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Germany's future as a carmaking location

Greetings from Detroit

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The COVID-19 pandemic has triggered unusual cyclical volatility in the German auto sector. However, structural challenges are much more relevant for the sector. They may endanger Germany's status as a carmaking location. Some of these challenges stem from regulatory framework conditions, others from market developments.

Tight EU CO_2 targets for new cars will force carmakers to introduce more electrical vehicles. This will lead to higher costs and exacerbate the structural change in the sector. Hardly anybody expects the structural changes to be ultimately beneficial for value added and employment in the auto sector in Germany.

Climate and energy policy-related uncertainties are one reason why the capital stock in energy-intense sectors, such as the metals or chemical industries, has been declining in Germany for years now. These sectors are part of the value chain in the auto sector, which, as a whole, may suffer from reluctance to invest at certain points in the chain.

The planned tightening of European emission standards (Euro 7) will also lead to higher production costs for the auto industry. In particular, prices for cars in the volume segment are likely to rise stronger in relative terms due to the cost increase. As a result, the production of "everyman cars" may come under pressure in high-wage countries such as Germany, France or Italy.

Traditional factors which determine a country's attractiveness as an industrial location, such as the tax burden on corporates, wages or working time flexibility, have recently deteriorated in Germany, at least in an international comparison. Protracted trade conflicts also dampen companies' willingness to invest. Moreover, the important western European car market has reached a mature stage. Finally, demographics are a challenge as well, as the workforce is likely to shrink and demand looks set to decline as well.

Germany's auto sector has recovered from the two major crises of the past 30 years (1993 and 2008/09), even though the recovery took several years in each case. However, the structural challenges raise the question of whether the sector will ever return to its former highs. We are afraid that it may become more and more difficult to keep mass market car production competitive in Germany.

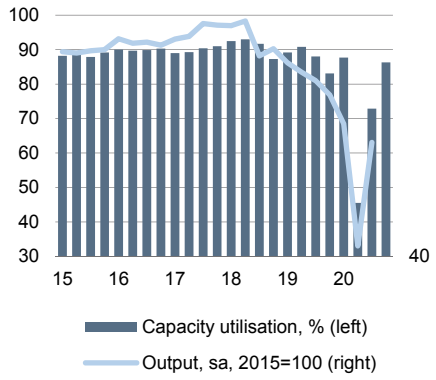
Germany's share in both global and European car production may decline over the coming years. We may see a similar development to that in Michigan (Detroit) where car output is now much lower than at the beginning of the century.

The German car industry is better prepared for the electric mobility future and other structural challenges than Germany as a production location.

Germany's future as a carmaking location: Greetings from Detroit

Output and capacity utilisation recover from corona shock 1

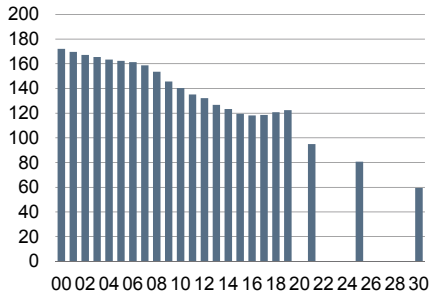
Automotive industry in Germany



Sources: Federal Statistical Office, ifo

EU sets ambitious targets for CO_2 emissions per car 2

Average CO_2 emissions of new passenger cars* in the EU, g/km

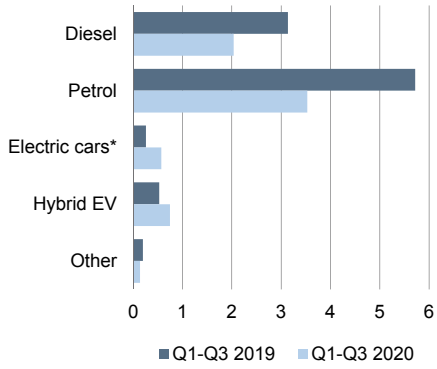


* Hist. developm., targets for 2021, 2025 and 2030

Sources: EEA, EU Commission, Deutsche Bank Research

New passenger car registrations in the EU: Electric cars catching up 3

m, units



* BEV, PHEV, range extender, fuel cell

Source: ACEA

Structural challenges more serious than corona crisis

The COVID-19 pandemic is clearly the most important factor behind any short-term cyclical development in the German auto industry. In 2020, the production index for the sector probably declined by about 25% in real terms. This was the third decline in a row. As global demand for cars is likely to pick up again in 2021, we expect the production index to rise by about 30% in real terms.

