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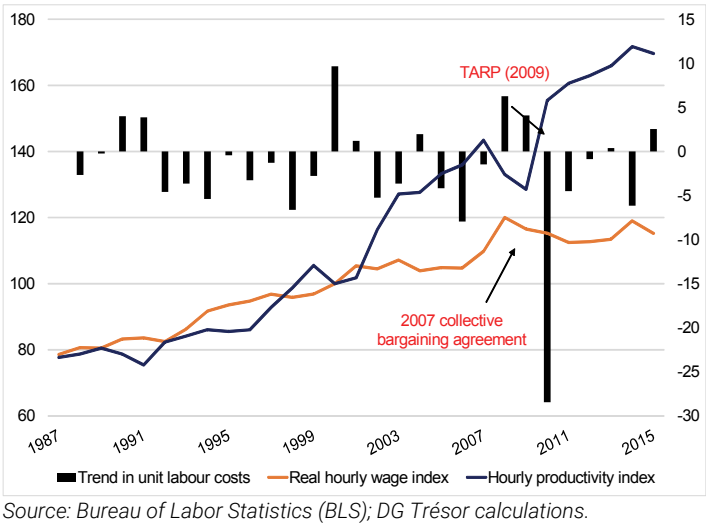
The US automotive industry: Challenges and outlook

- The 2008 economic and financial crisis hit the US automotive industry hard - especially the "Big Three" automakers General Motors, Ford and Chrysler.
- This crisis caused unprecedented upheaval on the US automobile market, leading to a sharp reduction in auto manufacturing. Between 2006 and 2009, the automotive industry lost 300,000 jobs, equivalent to nearly 30% of pre-crisis jobs in the sector.
- In 2009, the US federal government responded by implementing two major policy measures. Firstly, the American Recovery and Reinvestment Act (ARRA) shored up domestic demand and included tax provisions specifically for automobiles. The automotive industry was also one of the main sectors targeted by the second measure, the Troubled Asset Relief Plan (TARP), a supply-side initiative that bailed out and restructured Chrysler and General Motors.
- Since then, the US automobile market has regained positive momentum, underpinned by productivity gains, and has set new sales records. Automakers appear to be in better financial and economic health.
- The industry is now back on sound footing but is facing major challenges in the short and long terms: uncertainties over the long-term future of NAFTA; the sustainability of growth in the automobile market; increasingly stringent energy efficiency standards; the spillover effect of technological advances in electric motors, connectivity and self-driving vehicles; the widespread use of mobility services. Each of these innovations could challenge the place held by the 14 automakers present in the US automotive industry.
- In these circumstances, policymakers can play a key role to avert or cushion self-driving vehicles' potential negative impact on jobs, and can set up a pro-investment, pro-innovation framework while protecting individuals and upgrading transportation infrastructure.

Hourly productivity, real hourly wages and unit labour cost trends in the automotive sector



Source: Bureau of Labor Statistics (BLS); DG Trésor calculations.

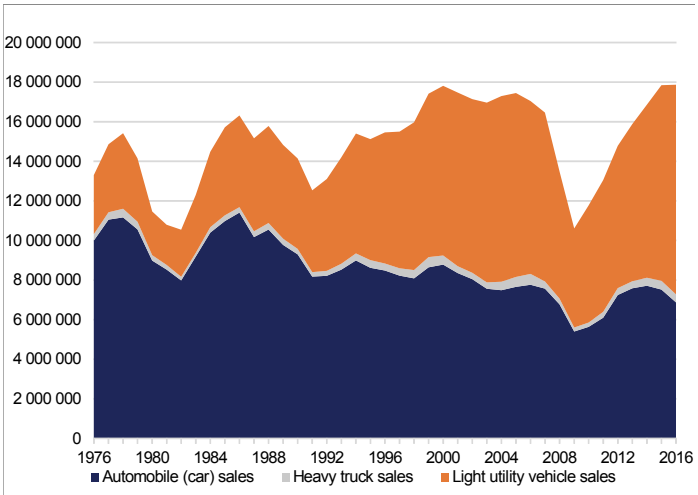
How to read this chart: The left-hand scale (base 100 in 2000) tracks the automotive sector's real hourly wages (calculated as total payroll divided by hours worked and deflated by the consumer price index) and its productivity. The right-hand scale tracks unit labour costs in the automotive assembly sector.

1. The automotive sector still holds a central place in the US economy

1.1 The US automobile market is still the world's second largest

The US is the world's second-largest market for automobiles. In 2016, auto sales in the high-growth Chinese market totalled 28 million, compared to slightly over 17.5 million in the US. These two countries account for 30% and 19.2% of the world automobile market, respectively.[1] Auto purchases made up 11% of consumer spending in the US in 2016.

