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# MEDIUM-RUN CAPACITY ADJUSTMENT IN THE AUTOMOBILE INDUSTRY

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## MEDIUM-RUN CAPACITY ADJUSTMENT IN THE AUTOMOBILE INDUSTRY

### Main findings

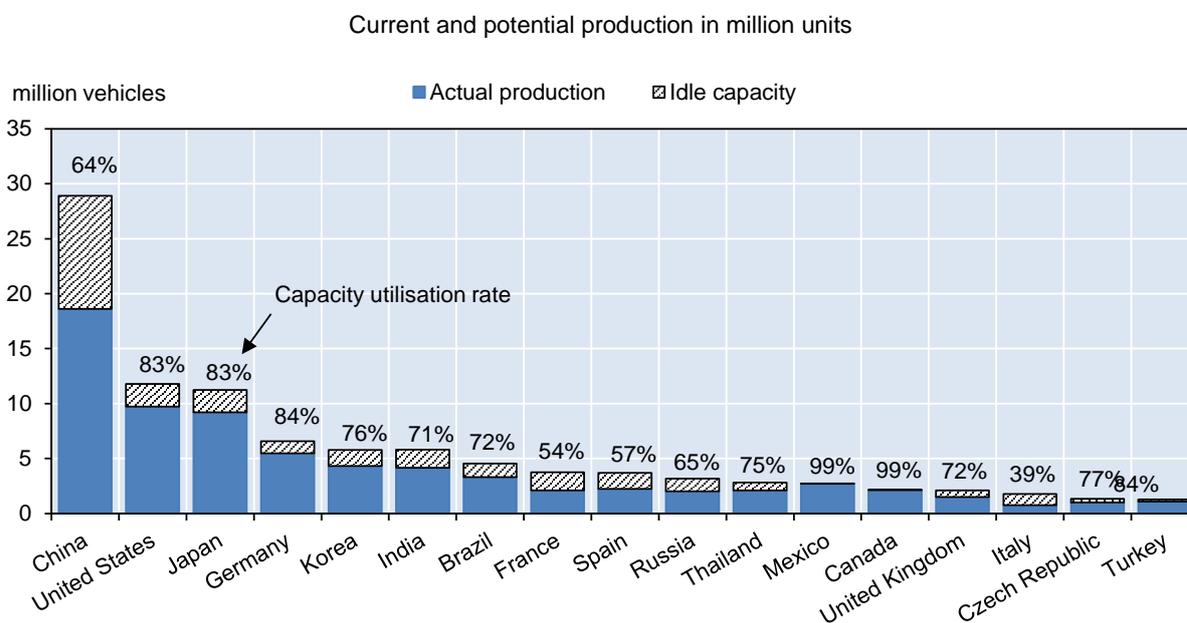
The automobile industry is coping with major shifts in demand, characterised by subdued prospects in advanced economies, strong growth in EMEs, and sizeable overcapacity in some countries. The economic crisis clearly contributed to overcapacities in OECD countries, but demand growth was sluggish even before. This suggests that a return of demand to pre-crisis levels might not be sufficient to absorb excess capacities. This note assesses the main forces that are likely to shape car demand in OECD and non-OECD countries over the next several years and the implications for capacity utilisation. The following conclusions emerge:

- On average across countries, capacity utilisation stood at around 70% in 2012, well below the historical average in manufacturing of around 80%. France, Italy and Spain face much lower utilisation.
- Projections of future car sales suggest that growth will mostly take place in emerging markets. The growth rate until 2020 is projected to average 3% per year for OECD countries and 9% per year for the BRIICS.
- A comparison of projected production levels in 2020 (between 125 and 130 million cars worldwide) with actual capacity in 2012 indicates that additional production capacity of around 35 to 40 million cars needs to be built over the next eight years. The countries with the biggest projected need to expand capacity in the medium term are India and China.
- As cars are mostly traded within regions, car plants in European countries might hardly benefit from the strong growth in emerging markets. Hence, while car demand may be sufficient to clear excess capacities in Europe as a whole by 2020, overcapacity may persist in a few countries, in particular Italy and France. Reducing overcapacity in these countries might be difficult without substantial improvements in competitiveness.
- There is a large degree of uncertainty surrounding these projections. Notably, they do not account for policy changes to mitigate greenhouse gas and other pollution emissions as well as congestion, which could significantly reduce the increase in demand, particularly in emerging markets.

## Many OECD countries are concerned about the future of their automobile industry

1. The automobile sector was severely hit by the economic crisis. Despite government support schemes, automobile production plummeted in 2008 and even in 2012 production was still 8% below its pre-crisis level in the OECD. On average across countries, capacity utilisation stood at 70% in 2012, well below the historical average in manufacturing of around 80% (Figure 1). The situation is particularly severe in several European countries, where manufacturers have had to close assembly plants with consequent job losses. While the decline in sales and the built-up of overcapacity have benefited consumers by weighing on car prices, they risk undermining the long-run viability of the automobile industry in countries where they are most sizeable. The extent of overcapacities currently observed in some countries raises concerns about the prospects of a severe restructuring of the automobile sector, which could have far-reaching implications due to the economic importance of the sector.