These significant cyclical fluctuations are caused by an external shock, namely the COVID-19 pandemic. They are unusual and a major burden for the industry. Nevertheless, structural challenges will play a considerably more important role in the coming years. They may even endanger Germany's status as a carmaking location. Some of these challenges stem from regulatory economic policy framework conditions, others from market developments. Demographic developments are a major factor, too. This article gives an overview of the situation.

CO_2 limits and subsidies for e-cars: Carrot and stick

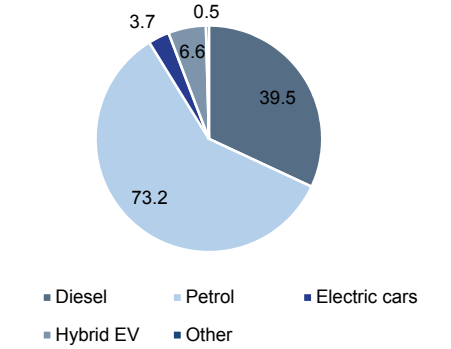
Climate policy regulations for the auto industry are the reason for the biggest structural break in the sector for decades. Tight EU CO_2 targets limits for new passenger cars that have to be reached in 2020/21 and 2030 force carmakers to introduce more electrical vehicles. While other countries are also introducing similar CO_2 limits, they are less ambitious than the EU. Battery electric vehicles (BEV) are treated as zero emission vehicles under EU regulations, even though that is only true for local emissions. There are still carbon emissions during power generation and along the value chain as a whole, i.e. including materials sourcing and battery production. Plug-in hybrid electric vehicles (PHEVs) are treated as low emission cars (per km) as well, even though they actually emit quite a lot of CO_2 if the combustion engine powers them. For that reason, current CO_2 regulation for PHEVs are already coming under more and more criticism.

Many countries subsidise electric vehicles, as pure market demand is still quite low. This "carrot and stick" policy (subsidies and CO_2 limits) makes the auto industry develop and produce cars which are not yet attractive enough for large numbers of customers (at least not without the subsidies). High prices, particularly for mass market vehicles, a small range, the gaps in the charging infrastructure, long charging times and other reasons are keeping demand low. While the market share of electric vehicles is increasing across the EU, this development is largely due to generous subsidies. Demand for traditional petrol or diesel engines declined due to the corona crisis in 2020. At the same time, subsidies for e-cars rose heavily so that their share in total new car registrations has jumped in the EU as a whole. In 2020, it was more than 8% for BEV, PHEV and fuel cell cars combined, up from 3% in 2019. The percentage for Germany was even 13.5%.

What does this structural change mean for the sector? First, it will lead to more expenses, above all for investments in the new technology, and declining average returns per car; after all, the car industry often subsidises electric vehicle purchases, too. Producers that do not comply with their CO_2 targets in 2020 or 2021 will have to pay fines – another element which may drive expenses up. While part of the higher expenses will be passed on to clients and suppliers, the remainder will weigh on producers' margins or will reduce available funds for potential investments, wage increases, bonus payments to staff or distributions to shareholders.

E-mobility had a small market share back in 2019 ... 4

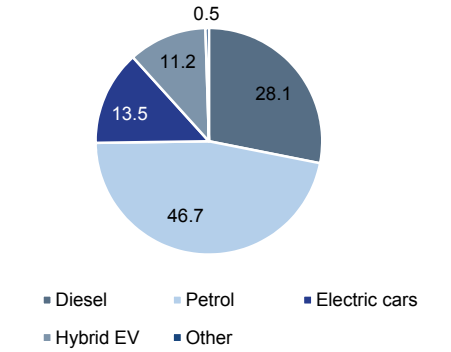
Share of propulsion technologies in total new passenger car registrations in Germany, 2019, %



Source: KBA

... but increased its market share in 2020 significantly 5

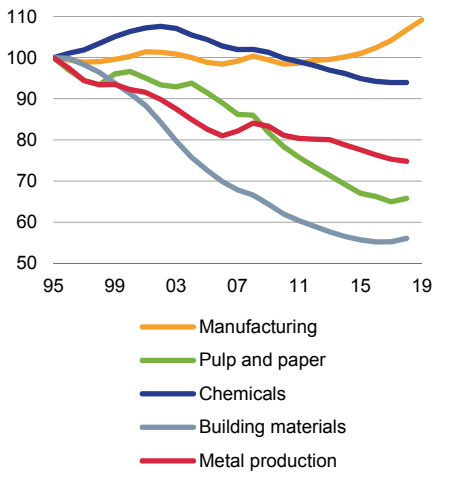
Share of propulsion technologies in total new passenger car registrations in Germany, 2020, %