Chart 1: Annual auto sales

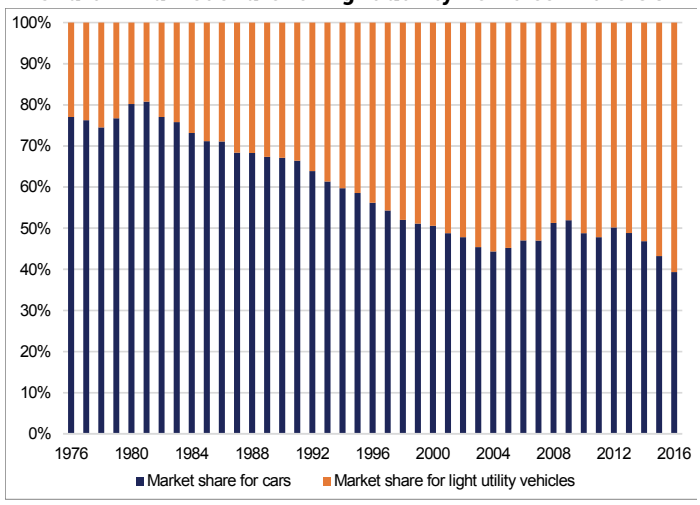


Source: Bureau of Economic Analysis (BEA); DG Trésor calculations.

How to read this chart: Number of cars, light utility vehicles and heavy trucks sold on the US market each year since 1976.

We can divide auto sales into three different segments. The first covers all heavy trucks and accounts for 2.2% of US auto sales. The second includes passenger vehicles sold to individuals, i.e. "cars" or "automobiles", and makes up 38.5% of US auto sales. The third and final segment comprises light utility vehicles,[2] i.e. vans, minivans, pickups and sport utility vehicles (SUVs). These vehicles are also sold to individuals and currently represent 59.3% of auto sales, a market share that has grown substantially since the 1970s. The steady growth in demand for light utility vehicles is attributable to the rise in consumer purchasing power, the fact that consumers view these vehicles as "safer", and the low price of fuel over the past several years.

Chart 2: Market share for light utility vehicles in the US



Source: BEA, DG Trésor calculations.

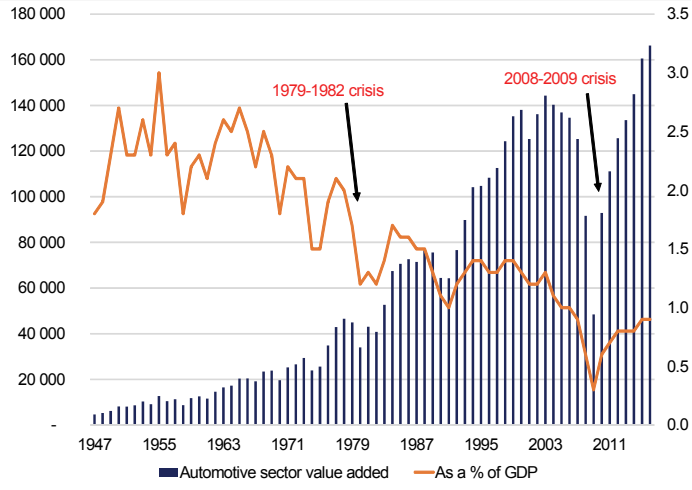
How to read this chart: Since 1976, the proportion of light utility vehicles, as a percentage of all auto sales to individuals, has risen. This chart shows the market share of cars and light utility vehicles as a percentage of total light vehicle sales each year since 1976.

1.2 The US remains a major location for automobile assembly

In 2016, the value added of the US automotive industry, as identified by the NAICS nomenclature,[3] totalled $167bn (in 2010 dollars), i.e. 0.9% of US GDP. The automotive industry's contribution to the US economy has declined from nearly 3% of GDP in the 1960s to less than 1% since 2006. In 2016, the industry employed 944,900 people, 61% of whom work in the parts manufacturing/suppliers segment.

(1) This study draws on information collected from the network of France's foreign trade advisers based in the US.
(2) Light utility vehicles differ from cars in terms of their technical characteristics, more specifically their weight and horsepower. The same criteria are used to distinguish between these two categories in the nomenclature used for international trade figures.
(3) NAICS codes 3361 (Motor Vehicle Manufacturing), 3362 (Motor Vehicle Body and Trailer Manufacturing) and 3363 (Motor Vehicle Parts Manufacturing).