**Figure 1. Capacity utilisation was low in most countries in 2012**



Source: LMC Automotive database.

2. The direct share of the sector in total value added and employment is relatively small – even in countries with a large automotive industry such as Germany and the Czech Republic the manufacturing of motor vehicles, trailers and semi-trailers as well as bodies and parts and accessories for motor vehicles and their engines does not account for more than 4% of value added and 2% of employment. Nevertheless, the comparatively high volatility of the sector implies that the car industry can, at times, make a large contribution to aggregate fluctuations in economy-wide activity. For instance, the direct contribution of the automobile industry to GDP growth amounted to half a percentage point in 2010 and to one third of a percentage point in 2011 and 2012 in the US. Furthermore, there are important spillovers from car production on other sectors (e.g. steel, chemical, electronic components and textile) whose scale depends on the structure of the supply chains, in particular the import content of the intermediate inputs to the sector. Estimates of these spillovers put the multiplier at 3 on average in G7 countries, *i.e.* a dollar increase in value added in the automotive sector generates 3 dollars of value added economy-wide, a level that is close to the top of what is

observed in other sectors (Haugh et al., 2010). These strong inter-linkages with other sectors of the economy amplify the impact of changes in car demand on activity.

3. The industry is also an important source of innovation, as indicated by its high share in total R&D spending. For example, in the Czech Republic, Sweden, France and Japan, the sector accounts for more than 15% of all R&D spending, and in Germany its share even exceeds 30%. In principle, this could mean that a shrinking of the sector in those countries could have important repercussions on a country's innovative capacity, with negative implications for long-run GDP per capita growth. In practice, resources devoted to R&D are to some extent fungible across the economy – at least over the longer term. Moreover, most firms operating in the sector have production capacities in several countries and regions of the world, either directly or through business alliances, and therefore may maintain important research and development facilities in their home country even if production were to decline.

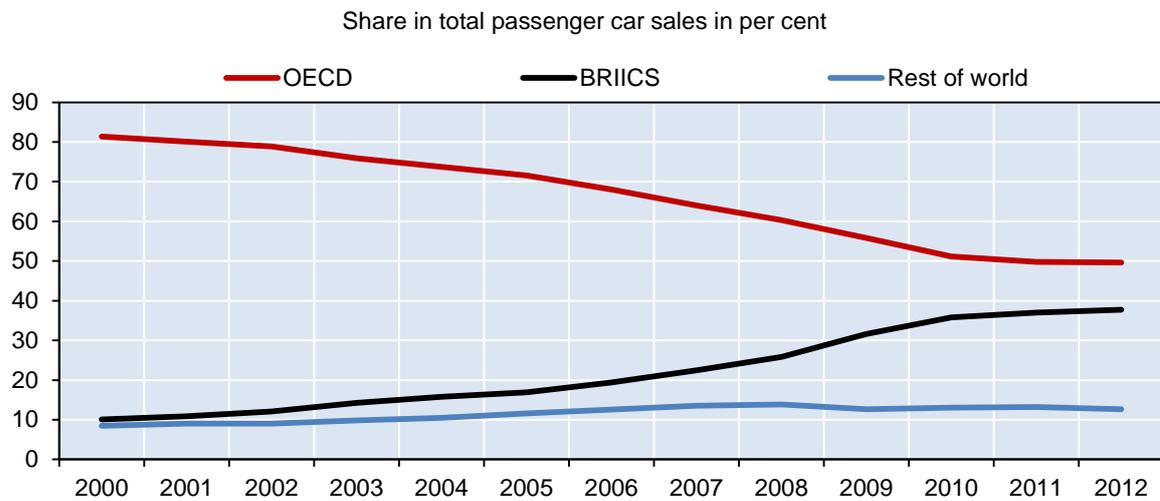
4. The prospects for a significant increase in car sales and production depend to a large extent on how much of the decline in recent years was due to cyclical factors as opposed to more fundamental drivers such as market saturation and changing demand patterns (e.g. less frequent replacements of old cars as a result of better quality). To address this issue, the outlook for car sales and production in 56 OECD and non-OECD countries has been assessed, distinguishing between temporary developments related to the cycle and more persistent patterns. This note aims at identifying which countries might face structural overcapacities or capacity shortfalls in the near future. It also assesses the factors that drive future developments of car sales, including GDP growth, oil prices, environmental regulation and competitiveness. In tackling these issues, the focus is on passenger cars and light commercial vehicles as well as on the assembly stage of car production.