Source: KBA

Real net fixed assets have declined in energy-intensive sectors 6

Real net fixed assets in individual German industrial sectors*; 1995=100



Source: Federal Statistical Office

In addition, the sector is likely to shift production to cheaper locations. This process usually takes several years; its impact is not felt all at once. Moreover, the shift from combustion to electric engines will lead to changes along the automotive value chain. While Germany is likely to establish a sizeable battery cell production, a significant number of batteries will be imported. As the market share of electric cars increases, demand for traditional engine parts and components, such as engines, gearboxes, exhaust systems, etc., will decline. Many of these parts and components are still produced in Germany. In fact, some companies from the sector have recently announced that they may shift traditional engine production abroad. Hardly anybody expects the structural changes to be ultimately beneficial for value added and employment in the auto sector in Germany. And neither do we, at least not from today's vantage point.

Please do not get us wrong: carbon emissions from transport do contribute to climate change and are an external effect that should be internalised in a suitable way. They should indeed be subject to regulatory control. Unfortunately, however, the combination of EU CO_2 emission targets for new passenger cars and huge national subsidies for electric vehicles is a highly inefficient (expensive) and ineffective instrument. A rising number of electric cars is unlikely to make a significant dent in overall carbon emissions of Germany or the EU as a whole over the coming years. At the global level, more electric cars might even increase carbon emissions for now because materials and battery production is highly energy-intensive and because many countries (China) rely to a large extent on coal-generated power for charging the vehicles. And even if carbon emissions decline overall, subsidising electric cars are a particularly expensive option to do that.

Like many other economists, we are in favour of using an upstream approach to include emissions from the transport sector into EU emissions trading. The German climate protection package of 2019 contains at least some measures to that effect. CO_2 targets for new cars and technology-specific subsidies would be unnecessary if the transport sector was fully integrated into emissions trading. A uniform carbon tax would be better than the current approach, too.

For now, however, major changes to the current system appear unlikely. The rules will not be overhauled unless all European carmakers (including those from France and Italy) find it difficult to adhere to the CO_2 limits in the coming years. In that case, these countries might put additional political pressure on the EU. All in all, the development will depend on the future uptake of electric cars. As of now, it is uncertain whether and when demand for electric cars will not rely on state subsidies anymore. In China, for example, demand for electric cars dropped significantly when subsidies were reduced in summer 2019.

Germany's status as a carmaking location under pressure from several sides

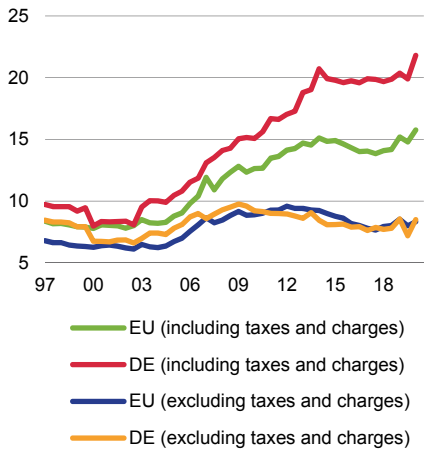
There are several other factors which are weighing on Germany's competitiveness as a carmaking location:

— Climate and energy policy-related uncertainties are one reason why the capital stock in energy-intense sectors, such as the metals or chemical industries, has been declining in Germany for years now. This is not so much the result of actual electricity prices, which are relatively low due to exemptions and special treatments for energy-intensive producers under the Renewable Energy Sources Act and under EU emissions trading. The key factor is that it is unclear for how long these exemptions will apply. And the resultant uncertainty obviously reduces companies' willingness to invest in large plants. The metals and chemical industries are ultimately part of the automotive value chain. This value chain is weakened as a whole as some

parts suffer from reluctance to invest. Moreover, the auto industry itself and mechanical engineering, an important equipment provider, suffer from relatively high electricity prices, even though production in these sectors is not excessively energy-intensive. High electricity prices may discourage investment decisions in Germany if – as expected – the trend towards automated production continues in the coming years. In this respect, too, Germany's competitive position has deteriorated during the last few years.

