eef The manufacturers' organisation

SECTOR BULLETIN: AUTOMOTIVE

In partnership with:

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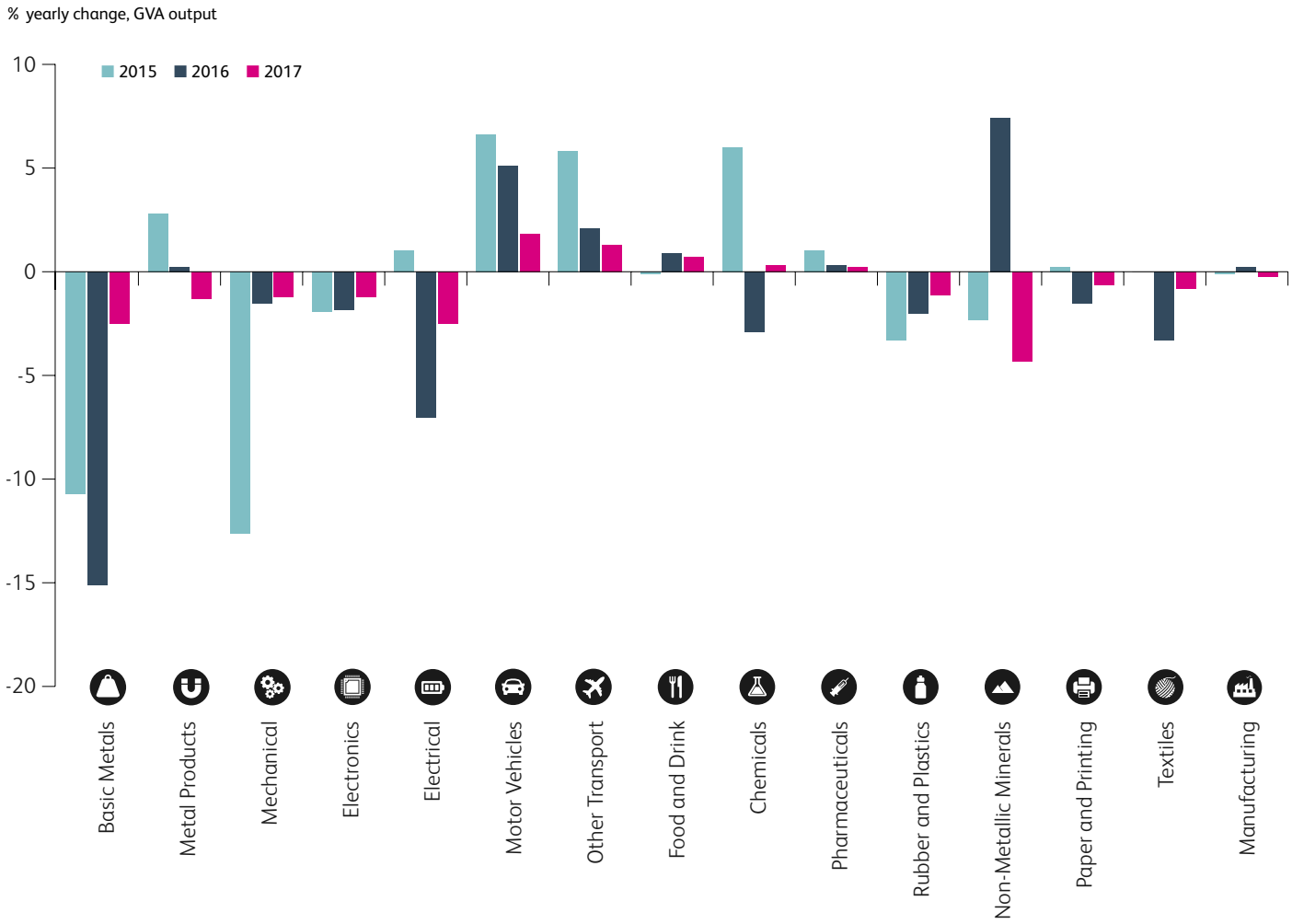
MANUFACTURING ROUND UP

The manufacturing sector is by no means a homogeneous entity; it's made up of a host of industries ranging from the manufacture of fully commoditised products to high value-add precision instruments. As a result, each sub-sector's ability to absorb the shocks and grasp the opportunities of recent domestic and global economic developments has varied considerably. Indeed, over 2015, output growth ranged from -12.6 % in the mechanical equipment sector to +6.6 % in the automotive industry.