### **Major shifts in demand patterns can be expected over the medium run**

5. The need to downsize or expand capacity in the medium term will depend on how well producers deal with the strategic and technological challenges that the industry is facing:

- *Demand is growing rapidly in emerging countries.* OECD countries accounted for 80% of world passenger car sales in 2000, but their share has since dropped to around 50%. The share of BRIICS in car sales more than tripled over the same time period and has almost reached 40% (Figure 2). With a 24% share of world sales, China is the largest market for passenger cars, well ahead of the European Union and the United States with 17% and 18% respectively. Between 2000 and 2012, passenger car sales in the BRIICS more than quintupled, driven by rapidly rising incomes. China and India account for around 70% and 10% of this increase respectively. Since car ownership rates in emerging countries are still low by international standards (in 2010, there were about 50 passenger cars per 1 000 persons in the BRIICS compared with 410 in the OECD), sales are set to keep growing at a fast pace in the foreseeable future. That said, rising fuel prices and regulatory restrictions on car ownership to cope with congestion and environmental problems are likely to dampen growth somewhat. In China, for instance, four cities (Beijing, Shanghai, Guiyang and Guangzhou) currently operate restrictions on the number of license plates and two more (Wenzhou and Nanjing) will follow soon (KPMG, 2013). According to statement by the China Association of Automobile manufactures, eight cities are likely to introduce restrictions.

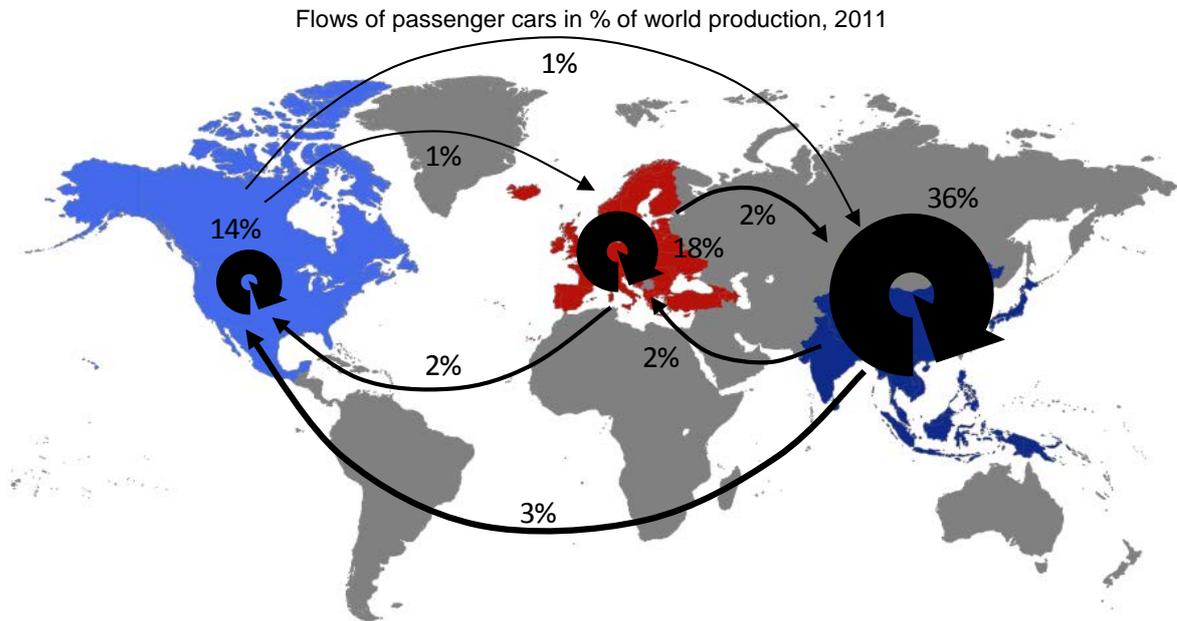
**Figure 2. Emerging economies account for an ever higher share of world car demand**



Source: Authors' calculations based on sales database by LMC Automotive.

- *OECD car demand is unlikely to grow much further.* Car sales in the OECD have declined over the past decade and stand 13% below their 2000 level. Falling incomes during the recession have clearly contributed to this, but growth had been subdued even prior to the crisis in many OECD countries, owing to market saturation, rising fuel prices, and low population growth. As the same forces are likely to be acting going forward, sales growth in many advanced countries may remain sluggish. Moreover, growing pressures to abate pollution emissions, not least to mitigate climate change, may raise the costs of owning a car (e.g. through higher taxes and congestion charges) while reducing the benefits (e.g. through urban driving restrictions). As an alternative, consumers may increasingly resort to public transportation and/or to car sharing arrangements, which offer mobility at a relatively low price, though with reduced comfort and flexibility (Capgemini, 2013).
- *Cars are typically produced in the region where they are sold.* In principle, cars could simply be exported from declining to growing markets, but cars are mostly assembled in the region where they are sold, not least due to transportation costs and trade barriers (Figure 3). In 2011, only around 11% of all produced passenger cars were traded between North America, Europe and South-East-Asia. Trade is further impeded by high import duties in several emerging markets.