Taxes and charges are the main drivers of electricity prices in Germany 7

Electricity price for industrial customers*, cents per kilowatt hour



* Annual electricity consumption. between 500 and 2.000 MWh

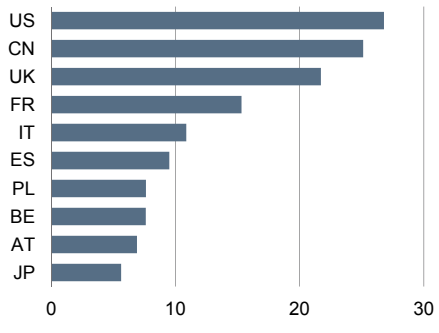
Source: Eurostat

— The planned tightening of European emission standards (Euro 7) will also lead to higher expenses for the auto industry. Current proposals foresee considerably stricter limits for nitrogen oxide emissions. These new rules might enter into force as soon as 2025. The European Automobile Manufacturers' Association (ACEA) has stated that the proposed standards are "technically infeasible for vehicles with combustion engines". However, it is by no means certain that this objection is taken into account during the political decision making process. A number of policymakers will conveniently ignore any statements from the sector that deal with physical limits, technological feasibility or rising costs. One thing is certain, however: tighter emissions standards will push up costs. In particular, relative price markups for cars in the volume segment are likely to rise due to the cost increase. As a result, the production of "everyman cars" may come under pressure in high wage countries such as Germany, France or Italy. In this context, it is a major problem that the discussion about emission standards for cars and suitable regulation options is highly emotional and, at times, influenced by ideological biases. To some extent, this is due to the diesel scandal, which has undermined the car industry's credibility. Numerous political decision-makers now regard the auto industry as the "enemy"; others have always done so. The importance of a prosperous auto industry for a flourishing economy and its enormous impact on R&D expenses are receding into the background. In fact, the auto industry alone funds more than one third of aggregate R&D expenses in Germany. Anyone who, against this background, should dare to ask after the costs and benefits of stricter emissions standards could be suspected of wanting to sacrifice people's health on the altar of economic interests. In absolute terms, however, nitrogen oxide emissions and concentrations have declined steadily in both the EU and in Germany over the last few years and are set to fall further.

— Traditional factors which determine a country's attractiveness as an industrial location, such as the tax burden on corporates, wages or working time flexibility (including temp work), have recently deteriorated in Germany, at least in an international comparison. Many companies cannot afford a combination of labour market rigidity and high absolute wage costs in the long run.

US, China and UK are most important export markets 8

German exports of automotive products by country, 2019, EUR bn

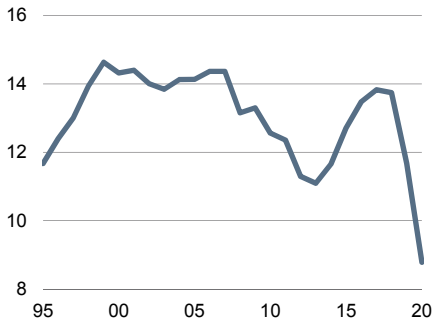


Source: Federal Statistical Office

— About three quarters of the total German car output are exported. The sector also exports engines, gearboxes and other parts and components. That is why Germany, as an industrial location, is heavily dependent on open markets and liberal trade policies. The trade conflict between the US and China, the Trump administration's threats of levying higher taxes on car imports from the EU and the uncertainties surrounding Brexit were and are not supportive for the sector; instead, they have dampened investment activity. At the moment, quick progress in international trade policy is not in sight. If the EU does not succeed in lowering trade barriers versus large growth markets such as China, India, the ASEAN countries or the US, these markets will be probably supplied from factories run by German carmakers in the relevant countries. For example, German producers' facilities in China may become an export hub for the Asia-Pacific region after 15 countries from that region signed the Regional Comprehensive Economic Partnership

Corona shock hits saturated western European car market 9

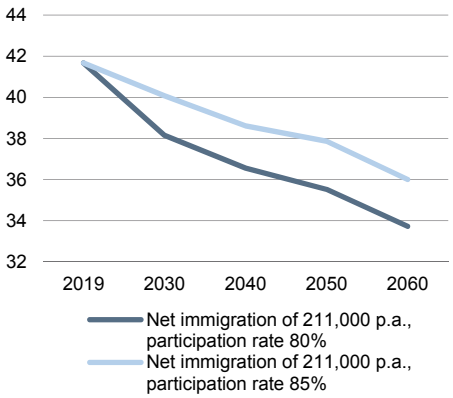
New passenger car registrations in EU-15, m