The key drivers of this variation have been the hefty drop in global commodity prices and the slowdown in world growth and trade. While these headwinds remain at play they appear to have bottomed out over the course of 2016. However, Brexit comes with a wave of fresh challenges for the UK's manufacturing sector.

For our inaugural quarterly sector bulletin, we'll be looking at understanding the automotive industry and how the sector is positioned to deal with Brexit and non-Brexit related challenges over the next few years. However, first we look at how these trends have played out across the manufacturing sector.

The performance of manufacturing sectors has varied considerably since 2015



Source: EEF & Oxford Economics (2016)

DROP IN COMMODITY PRICES

A key trend over the past two years has been the substantial decline in global commodity prices:

1. The price of crude petroleum (Europe Brent Spot Price) fell by 58% between July 2014 and July 2016, dropping as low as $30.7 per barrel in January 2016.
2. The price of Hot Rolled Coil (HRC) per metric tonne fell by 24% between July 2014 and January 2016 before steadily creeping up for the rest of the year.

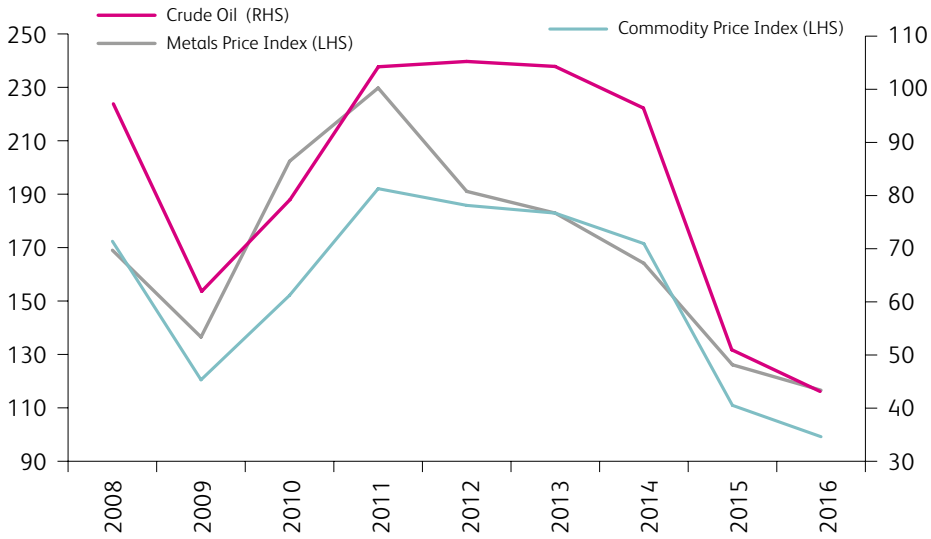
While the drivers of these drops have been different – mostly down to OPEC's supply-side policy for the effect on crude petroleum and over-capacity in the Chinese steel industry for the impact on HRC – their influence on the manufacturing sector has been both diverse and pervasive.

The drop in oil prices has propped up sectors that use crude petroleum as an input into production, such as chemicals and rubber and plastics but has sent sectors in the North Sea supply chain, like mechanical and electrical equipment, into the doldrums. What's more, the boost to household disposable incomes due to lower inflation has supported consumer-facing sectors like motor vehicles and food and drink.

The drop in steel prices has led to cutbacks in production in the basic metals sector, which has failed to recover despite the recent rally in HRC prices. On the other hand, sectors that consume large volumes of steel, like metal products, have seen production costs decline and margins improve. As such, the trend in global commodity prices has been both a boon and a bane for different manufacturing sub-sectors.