**Figure 3. Cars are manufactured in the region where they are sold**



Source: Authors' calculations based on UNComtrade and sales database by LMC Automotive.

- *Demand is shifting towards smaller cars.* Between 2000 and 2012, the share of basic, compact and sub-compact vehicles in total world car sales increased steadily, from 42% to 53%. At the same time, the shares of mid-sized and multi-purpose vehicles as well as large, luxury and sports vehicles went down, from 17% to 11% and from 9% to 4%, respectively. This development does not only reflect a composition effect, whereby the share of non-OECD countries – where lower purchasing power means that a sizable proportion of customers are buying smaller, more basic models – in total world car sales went up. In OECD countries as well customer preferences are shifting towards smaller cars, on the back of different factors including a higher price of gasoline and improvements in vehicle designs. As small cars tend to be associated with lower margins, this shift may have implications for the profitability of the industry.
- *Demand is shifting towards more eco-friendly cars.* Pressures on governments around the world to better protect the environment and fight pollution and climate change might induce further policy actions aimed at reducing greenhouse gas and other emissions also in the transport sector. Associated fuel efficiency and emission targets such as *CAFE* in the United States, *euro6* in the European Union, *JCO8* in Japan or *Bharat* in India is leading to a shift in demand towards cars with more efficient combustion engines, hybrid or electric powertrains as well as lighter and more fuel-efficient vehicle designs.
- *Consumer demand for cars to communicate with the outer world seems on the rise.* Connected vehicle technology enables vehicles to communicate with each other and the roadway via the internet and local area networks, allowing for additional safety, intelligent navigation and individualisation. With customers increasingly demanding these features (in a consumer survey conducted in 2012, 11% of respondents said that they already use connected car services and 27% said that the next car they purchase would have such services; Capgemini, 2013), it is imperative for automobile producers to keep pace with technological advances in order to maintain or expand market shares. Connected vehicle technology considerably

increases the complexity of business models for automobile producers, for whom such applications have traditionally not been the core expertise. The development of smart cars could also bring new types of competitors on the market.

### **Capacity expansion will be required, but mostly in emerging countries**

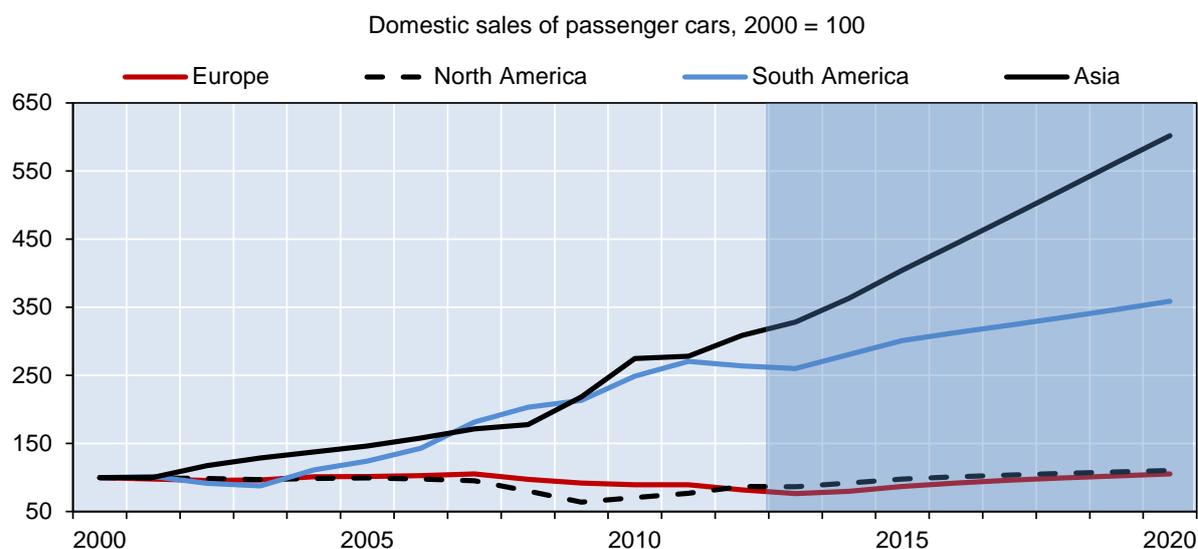
6. Rapidly growing demand in emerging countries and stagnating or slowly growing demand in advanced countries affect capacity needs. To explore these effects, a scenario analysis is conducted based on a newly estimated relationship between car sales, GDP per capita, population, unemployment and real oil prices (for more details, see Klein and Koske, 2013). Projections for GDP, population and unemployment that underlie the baseline scenario are consistent with the long-term economic scenario of the spring-2013 OECD *Economic Outlook*. In this scenario, GDP per capita is projected to grow at around 2% per year in OECD countries and at around 4% per year in non-OECD countries over the period 2013-20. The real oil price is assumed to increase by 5% per year in USD terms.