Chart 3: Trends in the automotive industry's value added in millions of 2009 dollars and as a % of total value added

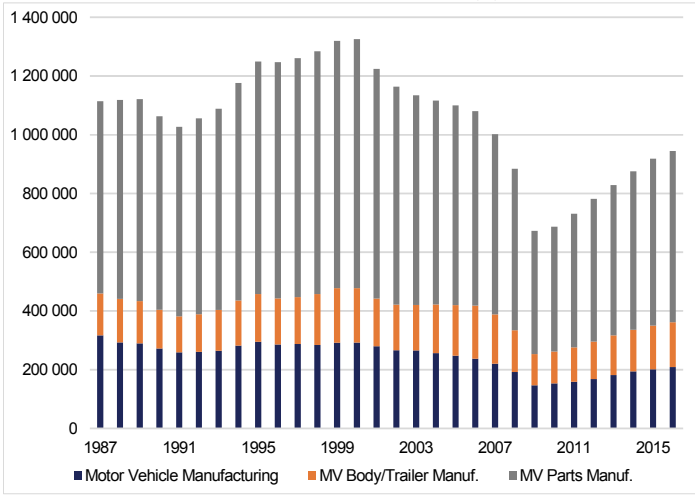


Source: BEA, DG Trésor calculations.

How to read this chart: The left-hand scale gives the value added, in millions of 2009 dollars, of the automotive sector, as identified by the NAICS codes 3361, 3362 and 3363. The right-hand scale tracks the sector's contribution to total US value added since 1947. Cutcher-Gershenfeld et al. (2015)[4] describe the 1979-1982 crisis as a convergence of the effects of monetary policy (key rate hikes to tackle inflation) and rising fuel prices.

Using a broader definition than the NAICS nomenclature, the "automotive industry" includes automobile manufacturers, with 14 automakers employing 320,000 people according to a 2015 report by the Center for Automotive Research (CAR),[5] plus auto parts manufacturers/suppliers (520,000 employees) and dealerships/repair shops (710,000 employees). CAR estimates that the automotive industry directly employs 1.5 million Americans. CAR's report also estimates the industry's total employment impact at 7.25 million jobs in 2014, based on a model developed by Regional Economic Models Inc. (REMI)[6] that takes into consideration the sector's "indirect" employment.

Chart 4: Automotive industry jobs



Source: BLS, DG Trésor calculations.

The industry also makes a sizeable contribution to innovation. In 2013, for instance, it invested almost $7bn in R&D in the US, equivalent to 7.2% of private-sector R&D spending in the country. According to the National Science Foundation, the automotive sector employed 83,000 people in R&D in 2013, accounting for 5.5% of all jobs directly related to R&D (i.e. scientists, engineers, technicians, support staff and managers) in the country.

Lastly, the automotive industry attracts foreign direct investment (FDI). FDI stocks in the sector stood at nearly $110bn in 2016, i.e. 3% of total US FDI stocks and more than 7% of FDI stocks in the manufacturing sector, according to data from the US Bureau of Economic Analysis (BEA).

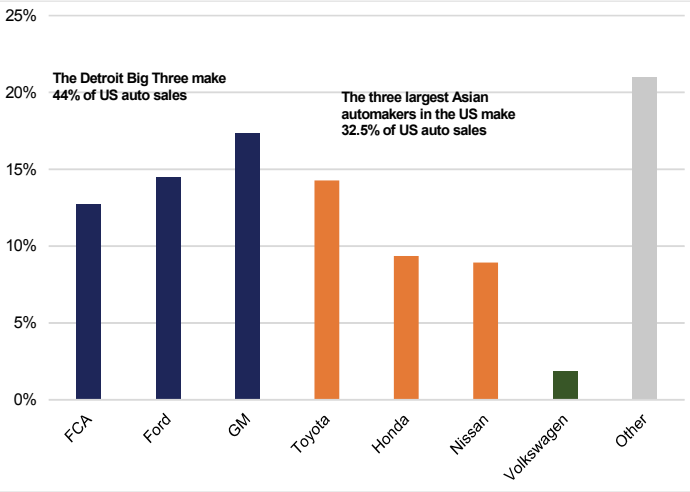
2. Internationalisation has changed the industry's geographic balance

For most of the 20th century, the US automotive industry was made up of the three major Detroit-based automakers: General Motors, Chrysler and Ford (dubbed the "Big Three"). The Big Three held almost 90% of the US automobile market in the late 1960s. Beginning in the 1970s, Volkswagen - followed by Asian automakers such as Toyota, Mitsubishi, Honda, Nissan and later Hyundai - entered the US market. These foreign automakers initially exported cars to the US, taking advantage of the oil crisis and the better fuel efficiency of their products. Then, as from 1985, these groups began to make vehicles for the US market in "transplants", i.e. manufacturing plants set up in the US. Over the same period, the Big Three acquired stakes in some foreign automakers, internationalising their production base and diversifying their end markets. This internationalisation gathered pace in the 1990s and 2000s, and transformed the industry's organisation and its geographic footprint. In 2016, the Big Three held just 45% of