Global commodity prices in freefall

Commodity price index (2005=100), Metals price index (2005=100), Crude oil (US dollars per barrel)



Source: IMF (2016)

DEMAND FROM KEY EXPORT MARKETS

Global trade growth has been persistently weak over the past two years, growing at the slowest pace since the financial crisis. This is reflected in subdued global growth. Most advanced economies are growing below their long-term trend and emerging markets have been in slowdown mode since late 2014, not least down to the painful ongoing transition of the Chinese economy.

This spells bad news for export-intensive industries with considerable exposure to overseas demand. Sectors in the capital and intermediate goods markets have been hit the hardest. This is due to the composition of growth in most advanced economies being characterised by strong consumer spending on the one hand but weak industrial activity on the other.

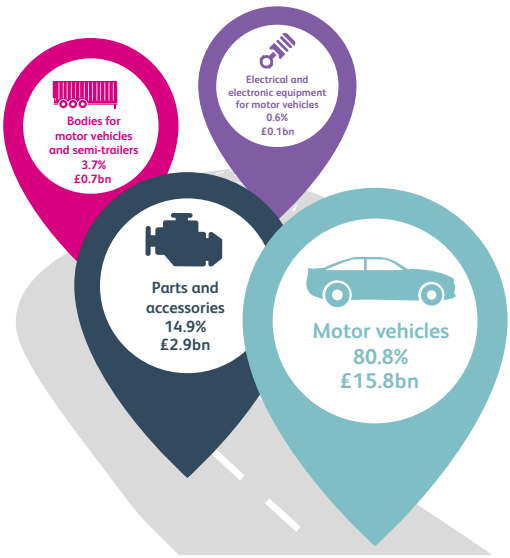
Therefore sectors like mechanical and electrical equipment, metals and electronics have struggled. Conversely, sectors like food and drink and automotive have grown strongly on the back of solid household expenditure.

UNDERSTANDING AUTOMOTIVE

The automotive sector manufactures a range of motor vehicles from cars, buses and commercial vehicles (vans, lorries etc) to snowmobiles, golf carts and caravans. This is complemented by the production of bodies for motor vehicles and their parts and accessories, such as electrical and electronic components, gearboxes, brakes and airbags.

Sector make up

GVA output, £



Source: ONS (2015)

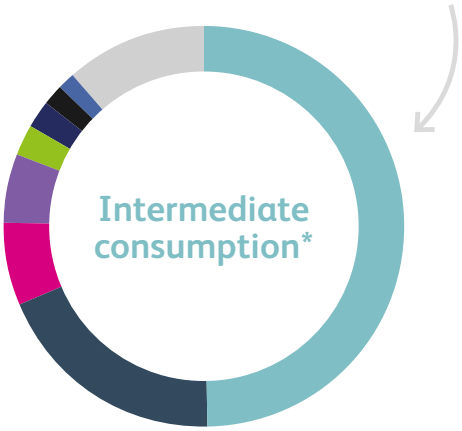
The automotive sector primarily produces final goods and 40% of what's made is consumed by domestic households, while another 29% travels to overseas markets.

About a quarter of output is used as an intermediate good by other industries. Intermediate consumption is the value of the goods and services consumed as inputs into production by other enterprises, rather than for final consumption; the goods or services may be either transformed or used up by the production process.

The remaining 8% is utilised as an investment by other businesses (e.g. a catering company buying a van).

