreement with Fiat with the aim to develop a new common rail injection pump for turbo diesel engines.

Bertone had an assembly agreement with Fiat. They produced open-topped Fiat Puntos[30] and create the design concepts for the new small car model and the Alfa

[30] The contract concerning the production of Punto expired.

Romeo coupé. *Fuji* supplies the automatic transmission. According to the joint venture with *GM*, Fiat carries out some purchasing operations for *Fuji* and *Isuzu*. The Canadian supplier company *Magna Int* provides all Fiat Pandas with all-wheel power trains.

Fiat and *Peugeot* have finalised a strategic alliance for the production of light commercial vehicles. Both of them have also been affiliated with the Moroccan assembly manufacturer Somaca. Fiat and *Peugeot* have a 20% stake and *Renault* has a 8% stake. The Italian company *Pininfarina* has concluded an assembly agreement with Fiat for different models and also undertakes some design projects for the manufacturer.

Fiat is planning a R&D and assembly agreement with *Suzuki* for the production of an SUV (Sports Utility Vehicle) by 2004.

2.5 Capacity Utilisation and Structural Overcapacity

In a worldwide perspective the current output of the car industry is well below the production frontier. Several features of the competition in automotive markets contribute to the phenomenon of overcapacity. On the one hand overcapacity is a transitory feature depending mainly on the cyclical variation of demand for cars. On the other hand overcapacity is often seen as a more permanent feature in the automotive industry. Short-run fluctuations and long-run under-utilisation of existing capacities are quite distinct phenomena and highlight the different aspects of car markets.

First of all, the car sales in Europe show cyclical variation. A cyclical downturn of the car market induces an increase in the number of unsold cars which leads to a greater price competition and more attractive terms for de luxe equipment. If cyclical variation affects a whole set of regional markets it will also reduce the number of produced cars and hence cause a temporary under-utilisation of capacity. During the last fifteen years capacity utilisation rates in the car industry have shown quite similar developments for most European countries (EU-15 only; see Figure 20). The most distinct features of the European automotive production are the dramatic decline of capacity utilisation in the first half of the 1990s and the revival of capacity utilisation until the year 2000. Since then capacity utilisation declines gradually and it is not clear whether we will see an upturn of the average capacity utilisation rate in Europe in the near future. We can also see from this figure that even in the boom periods 1989-1990 and 1999-2000 capacity utilisation rate amounts to 90%.

The lower half of the figure shows the capacity utilisation rates by country. There is a distinction between large countries and smaller countries with a significant production of cars or production of parts. The figure suggests that variation is more pronounced in those countries with a large final production of cars. Moreover, the general trends are quite similar in all countries although there are significant differences. The most obvious one is that the Italian car industry shows a lower degree of capacity utilisation than the other European countries. Even in the

boom period in the late 1990s the Italian automotive industry realised a capacity utilisation rate which is below the rate of Germany, the leading car producer, during the slump in the early 1990s. Hence, there seems to be a structural overcapacity there as well. Finally, we should note that even in extreme boom periods capacity utilisation rates never approach 100%. Therefore, one should not consider 100% as the full capacity utilisation rate. Capacity utilisation rates close to 100% (say 90-95%) can already be taken for full utilisation of capacity.

These figures refer to the automotive industry as a whole comprising car and truck manufacturers as well as suppliers. Separate data on capacity utilisation rates for final producers and suppliers are not available from DG ECFIN. National level data reveal that as a rule the capacity utilisation rate for final assembly of car is significant lower than for the manufacturing of parts (1st, 2nd, 3rd tier suppliers). Hence, overcapacity is primarily a problem of car makers. Accordingly, overcapacity can be linked to market strategies of car makers and idiosyncrasies of final car production.

When setting up a final assembly plant car makers have to assess the market potential for the model(s) produced in the assembly. The planning of plant capacity normally takes considerable time before a new model enters the market or – in emerging markets – before the market potential for a new model can be estimated accurately. The marginal costs of an ex-post capacity increase are much larger than the cost of the ex-ante capacity increase.[31]

In addition, the cost of extended delivery times which are the result of lower capacities are especially large in market segments which are fiercely competitive and the possibilities of product differentiation between companies are relatively low. In this way, it is more reasonable to build plants based on more optimistic variants of sales forecasts. Therefore one should expect lower capacity utilisation rates for plants with standard cars than for the luxury car or the SUV segment of the market.