### ***Demand is set to grow mainly in Asia and South America***

7. Over the next two years, car sales are projected to increase only moderately in the OECD (by 0.7% per year on average). In several European countries car sales are expected to continue declining (e.g. Spain and France), while in North America, sales are set to increase in 2013 and 2014. As a result, average capacity utilisation might remain relatively low in OECD countries. By contrast, in most emerging markets a continued strong increase in car sales is to be expected on the back of rapid growth of GDP per capita, albeit slower than in recent years.

8. In the medium run, growth in car sales is projected to be mainly driven by demand from emerging markets in Asia and to a much lesser extent South America (Figure 4). Global sales are set to increase by 6 million units per year on average, with 75% of this increase coming from non-OECD countries (Table 1). In Asia, sales growth would be mainly driven by China, which would account for 40% of total growth (India would account for another 14%). In Korea, sales would be growing by 2½ per cent per year over the projection period and in Japan they would slightly fall on account of a shrinking population. Growth is projected to be rather sluggish in North America and European OECD countries, at a rate of 3% per year. The figure for Europe hides important differences across countries, due not least to different cyclical conditions. While car sales in Austria, Denmark and Germany are projected to fall slightly, Italy and Spain would experience growth of 5% and Portugal even of 7½ per cent as a consequence of a rebound in GDP per capita growth. In Greece, car sales which are currently very depressed might even go up by as much as 13% per year.

**Figure 4. Passenger car sales will grow rapidly in Asia and South America**



Source: Authors' calculations.

**Table 1. Main results of the projections**

	Baseline scenario						
	OECD	non-OECD	Asia	North America	South America	Europe	World
Total sales in 2012 (million units)	46.2	35.1	40.0	15.3	4.2	16.9	81.3
Total sales in 2020 (million units)	57.6	69.5	71.8	19.4	5.6	21.8	127.1
Average growth rate of total sales rate (in %)	3%	9%	8%	3%	4%	3%	6%
Contribution to world sales growth (in %)	25%	75%	69%	9%	3%	11%	100%
Capacity in 2012 (million units)	60.1	52.8	56.9	17.4	5.7	25.7	112.9
Capacity needed in 2020 (million units)	67.8	81.8	84.5	22.8	6.6	25.6	149.6
Capacity shortfalls (in million units)	7.7	29.0	27.6	5.4	0.9	-0.1	36.6
Capacity shortfalls (in % of 2012 capacity)	13%	55%	48%	31%	16%	0%	32%

*Note:* Capacity needed in 2020 corresponds to the capacity needed to maintain a capacity utilisation rate of 85% in 2020. The 85% utilisation rate was chosen because it is close to the utilisation rate observed in OECD countries on average over the past two decades in the manufacturing sector (around 80%) and to the optimal utilisation rate as suggested by experts of the automobile industry (between 80% and 90%). The results do not change significantly when the capacity utilisation rate is set at 80% or 90%.

Source: LMC Automotive, authors' calculations.

***Only a few European countries might have to downsize production capacity***

9. To gauge the implications of these projections for the need to expand or downsize production capacity, projections for sales need to be transformed to projections for production. More specifically, projections for production levels in 2020 are derived by adjusting the domestic sales