(4) J. Cutcher-Gershenfeld, D. Brooks and M. Mulloy (2015), "The decline and resurgence of the U.S. auto industry".
(5) K. Hill, D. Menk, J. Cregger and M. Schultz (2015), "Contribution of the Automotive Industry to the Economies of All Fifty States and the United States", CAR Group.
(6) REMI (http://www.remi.com/) is a company that develops and sells macroeconomic assessments derived from several proprietary macroeconometric models. For example, its PI+ model, currently in version 2.1, is used by some US government agencies for impact studies, and has resulted in publications in the American Economic Review (see http://www.remi.com/wp-content/uploads/2017/10/PI-Overview-v2_1.pdf).

the US market, fairly similar to the combined market share of the three leading Asian automakers. According to the BEA, in 2016, the US exported some 1.34 million automobiles[7] to the rest of the world, and imported 3.85 million vehicles (of which 2.6 million from Canada and Mexico).

Chart 5: Market share of automakers



Source: ***NADA Report 2016****.*

2.1 In the US, a portion of the automotive industry has moved to the South

Most of the Big Three's factories are located in or around Detroit, Michigan, or in the adjacent states of Ohio, Indiana and Illinois. This region boasts a long industrial heritage, and workers are unionised, belonging to the United Automobile, Aerospace and Agricultural Implement Workers of America (UAW). "Transplant" automakers have generally set up plants in the South, in "right-to-work" states where collective bargaining agreements are rare and labour costs are lower.

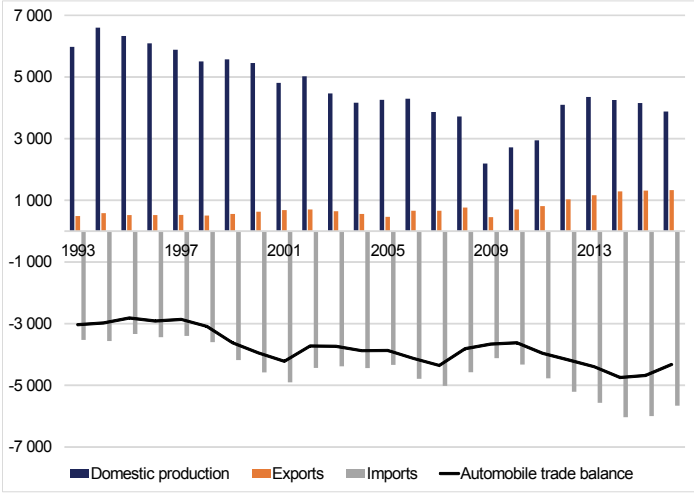
These diverging geographic footprints lead to pay gaps between the workers in the Big Three's factories and those of the transplant automakers. In 2005, Cutcher-Geshenfeld, Brooks and Mulloy (2015)[8] estimated the average wage gap between a Ford worker and a transplant automaker employee at $3.62 per hour worked, with an average hourly wage of $27.41 for Ford and $23.79 in transplant factories. Moreover, from the employer's standpoint, the labour cost gap was even wider due to the non-wage costs of benefits such as health insurance premiums paid by the employer (known in the US as "employer compensations"). In 2005, the total average cost of an hour worked was $64.88 for Ford, vs. $44.33 for transplant automakers - a labour cost gap of $20.55 per hour worked. Following collective bargaining agreements signed with the UAW in 2007 and 2010 (described below), these gaps began to narrow in 2007, coming to an estimated $6 per hour in 2010.

Lower labour costs are not the only reason automakers are attracted to the South. Southern states have sometimes given direct or indirect support to foreign automakers to build plants. The development of local ecosystems - including many auto parts suppliers, laboratories and university research centres specialised in automotive R&D - may have played a role, along with direct or indirect subsidies offered by state governments to attract these foreign automakers.

2.2 The appeal of Mexico has been a major feature of the past decade

In the 1980s and 1990s, the opening of trade accelerated with NAFTA, which took effect in 1994. NAFTA opened up new end markets for automakers and created new potential manufacturing sites - especially in Mexico. This opening of trade coincided with disruption of supply chains, as many components assembled by automakers are manufactured by suppliers that are increasingly located outside the US.

Chart 6: Automotive sector trade in volume terms



Source: BEA, DG Trésor calculations.

How to read this chart: US automobile production volumes, exports and imports, and automobile trade balance (showing net imports over the full period). These figures refer to the automobile segment, and do not include light utility vehicles. The right-hand scale is expressed as thousands of vehicles per year.