Source: ACEA

Demographic change will lead to a significant decline in labour force 10

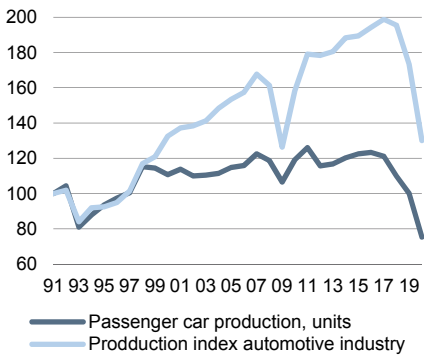
Labour force (people aged 20-66 years) in Germany, projections, m



Source: Federal Statistical Office

Production index performs better than unit production 11

Automotive industry in Germany, 1991=100



Sources: Federal Statistical Office, VDA, Deutsche Bank Research

(RCEP) at the end of 2020. That would have a negative impact on German exports to southern and south-eastern Asian countries. For many years now, German producers' output abroad has been growing more quickly than domestic production, and this trend is set to continue.

— The EU is the most important market for German automotive exports. However, the EU car market is mature. In the future, any growth will probably depend on equipment upgrades, not on increasing unit sales. That means that local demand will provide only limited stimulus for domestic production.

— And finally, Germany's status as a production location will probably suffer from the shrinking of the workforce. The baby boom generation will start retiring in the coming years. Labour market policy measures such as reducing the retirement age to 63 will reinforce that trend. By 2030, the workforce (i.e. those aged between 20 and 66) looks set shrink by more than two million people. While this development may be offset to some extent by automation and digital technologies ("industry 4.0"), the long-term net impact will probably be negative. High electricity prices (see above) will also play a part in this development, as they will make automated production more expensive.

Will output ever return to its former highs?

Germany, as a carmaking location, has exceptional advantages. The most important of them is probably that producers, industrial suppliers, equipment providers (e.g. mechanical engineering companies), engineering service providers, logistics suppliers and universities and other research institutions work closely together on new technologies and are situated near each other. The production location benefits from this vertically integrated value-creation chain and the good qualification and know-how of the workers, which have developed over the last few decades. Significant competition within the sector has always been an engine of steady innovation and productivity improvements. However, in view of the factors mentioned above, it is difficult to be optimistic about the location's future.

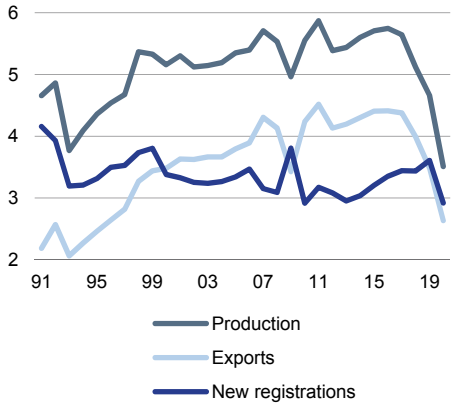
The COVID-19 pandemic was a considerable shock. 2020 was the year in which German car output was lowest since the German unification. At just above 3.5 million units, it was below the 4 million threshold for the first time since 1993. Back then, the economy dipped after the unification boom. For a long time, a rule of thumb said that more than 5 million cars produced each year were a satisfactory result for the auto industry in Germany. The peak was reached in 2011, with annual output coming to just below 5.9 million cars. In 2020, output was down 40% from that level.

The production index for the automotive industry, which includes suppliers and qualitative components such as better equipment, has trended upwards since 1993. The global economic and financial crisis in 2008/09 was the only (and temporary) major interruption of this development. However, the index had been declining for two years before the corona crisis on the back of weak global demand for cars. In 2020, it is likely to be one third below the peak of 2017.