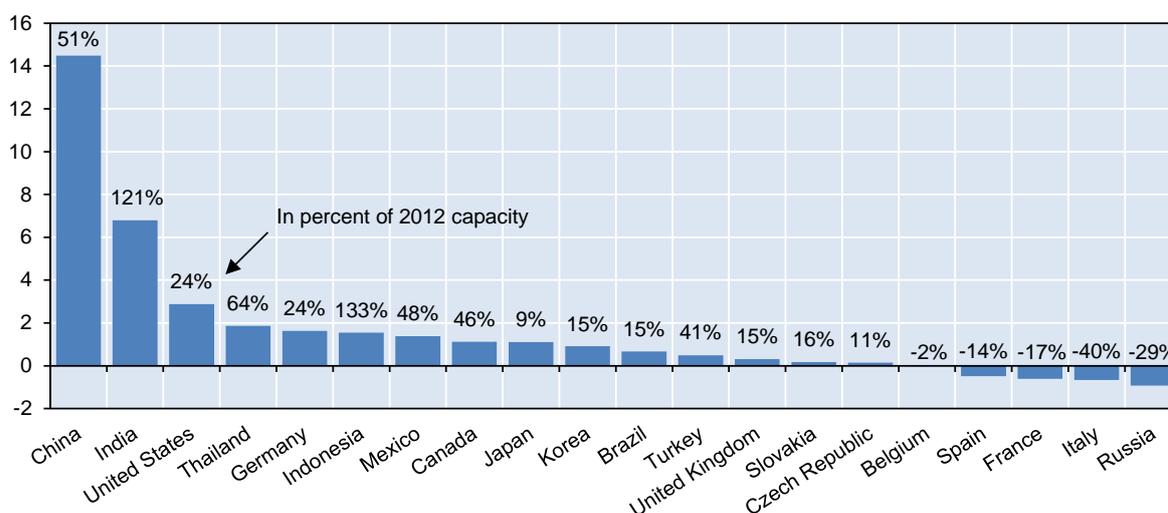
projections for net exports (even though cars are rarely traded between major regions, intra-regional trade is sizeable), assuming that countries' market shares remain constant at their 2011 value throughout the projection period. A comparison of projected production levels in 2020 with actual capacity provides estimates of capacity surpluses or deficits to be expected in individual countries in the medium term. Overall, the projections indicate that additional production capacity of around 37 million cars would be required to meet global car demand over the next eight years, with quite huge differences across regions (Table 1). In Europe, excess capacity might be absorbed by 2020 and the need for additional capacity is likely to be limited. By contrast, in Asia, North America and South America, capacity may have to rise by around 50%, 30% and 15%, respectively, to meet future demand. The capacity increases in Asia will probably mainly materialise in non-OECD countries. As shown in Figure 5, the countries with the biggest projected need to expand capacity are India (7 million vehicles or 120% of 2012 capacity) and China (14½ million vehicles or 50% of 2012 capacity).

10. Car manufacturers are already heavily investing in new capacity in China, for instance by opening car assembly plants (e.g. PSA in Wuhan, Ford in Nanchang). The planned capacity targets announced by automakers suggest that manufacturing capacity would increase from 28.5 million in 2013 to 40 million vehicles by the end of 2015 (KPMG, 2012). LMC Automotive also expects capacity in China to reach around 40.5 million units by 2020. With this amount of capacity, a utilisation rate of 90% would be required to meet the demand implied by the baseline projections for 2020. To bring utilisation down to 85%, additional capacity of around 2 million units would be needed.

11. In Europe as a whole, excess capacities are projected to be progressively absorbed by 2020. However, there are important differences across countries, with sizeable overcapacity in Italy, Spain, and France, but capacity shortfalls in Germany and several Eastern European countries. This is in line with the idea that while car producers could use idle capacities to meet demand on the European market, they may prefer expanding capacities in countries with a comparative advantage and cutting capacities in less attractive locations, as they did in the past. As such, in absence of changes in the relative competitiveness level of European countries, the shift in production from Western to Eastern Europe might continue in the future. Downsizing has already started in Western Europe, with three plants having been closed since 2007 (the Opel plant in Antwerp, Belgium, the Fiat plant in Termini, Sicily and, at least temporarily, the Saab plant in Trollhattan, Sweden). Further closures of car assembly plants have been announced for the next few years (in Southampton, Genk, Aulnay, and Bochum). The impact of these closures on excess capacity in the concerned countries is quite uncertain but they will probably contribute to reduce overcapacity. Simple calculations suggest that the capacity utilisation rate might increase by 25 percentage points in Belgium, 2 percentage points in Germany, France and the United Kingdom assuming that half of the production of the closed plants stays in the country.

**Figure 5. Some European countries might need to reduce capacities**

Capacity surplus and deficit in major car producing countries by 2020, in million units



*Note:* The bars show the required capacity adjustment assuming a capacity utilisation rate of 85% in 2020. The choice of the 85% utilisation rate was motivated by the average utilisation rate observed in OECD countries in the manufacturing sector (around 80%) and the desired utilisation rate as suggested by experts of the automobile industry (between 80% and 90%). The results do not change significantly when the capacity utilisation rate is set at 80% or 90%.