Given the fierce competition in global automotive industry an additional argument arises when looking at the capacity utilisation in emerging markets. Looking at the distribution of market shares on national car markets it becomes obvious that there are lasting effects of being a “local” company. Hence, there is a widespread believe that being the first to produce locally and to reach a significant market share very early will have lasting effects on reputation. As a consequence of strategic interaction between companies, the overall capacity of new plants in emerging markets often exceeds current and near-future market potential quite dramatically.[32] Presently, this is quite obvious in the case of expansion plans of

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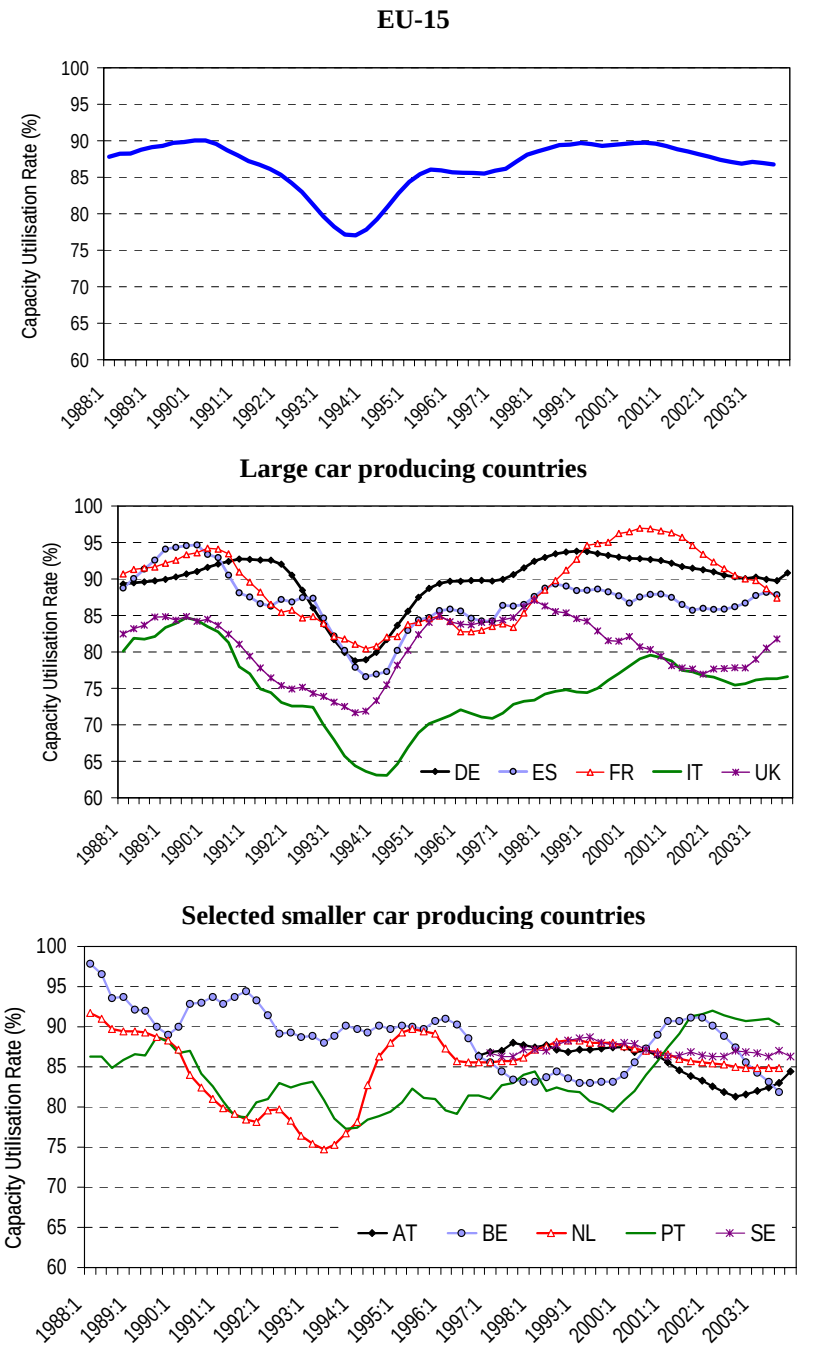
31 Admittedly, there is the possibility to change from a two-shift to a three-shift and vice a versa, which gives some ex-post flexibility. However, changing the number of shifts also induces different unit labour costs.