Demand structure

Manufacture of motor vehicles, trailers and semi-trailers	49.9%
Wholesale and retail trade; repair of motor vehicles and motorcycles	18.9%
Administrative and support service activities	6.6%
Transportation and storage	5.7%
Manufacture of machinery and equipment	2.4%
Human health and social work activities	2.2%
Public administration and defence	1.6%
Financial and insurance activities	1.4%
Other	11.3%



*Value of goods produced by the automotive sector used as inputs into production by enterprises, % of total intermediate consumption

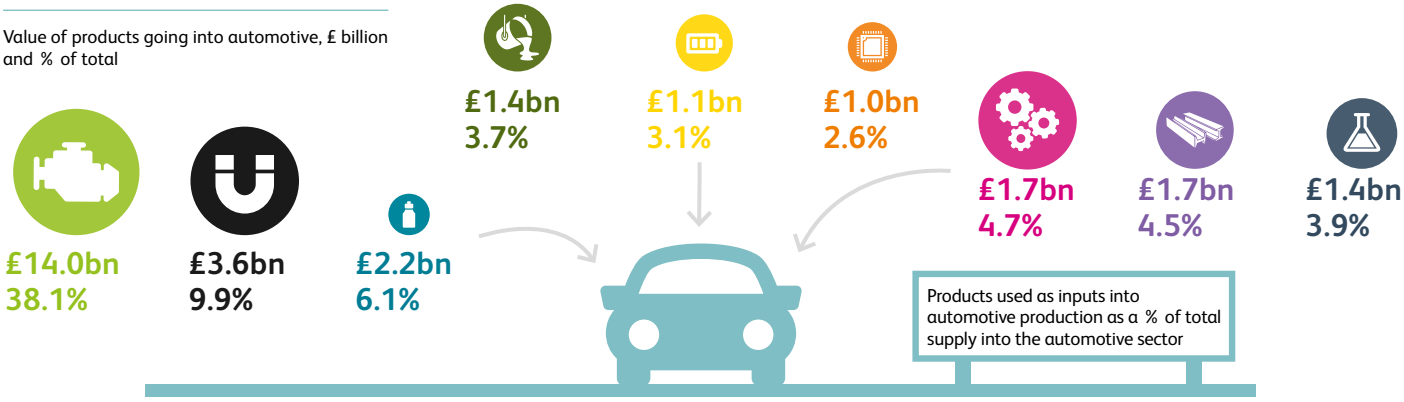
Source: ONS (2014)

DOMESTIC SUPPLY CHAIN

The automotive supply-chain is characterised by a small number of large Original Equipment Manufacturers (OEMs) at the top and a tiered structure of suppliers underneath, mostly dominated by a large number of SMEs. The requirement for the correct, high-quality parts and components to arrive at the right time, in the right quantity for efficient final assembly at OEM plants, has resulted in increased complexity in the automotive supply chain. In addition, the need for minimising order-to-delivery time for customers combined with a larger degree of personalisation has led to a tiered approach that has significantly improved flexibility and responsiveness in the automotive supply chain.

Domestic supply chain

Value of products going into automotive, £ billion and % of total



- Parts of motor vehicles, trailers and semi-trailers
- Fabricated metal products
- Rubber and plastic products
- Other basic metals and casting
- Electrical equipment
- Computer, electronic and optical products
- Machinery and equipment
- Basic iron and steel
- Petrochemicals

Source: ONS (2014)

OEMs:

OEMs are the known automotive brands, such as Nissan, BMW, Toyota and the like. They design, manufacture and market cars. They source parts from suppliers and assemble the final product.

Tier 1:

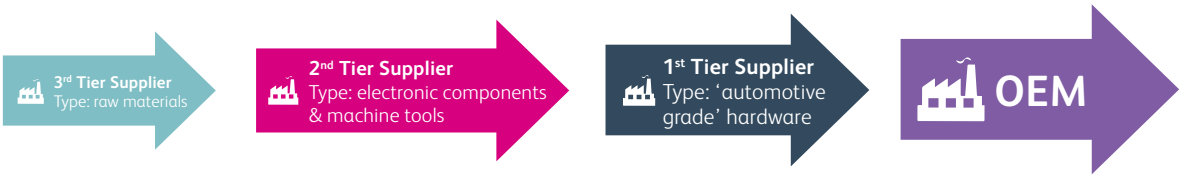
Companies that supply parts or systems directly to OEMs. They specialise in making 'automotive-grade' hardware, such as engines, system integrators, battery technology and steering systems. Tier 1 companies tend to locate their production plants near OEMs and develop close working and business relationships with them.