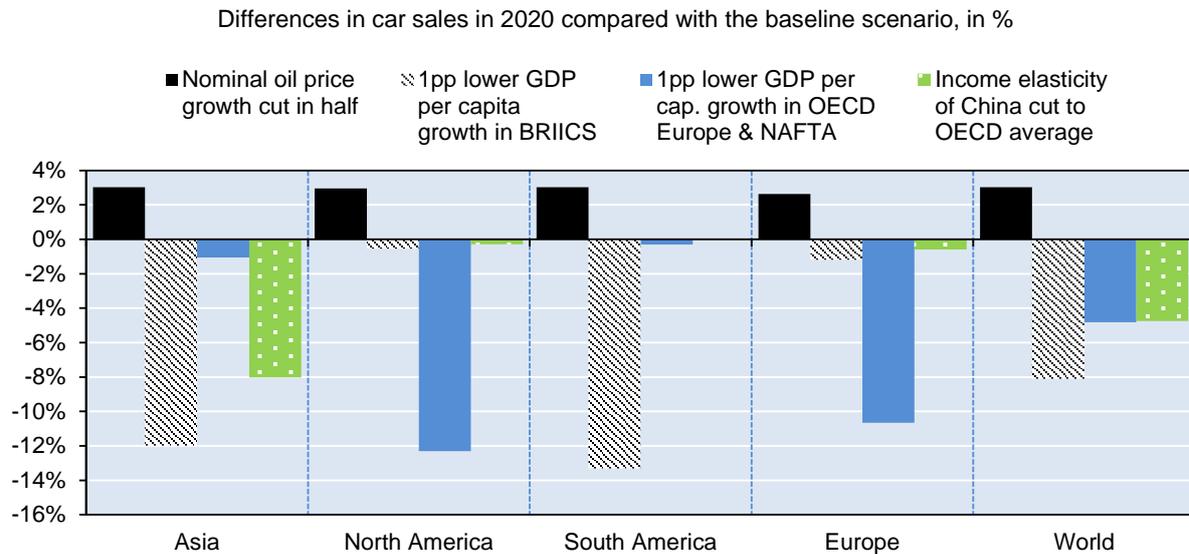
*Source:* Authors' calculations and LMC automotive database.

### ***Policies and macroeconomic conditions will shape the car market***

12. The projections are surrounded by a high degree of uncertainty and prospects for car sales crucially hinge on assumptions about GDP, population and oil price developments as well as on the responsiveness of car sales to these factors. Moreover, policy action to deal with environmental problems might strongly influence future car demand and are not accounted for in the simple framework used above. To shed further light on these issues, a number of alternative scenarios are carried out (Figures 6 and 7).

- If economic growth were lower than assumed in the baseline scenario, demand for cars would increase less strongly, reducing the need for future capacity expansion at the global level. For example, if annual growth in the BRIICS was one percentage point lower than in the baseline scenario, global car demand in 2020 would end up 8% below the value implied by the baseline scenario (Figure 6). Global car sales are less sensitive to assumptions about GDP per capita growth in advanced countries, reflecting a lower responsiveness of car demand to changes in GDP per capita in these countries. For instance, if GDP in Europe and North America grew annually by one percentage point less than in the baseline, global car demand would only be 5% lower in 2020.
- Since cars are mostly traded within regions, different assumptions on GDP per capita growth in a specific region or country mainly affects car production in countries in that region. For instance, the one percentage point decline in GDP per capita growth in the BRIICS is projected to raise overcapacity by only 300 000 cars in Europe (around one per cent of the 2012 capacity level), but to cut capacity needs by 10 million cars in Asia (18% of the 2012 capacity level). Conversely, European countries are set to hardly benefit from higher GDP growth in emerging markets in terms of a boost to car production in Europe.

**Figure 6. Prospects for car sales are sensitive to the assumptions underlying the projections**



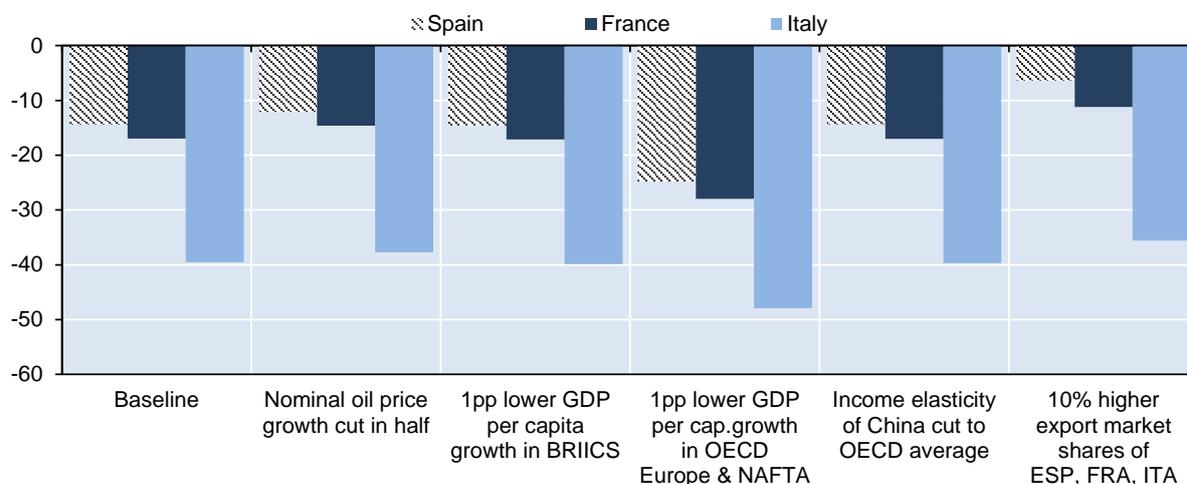
Note: Income elasticity of sales to GDP per capital of China is cut from 1.7 to unity (OECD average).