32 See Sturgeon (1997) for a more detailed discussion of this argument. As a striking example Sturgeon and Florida (2000) report an average capacity utilisation rate in transplants in Vietnam of around 10%.

Fig. 20. Capacity utilisation in EU-15 car industry – 1st quarter 1988 to 4th quarter 2003

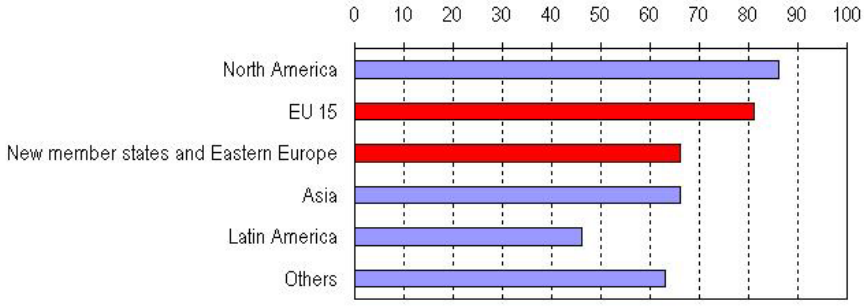


Remark: The original quarterly capacity utilisation rate is smoothed by a moving average filter using 3-quarter lags and leads. The original data does not show any evidence of seasonal variation. Other filters (e.g. Hodrick-Prescott) do not lead to different conclusions. Data on capacity utilisation are gathered by a group of economic research institutions as part of the regular business cycles surveys. National data are harmonised and published by DG ECFIN.
Source: DG ECFIN 2004-05-26.

automotive producers in China. So, the strategic objective to gain a first mover advantage in new markets seems to be another driver of overcapacity in global automotive markets.

Hence, one should expect larger over capacities in emerging markets, as illustrated by figure 21 which refers to the boom year 2000 in order to eliminate the impact of the current downturn in major markets. The figure shows that the capacity utilisation rate was quite high in North American plants and EU-15 plants. Significant overcapacity was present in Eastern Asia, Latin America and other countries but also in Eastern Europe.

Fig. 21. Capacity utilisation rate for car assembly plants in major regions during the 2000 boom



Source: Reinaud (2001).

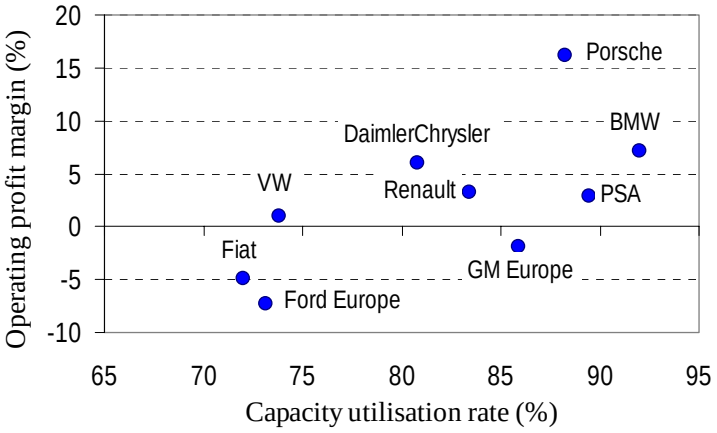
More precisely, overcapacity is less likely a problem in higher priced market segments where competition is less fierce than in the standard car segment. Low capacity utilisation in Asian plants can be attributed to different reasons. Japan, the leading car market shows a slow growth during the 1990s. Moreover, export sales of Japanese plants face additional competition in US and Europe from the new Japanese transplants in both regions. As a result structural overcapacity arises. Similar arguments refer to Korea which was also severely hurt by the 1997-98 Asian crises.