Tier 2:

Companies that produce parts used in the production of motor vehicles but not sold directly to OEMs. Tier 2 suppliers manufacture products like electronic components and machine tools. They tend to supply Tier 1 companies who package the inputs into 'automotive-grade' products and sell them on to OEMs. Tier 2 suppliers are rarely automotive-specific and tend to sell into other industries too.

Tier 3:

Companies that produce raw, or close to raw materials like textiles, metals and plastics. Tier 3 producers will sell across tiers, as most manufacturers in the supply chain will require raw materials to make specialised products, systems and components. Like Tier 2 suppliers, raw material producers will sell to a diverse range of industries.



INTERNATIONAL SUPPLY CHAIN

Over the last 20 years, international automotive supply chains have seen substantial offshoring of manufacturing components across the globe. Low technology, labour intensive components have been outsourced to low wage countries (often in South East Asia), before being funnelled into a single plant that performs the final assembly process.

The final assembly plant is usually located as close to the target market as possible. Proximity to the sales market allows for a number of key competitive advantages for suppliers. In operational terms it allows for lower logistic costs, greater responsiveness to the configuration of parts, as well as greater flexibility in the volume and product mix. In strategic terms it acts as a general proxy against risk, be it currency fluctuations or the final shipping procedure.

Top imported products by value

Value (£ billion) and % share of total automotive imports

Cars and other vehicles designed for transport of persons:
65.0% **£31.8bn**

Parts and accessories of motor vehicles:
21.3% **£10.4bn**

Motor vehicles for the transport of goods and special purpose motor vehicles:
11.0% **£5.4bn**

Road motor vehicles designed for transport of 10 or more persons; road tractors for semi-trailers:
1.3% **£0.6bn**

Trailers and semi-trailers and other vehicles:
1.3% **£0.7bn**

Source: uktradeinfo (2015)

NEW INTERNATIONAL SUPPLY CHAINS – MEXICO A CASE STUDY

The patterns of international supply chains as outlined above are changing. There has been an increasing trend for automotive manufacturers to 're-shore' their operations closer to sales markets, with a single nearshore destination consisting of manufacturing, production and assembly plants all located in close proximity.

A clear example of this is Mexico, where Nissan recently opened up its third manufacturing complex in the country. This move provides Nissan with a number of advantages; the ability to streamline the supply chain to reduce transit costs, slash lead times and improve responsiveness to customer demands.