Source: Authors' calculations and LMC automotive database.

- To investigate the implications of alternative oil prices assumption on the results, nominal oil price growth is cut in half relative to the baseline, which is broadly equivalent to maintain the price of oil constant in real terms over the projection period. In nominal terms, the price of Brent crude reaches USD 130 in 2020 (compared with USD 160 in the baseline). In this scenario, car demand at the world level would be 3% higher than the level projected in the baseline, inducing an increase in extra capacity required to satisfy demand of around 4.5 million units. However, the distribution of car production across countries and regions would hardly change, and thus would not do much to reduce overcapacity in Western Europe.
- Likewise, moderate improvements in competitiveness would barely help to reduce overcapacity in Western Europe. For example, raising the export market shares of Spain, France, and Italy by 10% would still leave them with sizeable overcapacities in 2020 (Figure 7). For these three countries to achieve a capacity utilisation rate of 85%, their market shares would need to increase by respectively 20%, 30% and 100%.
- The baseline scenario abstracts from the influence of changes in economic policy on car demand. However, measures taken by governments to ease congestion and reduce greenhouse gas and other emissions may dampen demand by restricting car ownership or raising its cost. The issue appears particularly relevant for emerging markets where car ownership is rising rapidly, with associated congestion and pollution problems. Reducing the responsiveness of car demand to income in China to the OECD average level is the option chosen here to illustrate the potential impact of stricter environmental regulation on car demand. For instance, such a weaker link between GDP per capita and car sales could result from an extension of the lottery schemes that already exist in several Chinese cities to limit the number of new car registrations. The lower responsiveness of car sales to changes in income in China would reduce car sales by 5% worldwide by 2020 relative to the baseline (Figure 6). This would mainly affect production in China because most of the cars sold in this country are produced domestically.

**Figure 7. Overcapacities persist in several EU countries under various scenario assumptions**

Capacity adjustment needed to satisfy demand in 2020 and maintain utilisation rate of 85%, in % of 2012 capacity



*Note:* Capacity projections assume a capacity utilisation rate of 85% in all countries. Income elasticity of sales to GDP per capital of China is cut from 1.7 to unity (OECD average).

*Source:* Authors' calculations and LMC automotive database.

### What are the main implications?

13. The analysis conducted above suggests that the projected pick-up in economic activity in OECD countries to growth rates that are closer to historical norms will not be sufficient to absorb the current large overcapacities observed in a number of European countries. In these countries, clearing excess capacity may thus require either to increase the share of domestic cars sold in both foreign and domestic markets or to downsize production capacities.

- To increase demand for domestically produced cars, countries with overcapacity could divert demand from their competitors by improving their relative competitiveness. They could also specialise in the market segments which are set to grow strongly in the future, in particular if their overcapacity issues are due to a mismatch between the cars they currently produce and the cars demanded by consumers. Our projections suggest however that even a strong increase in export market shares, while welcome, might not be sufficient to clear existing excess capacity.
- In absence of a sustained improvement in demand prospects, car producers might have to downsize production capacity. Such structural adjustments are likely to take time because under uncertainty, there is a value for car producers of waiting before downsizing. For instance, car makers might delay downsizing if they expect that competitors will also reduce capacities in the near future. Downsizing non-viable firms is likely to generate long-term benefits by improving the allocation of resources in the economy, but may also induce social costs. Because the automobile sector is geographically concentrated, plant closures might significantly damage the local economy as upstream activities could also leave affected regions. The US automobile industry has gone through a major restructuring, with capacity of the three main US car producers reduced by 29% between 2004 and 2012 (McAlinden and Chen, 2012). This restructuring has helped to restore profitability and price competitiveness of

domestic producers (Klier and Rubenstein, 2013). However, employment in the automotive sector did not recover as fast as production and stands around 20% below its pre-crisis level.

14. Subsidising car purchases through various mechanisms has often been used as means to boost car demand and support the domestic automobile industry. However, not least because such policy has only temporary effects on car demand, it is not appropriate to deal with structural overcapacity. Car scrapping schemes may even curb long-term growth by delaying the necessary adjustments to structural changes in the automobile industry and lock in inefficient activities. Increasing temporarily demand for firms that are possibly not viable might divert private investment from more profitable activities, thereby distorting the allocation of resources in the economy. Even in the short term, car scrapping schemes may have a limited impact on activity as they only shift car consumption in time (Haugh et al., 2010).

### **Suggested further reading**

The main paper providing the background to this note is:

Klein, C. and I. Koske (2013), “Capacity Needs in the Automobile Industry in the Short- to Medium Run”, *OECD Economics Department Working Papers*, forthcoming.

Additional related literature includes:

Capgemini (2013), "My Car, My Way, Cars Online 12/13"

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