Eastern Europe faced a rapid expansion of production capacities in the last decade. Capacity utilisation in the standard car segment is far below the capacity utilisation in EU-15. A recent study of PwC AUTOFACTS (2004) estimates capacity utilisation for car plants in Poland remaining at about 50%, and at 40% in Slovakia in 2004. The study forecasts average capacity utilisation to remain at this

level in Poland and a strong increase in Slovakia (70%). However, even in the long run capacity utilisation rates in the new member states are expected to be below capacity utilisation in most of the EU-15 countries. Low production costs in the new member states and the existing potential for further decreases in unit labour costs in car production will increase competition in EU-15 markets. The impact of excess capacity will put the traditional car producing locations in EU-15 under pressure as well. Besides, as suppliers open up additional production facilities in the new member states they encounter similar dangers.

More recently, capacity utilisation rates for major assembly facilities seem on the rise again. PwC AUTOFACTS estimates a slightly increasing capacity utilisation rate for car assembly plants in the EU. On average capacity utilisation is expected to rise to around 78% in 2004 (77% in 2003; 76% in 2002). However, this increase is the result of capacity reduction, and not of an increasing demand, and new capacity will enter the market in the new member states soon. There is a close link between capacity utilisation and profitability. As a rule of thumb, car makers break even when capacity utilisation rates reach 80% with some variation between plants. The close relation between profitability and capacity utilisation is evident from the figure 22.

Fig. 22. Capacity utilisation rate and profit margin in European assembly plants in 2003 by automotive groups



Source: PwC AUTOFACTS / Automotive News Europe June 2004.

Figure 22 shows a wide variation in capacity utilisation and also profitability between car makers in Europe. This group-level data also reflects what was evident from the industry level capacity utilisation rate above. Fiat shows capacity utilisation below European average whereas the French and some German car makers are above average. The wide variation in capacity utilisation again makes us suppose that overcapacity is to a lesser extent a problem for European plants than for other locations outside of Europe. However, some European plants show

low capacity utilisation rates, and hence we should expect that with a sluggish market there will increasingly arise a discussion where to reduce capacity. It is well-known in the industry that capacity reductions are made only when a low capacity utilisation stays for some years and when it is expected that even new models will probably not lead to increased capacity utilisation.

In summary, when looking at the overcapacity issue in global automotive industry one has to separate cyclical developments from structural explanations. In a global perspective capacity utilisation in EU-15 is high. However, sluggish market development in major car markets together with a rapid expansion of production capacities in emerging markets as well as transplants in developed car markets will fuel the overcapacity problem. This will lead to stronger competition especially in traditional segments of the car market and increase the pressure on production costs and hence stimulate the search for product innovation to escape from fierce price competition in the standard car segment. Additionally, it will stimulate the search for cost reduction via new production technologies and organisational innovations. The overcapacity will stimulate competition within automotive groups between different local production units but also the cooperation between brands within and between groups. The re-organisation of the industry which will also take place within the EU will probably increase the competitiveness of the EU car industry since the EU offers both low cost production possibilities and a large potential for innovation. However, the process of reduction of capacity takes time. Normally, capacity adjustment in the form of plant closures will only take place when a low degree of capacity utilisation stays for some years. So, despite the existing overcapacity in EU-25 the capacity of EU car assembly plants is only gradually adjusted downwards in Western Europe. Hence, we expect some reduction of capacity in the coming years.

2.6 Conclusion

Europe is a very big and important market for all the market players. The fact that eight companies have their roots in Europe is highly significant. Car production is still dominated by Europe. A closer look at the biggest manufacturers shows that European companies such as Volkswagen, DaimlerChrysler, PSA and Renault play a dominant role among the world's largest automotive enterprises.

In some automotive segments such as trucks or buses, manufacturers have concentrated production in regions such as America and Asia. In terms of buses China is becoming increasingly more important than other countries. Public transport is developing rapidly in this country, and this represents a strong demand advantage. The major players in this segment are exclusively from Asia. The truck segment is strongly dominated by the American market. GM and Ford take the worldwide lead in truck production.

The biggest opportunities remain in the hands of Eastern Europe. Despite their recent membership of the European Union, Eastern Europe is still the region with an accelerated automotive industry growth. New assembly and production plants

have been installed in these countries. Not only are manufacturers setting up in Eastern Europe, the preliminary value chain is moving as well, i.e. the whole supplier industry is taking advantage of this region.

Globalisation offers a lot of possibilities for multinational companies and regions. These regions – Europe, America and Asia – find themselves in tough competition for the best assembly locations. Certain countries such as China attract manufacturers both owing to the advantageous production conditions and new markets – largely untapped to date – which they offer.