(7) These figures do not include light utility vehicles.
(8) J. Cutcher-Gershenfeld, D. Brooks and M. Mulloy (2015), "The decline and resurgence of the U.S. auto industry".

In the 2000s, Mexico attracted a growing proportion of automotive industry investments, leading to an increase in Mexico's automotive sector output and a surge in trade flows between the US and Mexico. Nevertheless, the US continues to attract the lion's share of automotive industry investments in North America.

Table 1: Investments in the North American automotive sector

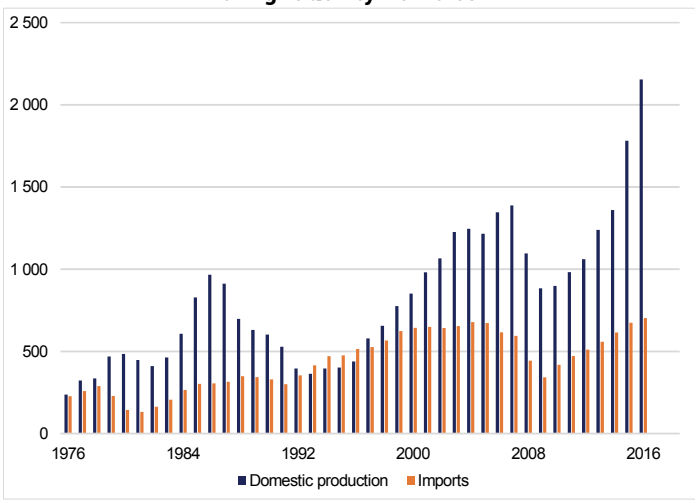
	United States	Canada	Mexico
2001-2005	$16.3bn	$5.6bn	$1.6bn
2006-2010	$26.3bn	$1.8bn	$5.8bn
2011-2015	$63bn	$6.1bn	$21bn

Source: CAR.

2.3 A large portion of utility vehicles are still assembled in the US

Unlike the automobile (passenger car) segment, a large portion of light utility vehicles (which make up nearly 60% of vehicles sold in the US) are still assembled in the US. In 2016, 75% of light utility vehicles were assembled in the US, according to BEA data. Two complementary factors explain why production on this market segment is still largely carried out domestically: 1) this segment benefits from strong demand in the US, and the automakers operating there have built up their reputations and expertise; and 2) the US government established special import duties for these vehicles in 1964, known as the "Chicken Tax". Unlike passenger cars (which are duty free so long as 62.5% of the value of the vehicle originates in NAFTA countries), imports of these light utility vehicles are subject to a duty equal to 25% of the value.

Chart 7: Domestic production and imports of light utility vehicles



Source: BEA, DG Trésor calculations.

How to read this chart: Number of light utility vehicles sold on the US market and manufactured in the US or imported, since 1976. The right-hand scale is expressed as thousands of vehicles per year.

3. The automotive industry in crisis

3.1 Government rescue of Chrysler, General Motors and the entire US automotive industry in 2009

In 2008, as global demand fell, auto sales plunged by 40% in the space of a few months. US automakers scaled back their production in US factories to adjust to this market situation, with production cut almost in half. Of the Big Three, General Motors and Chrysler suffered financial difficulties that jeopardised their survival, while Ford avoided such difficulties only because it had carried out refinancing before the crisis began.

Beginning in the mid-1990s, US automakers had developed strategies to regain competitiveness. Cutcher-Gershenfeld, Brooks and Mulloy (2015)[9] note that these automakers focused on setting up more flexible manufacturing organisation by negotiating collective bargaining agreements with the UAW in 2007 and later in 2010. These agreements aimed to adjust working conditions and to bring workers into the production and innovation decision-making process at an earlier stage. Already in the 2007 agreement, the union agreed to efforts to rein in labour costs: starting salaries for Big Three workers were reduced, as were fringe benefits (i.e. non-wage benefits such as employee savings plans, pensions and health insurance). The 2007 agreement set up voluntary employees' beneficiary associations (VEBAs) to manage the financing of workers' non-wage benefits (namely health insurance, pensions, training and holiday pay) and to separate these

(9) J. Cutcher-Gershenfeld, D. Brooks and M. Mulloy (2015), "The decline and resurgence of the U.S. auto industry".

benefits more clearly from the rest of the automakers' activities.

When the crisis began in 2007, the US automakers were in a weakened position. They had not yet restored their cost competitiveness, and their financial position was deteriorated. In addition, the Big Three's strongest market positions were in light utility vehicles - the market segment hit hardest by the economic crisis. Thus, Goolsbee and Krueger (2015),[10] who sat on the White House's team of economic advisers at the time, note that a majority of advisers were opposed to special intervention for the Big Three because taxpayers ran the risk of having to "pay twice": first for the bailout itself, and then later on to deal with deindustrialisation, which seemed inevitable.