Germany's auto sector has recovered from the two major crises of the past 30 years (1993 and 2008/09), even though the recovery took several years in each case. However, the structural challenges for Germany as a car-producing location raise the question of whether the sector will ever return to its former highs after the COVID-19 pandemic. We are afraid that it may become more and more difficult to keep mass market car production (i.e. the production of small and compact cars) competitive in Germany. This also applies to parts and equipment production, which is less demanding from a technological vantage point. Higher costs, not least due to climate and environmental policy regulation,

Output and exports far below former peaks 12

Production, exports und new registrations of passenger cars in Germany, m



Source: VDA

may make firms gradually reduce their production in Germany over the coming years.

The consolidation of the global car industry, particularly in the volume car segment, will contribute to this development; just think of the recent mergers in this part of the sector. As a result, factories in Germany will compete for business with locations abroad within the car conglomerates.

For now, we are more optimistic about the production of (larger) mid-size and upper class cars in Germany and expect qualitative growth not least on the back of the second major technological structural change in the car industry, namely the megatrend towards connected and (partially) autonomous driving. This trend will increase demand for additional software and hardware, which will lead to higher value creation (everything else being equal). Research and development will continue to play an important role in Germany, too. However, the structural shift resulting from the substitution of internal combustion engines by electric propulsion technologies is likely to be negative for value added in Germany.

German carmakers better prepared for the future than Germany as a carmaking location

This report's title and its comparison between the outlook for Germany as a car-producing location and the development in the region around Detroit, the traditional heart of the US auto sector, may appear shocking at first. After all, many people think that Detroit, Michigan, is an example of industrial decline. However, this impression is somewhat distorted. Light vehicle (LV) production in Michigan is still very relevant, even if unit production was down by about one third during the last few years compared to the beginning of the century. As a result, the state's share in total US LV output has dropped from almost 25% in 2000 to considerably below 20% in the last few years. Several southern states have raised their shares; there, German carmakers, too, have invested in new factories. One important reason for this shift within the US was that expenses, for example for wages and pension costs, were high in Michigan.

Car output in US state Michigan has significantly declined over time

A similar development for Germany does not appear impossible, even though the drivers explained above will be key and thus different from the Detroit case. In Germany, too, sector output might permanently remain below its former peaks. Germany's share in global and European car production is threatening to decline.

Blanket criticism saying that the German car industry has missed all major technological trends is and has always been wrong

Some market observers have been burying the German auto industry for decades now. The industry has been repeatedly charged with having "missed all major technological trends". This blanket criticism has always been wrong; moreover, it has never been based on an objective analysis of relevant data. What is true is that, while German carmakers may not always have been the first to catch on to new trends, they have often become the best suppliers later on. Relevant, measurable indicators such as market shares in key markets, economic profitability or innovative power show that German carmakers and their suppliers have never had to hide from foreign competitors.

German carmakers have been late, but not too late to embrace the trend towards electromobility

Turning to e-mobility, the German auto industry is once again accused of having missed a new technological trend. And as in many other cases, this criticism is not true in such a generalised way. While the share of German carmakers in total e-vehicles sales is below that in traditional car sales in many markets, the shift from combustion to electric engines is more like a long-distance run, not a sprint. So far, no producer has emerged as a clear and decisive leader. Moreover, German carmakers can rely on a full product pipeline. While they may have come later to the party than many competitors, we do not think they are too late. In the medium to long term, the most important question is whether carmakers can increase their market shares for electric vehicles and earn

In the medium to long term, the most important factor is whether carmakers can increase their market shares for electric vehicles once state subsidies are reduced

money with selling such cars once state subsidies are reduced or completely abolished. Only then can we make a final judgement. And German companies, with their focus on premium cars, appear quite well positioned for now.

Government regulation, which is not as effective as it could be and more expensive than necessary, as another burden

Overall, we believe that the German automotive industry is better prepared for the electric mobility future and other structural challenges than Germany as a car-producing location. Companies are free to decide where they want to produce and can change locations over time if the framework conditions deteriorate. From today's vantage point, the outlook for Germany as a car production location appears comparatively bleak. Unfortunately, some of the burdens are the result of climate policy regulations which are considerably less effective than they could be and more expensive than necessary. If these regulations lead to significant job losses or layoffs in major carmaking locations, the political measures will become the subject of heated discussions and criticism. Still, so far this is only a warning; things will not necessarily go this way. Automotive technology has not reached its apex; technological progress may lead to even more value creation in Germany. Nevertheless, it is disconcerting if numerous policymakers simply shrug off the deterioration of the framework conditions, be it for the auto industry or for other sectors. Once an industrial location has lost its lustre, it may be difficult to lure companies back.

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