The Obama administration's plan to rescue the automotive industry had two parts:

- First, the American Recovery and Reinvestment Act (ARRA), a rescue plan consisting of a package of measures to boost demand throughout the economy. This rescue plan, totalling some $819bn between 2009 and 2019 (five points of GDP), included a specific provision for the automotive sector: a tax deduction on auto purchases worth a total of $2bn per year.
- Secondly, the recovery efforts continued with provisions aimed at supporting the Big Three as part of the TARP (Troubled Asset Relief Program) passed in 2009. Refinancing of General Motors (GM) and Chrysler was subject to these automakers restructuring their offer: the least efficient sites had to be shut down; the VEBAs created in 2007 were overhauled, with the benefits for newly-hired workers scaled back along the lines of the 2007 agreement; and the automakers' sales strategy was refocused with many brands being eliminated. The US Treasury[11] estimates the amount of this aid at nearly $80bn, of which $51bn for GM, $12.5bn for Chrysler, and $17.2bn for Ally Financial (the new name for GM's financial arm GMAC Inc.).

Table 2: Overview of turnaround and rescue measures for US automakers

Year	Measure taken	Initiator	Targeted effects
1995-2005	Incremental change in managerial processes	Companies	Supply competitiveness
2007	Collective bargaining agreements in 2007 and 2010	Companies and social partners	Supply competitiveness
2009	American Recovery and Reinvestment Act (ARRA) $819bn, of which $2bn for tax deductions on auto purchase	Federal government	Boosting overall demand
2009	Troubled Asset Relief Plan (TARP) $80bn	Federal government	Refinancing Supply competitiveness

Source: DG Trésor summary table.

The rollout of both ARRA and TARP coincided with the recovery in US auto sales. Compared to the pre-crisis level, productivity per worker had increased significantly by the early 2010s, and these automakers' competitiveness had also recovered thanks to cost control.

3.2 The US market recovered after a few years of crisis

The US automobile market turned around in 2010, four years before the European market recovery, and has surpassed expectations. Sales exceeded their pre-crisis level in 2015, followed by record sales in 2016 and probably again in 2017.

(10) D. Goolsbee Austan and Alan B. Krueger (2015), "A retrospective look at rescuing and restructuring General Motors and Chrysler", The Journal of Economic Perspectives 29.2: 3-23.
(11) https://www.treasury.gov/initiatives/financial-stability/TARP-Programs/Pages/default.aspx

Amongst the factors underpinning the US automobile market's strong momentum, we can emphasise three: *(i)* a return to virtual full employment; *(ii)* low fuel prices during the recovery period, more than offsetting the higher prices of new vehicles; and *(iii)* an abundant supply of credit enabling US consumers to purchase vehicles. Auto loan outstandings stood at $1,167bn in the first quarter of 2017, compared to $700bn ten years earlier, accounting for 9.2% of total US household debt (vs. 5.9% ten years earlier).

This market recovery drove growth in US auto production as from 2010. The production rebound has been stronger and more sustainable than in Europe. US production exceeded its pre-crisis level in 2014, and has levelled off since then.

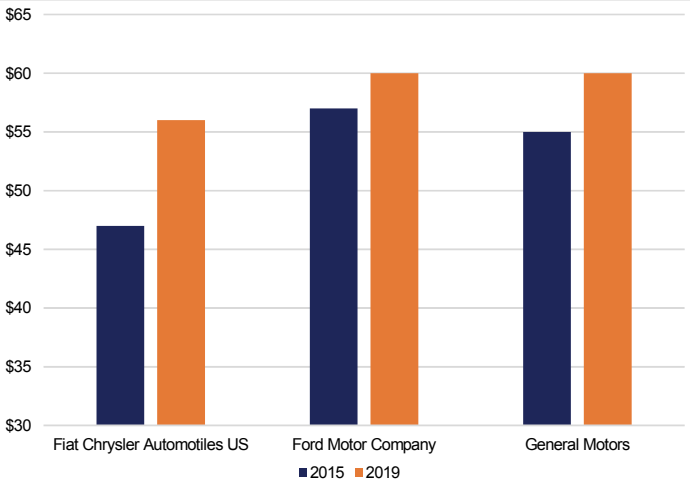
Despite their serious financial difficulties in the recent past, each of the Big Three automakers has returned to profits. All three now generate free cash flow and benefit from favourable terms on the debt markets.

4. The challenges facing the US automotive industry

4.1 Can the industry sustain its productivity recovery in the long terme?

The wage restraint policies have lowered real wages in the industry. In 2014, real wages were lower than in the 2000s. In 2015, the Big Three and the UAW signed new collective bargaining agreements as an initial response to workers' nascent demands. However, these agreements currently do not apply to foreign automakers, whose plants are often located in the South, or to auto parts suppliers.

Chart 8: Trend in hourly wages under the 2015 agreements



Source: Center for Automotive Research, 2017.

4.2 The industry is facing major technological challenges

There are multiple sources of innovation in the automotive sector. The automobiles on the market today incorporate an increasing number of connected components, and the automotive industry is at the forefront of the Internet of Things. Eventually, vehicles may become autonomous and connected, thanks to artificial intelligence and the development of connectivity.

Other fields have also seen a rapid succession of technological changes: lighter materials, more automated assembling of vehicles and components, as well as advances in powertrain technology. These powertrain advances point to all automakers eventually adopting a new propulsion technology, even though they owe their central place in the value chain partly to their technological and industrial expertise in the internal combustion engine.[12] On one hand, electric motors offer an increasingly mature powertrain solution, but on the other, electricity production with current technology creates pollution, so it is uncertain whether electric vehicles will be widely adopted. Moreover, other alternatives have emerged, such as fuel cell technology - provided that a solution to the hydrogen transportation problem can be found.

Lastly, automotive demand could also change over time with the development of sharing platforms: spending could shift from buying vehicles for personal use to paying for access to mobility services, with vehicles being shared by several users or being hired with a driver (e.g. ride-hailing services such as Uber) depending on consumers' needs. The rise in shared vehicles could reduce the total vehicle fleet and annual auto sales. That said, an opposite effect could also occur: a decline in transportation costs due to the use of shared vehicles could actually *increase* the number of users and the number of kilometres driven. In turn, this could increase the amount of maintenance required and accelerate renewal of the vehicle fleet. Lastly, shared vehicles might - if they are connected and autonomous - be more costly than other vehicles. So the overall impact on the size of the auto market, in nominal terms, is ambiguous and uncertain.

(12) This is one of the explanations given for Tesla's current market capitalisation compared to its more traditional automaker peers. Whereas the valuation of traditional automakers is derived from patents related to the internal combustion engine, and will automatically lose value if another powertrain technology becomes dominant, Tesla is a company whose intangible assets can apparently only gain value as time goes on.

4.3 NAFTA talks

Mexico, Canada and the US have begun the process of renegotiating the North American Free Trade Agreement (NAFTA). The automotive industry is at the heart of these talks. US trade representatives have proposed four ways of revising the rules of origin applied to the automotive sector: *(i)* raise the required minimal NAFTA content to 85% vs. 62.5% currently; *(ii)* introduce a minimal threshold of 50% US content for vehicles sold in the US; *(iii)* revise the list of vehicle components within the scope of this rule;[13] and *(iv)* establish a new process for certifying the origin of vehicle components in which automakers' own declarations would play a less important role.

Available impact studies indicate that if the US withdrew from NAFTA, it would have a negative, albeit limited, impact on US auto production and consumers: Head and Mayer (2016)[14] estimate a 0.5% rise in auto prices and a 1% decline in production, whereas Dziczek et *al.* (2017)[15] project higher short-term price effects, as the factors of production cannot be reallocated rapidly, with the market contracting by around 3% in the long term.

4.4 The question of environmental and climate standards

The fuel efficiency of vehicles on the US market improved at a rapid pace in the late 1970s and early 1980s, before flattening for most of the 1990s. The Corporate Average Fuel Economy (CAFE) standards, first enacted in 1975, require automakers to achieve fuel efficiency gains. These standards explain a large portion of the improvement in fleet fuel efficiency. Another portion of this progress is probably attributable to changing consumer preferences and higher fuel costs. These standards were initially adopted in the wake of the oil crisis to reduce fuel costs. Since the 2007 Energy Independence and Security Act, they have also targeted a reduction in the environmental and climate footprint of vehicles. In 2011, the Obama administration proposed an ambitious plan for fuel efficiency gains over 2017-2025, and obtained the agreement of automakers representing 90% of all automobiles sold in the US.

These new requirements, and especially the 2017-2025 plan, raise issues for the US automotive industry. Industry representatives made these issues known during the mid-term evaluation of the 2011 plan, stating that the costs of moving to electric cars had been underestimated. This prompted the Trump administration to announce in March 2017 that the mid-term evaluation of CAFE standards would be revisited.

5. US policymakers are focused on the challenges facing the industry

5.1 How can policymakers react to the ramp-up in self-driving vehicles?

Several studies have shown that self-driving vehicles may have repercussions on overall employment and productivity. Morgan Stanley (2013)[16] estimates that self-driving vehicles would boost US GDP by $1,300bn, i.e. by 8%. R. Atkinson (2014)[17] reaches a similar estimate of $1,050bn. The main source of gains for the economy (90% of total gains) would be a reduction in accidents due to the widespread use of self-driving vehicles.

Moreover, productivity gains in the freight and passenger transport sectors would be likely to have a strong impact on employment in these sectors. According to Atkinson, widespread adoption of these technologies could cut two million jobs (FTE), with intelligent robots replacing human drivers, and this would probably be one of the first signs of artificial intelligence impacting the broader employment market. However, these studies do not model the positive effects that productivity gains and less time spent driving would have on consumption (and thus on employment) - particularly consumption related to leisure activities.

(13) However, including connected objects on this list is not self-evident, as these objects are partially covered by other trade agreements.
(14) K. Head and T. Mayer (2016), "Brands in Motion: How frictions shape multinational production", *CEPII working paper* no. 2015-26, and updates to the authors' research.
(15) K. Dziczek, B. Swiecki, Y. Chen, V. Brugeman, M. Shultz and D. Andrea (2017), "Trade Benefits to the Automotive Industry and Potential Consequences of Withdrawal from the Agreement", *Center for Automotive Research*.
(16) Morgan Stanley Blue Papers (2016), "Shared Mobility on the Road of the Future".
(17) R. Atkinson (2014), "The Coming Transportation Revolution", *Milken Institute Review*.

A crucial stake is setting up a regulatory framework for this industry that provides legal certainty for innovators, insurers and users. In late 2017, US lawmakers debated a bill on self-driving vehicles[18] aimed at: *(i)* establishing the federal government's authority to regulate self-driving vehicles; *(ii)* setting up a general framework for testing these federal regulations; and *(iii)* defining certain standards for the commercial operation of such vehicles, notably regarding ownership and the use of data collected by self-driving vehicles. Progress on this legislation has been slowed by debates about whether to include the commercial road transport sector, a move opposed by labour unions who anticipate the negative consequences it could have on jobs in the sector.

Setting clear rules and standards could enable automakers and their suppliers, as well as insurers and all other industry stakeholders, to better anticipate the legal responsibilities related to the development of the self-driving vehicle.

5.2 Evolving transportation infrastructure

The development of self-driving vehicles and/or innovative propulsion technologies would probably require road infrastructure to evolve. Users cannot take advantage of the full potential of the new technologies in a connected vehicle unless the infrastructure is also connected. The related projects all involve connectivity and are referred to as "Vehicle to Infrastructure" or V2I.

One example is a programme in place in California since 2013 that provides up to $20m p.a. in public co-financing for equipping service stations for electric and hydrogen cars. However, battery technologies have not yet reached full maturity, creating a major obstacle to the widespread use of electric cars and raising the question of providing support for R&D so that the cost of batteries declines.

In addition, the ramp-up of self-driving vehicles could be slowed by the low cost of parking in US cities, with parking actually free in many cases. This gives an unfair advantage to mobility solutions that involve cars that are frequently parked - in other words, cars that are not self-driving or shared. As noted by Donald Curran Shoup,[19] users do not pay the social marginal cost of parking (i.e. the use cost and negative externalities). This amounts to giving these "traditional" vehicles a comparative advantage over self-driving or shared cars. An increase in parking prices would encourage drivers to take up these innovative mobility solutions.

5.3 Policymakers have the leverage to attract short-term automotive investments to revitalise their industrial base

Some analysts have also emphasised policymakers' shorter-term role in attracting automotive investments. For example, Swiecki and Menk (2016)[20] highlight the impact of certain measures - such as tax credits and direct or indirect government support - in attracting investments to Mexico.[21]Nevertheless, these researchers state that better training for Mexican workers was another important source of leverage. Last but not least, an essential part of policy favourable to automotive investments is trade openness, which ensures a large number of end markets for the vehicles manufactured in a country.

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(18) The SELF DRIVE Act was passed by the House of Representatives (https://www.congress.gov/bill/115th-congress/house-bill/3388), and the Senate is considering a bill sponsored by Senator Gary Peters.
(19) D. Shoup (2017), *The High Cost of Free Parking: Updated Edition*. New York: Routledge.
(20) B. Swiecki and D. Menk (2016), "The Growing Role of Mexico in the North American Automotive Industry", *Center for Automotive Research*.
(21) By aggregating the various forms of support that automakers receive when they invest in a factory, the researchers estimate that automakers receive between $0.24 and $0.73 for each dollar invested in Mexico, compared to $0.16-0.23 in the US.

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