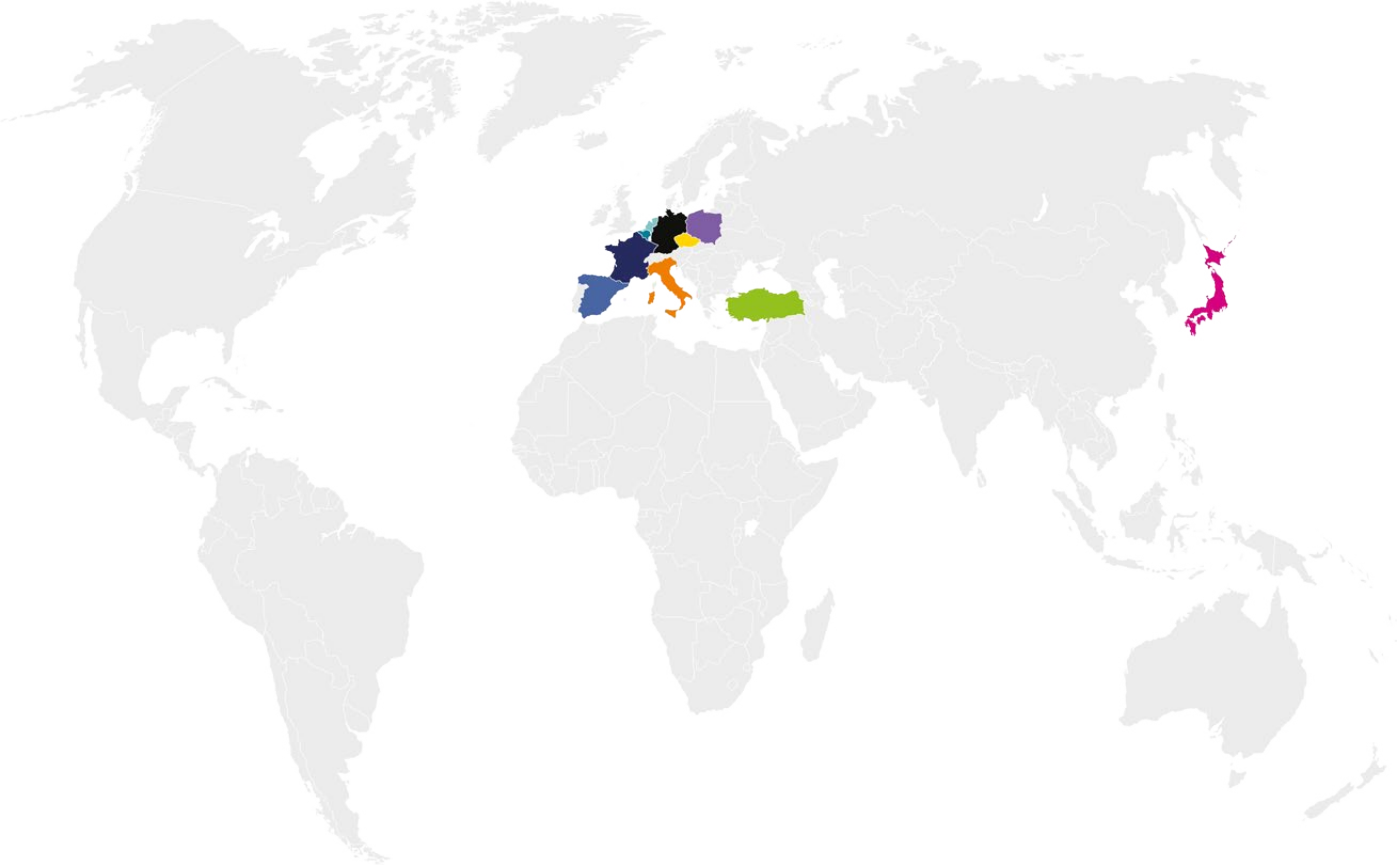
Nissan's move to re-shore production to Mexico is part of a wider hemispheric approach to unite its operations in the United States, Mexico and Brazil. This is a complex procedure and involves merging common engineering resources, standard processes and supply chain practices under single management.

In Mexico, Nissan has gone at great lengths to optimise its supply chain. It has developed strategies to encourage suppliers to locate as close to their plant as possible, including

inside its own manufacturing facilities or in supplier parks adjacent to its factories, locking in synergies and efficiency gains in the supply chain.

Manufacturers in Mexico are also able to capitalise on improved logistics. Access to roads and rail transport forgoes reliance on costly and time-consuming trans-Pacific shipments. The small distance between factories at various stages of the production process allows for sharing of critical resources and labour. Combining these with Mexico's excellent trade links, proximity to the large US market, a growing domestic market, and high quality labour force at a relatively lower cost, Mexico has become the nearshore destination for a range of automotive manufacturers. As a result, Mexico has become the 7th largest motor vehicle producing country in the world.

Key import markets



Germany: 40.3%
£19.9bn

Belgium: 10.6%
£5.2bn

Spain: 9.0%
£4.4bn

France: 7.4%
£3.7bn

Italy: 3.6%
£1.8bn

Japan: 3.6%
£1.8bn

Turkey: 3.5%
£1.7bn

Netherlands: 2.7%
£1.4bn

Poland: 2.4%
£1.2bn

Czech Republic: 2.4%
£1.2bn

Source: uktradeinfo (2015)

41% OF TOTAL SUPPLY INTO PRODUCTION IS IMPORTED

Source: ONS (2014)

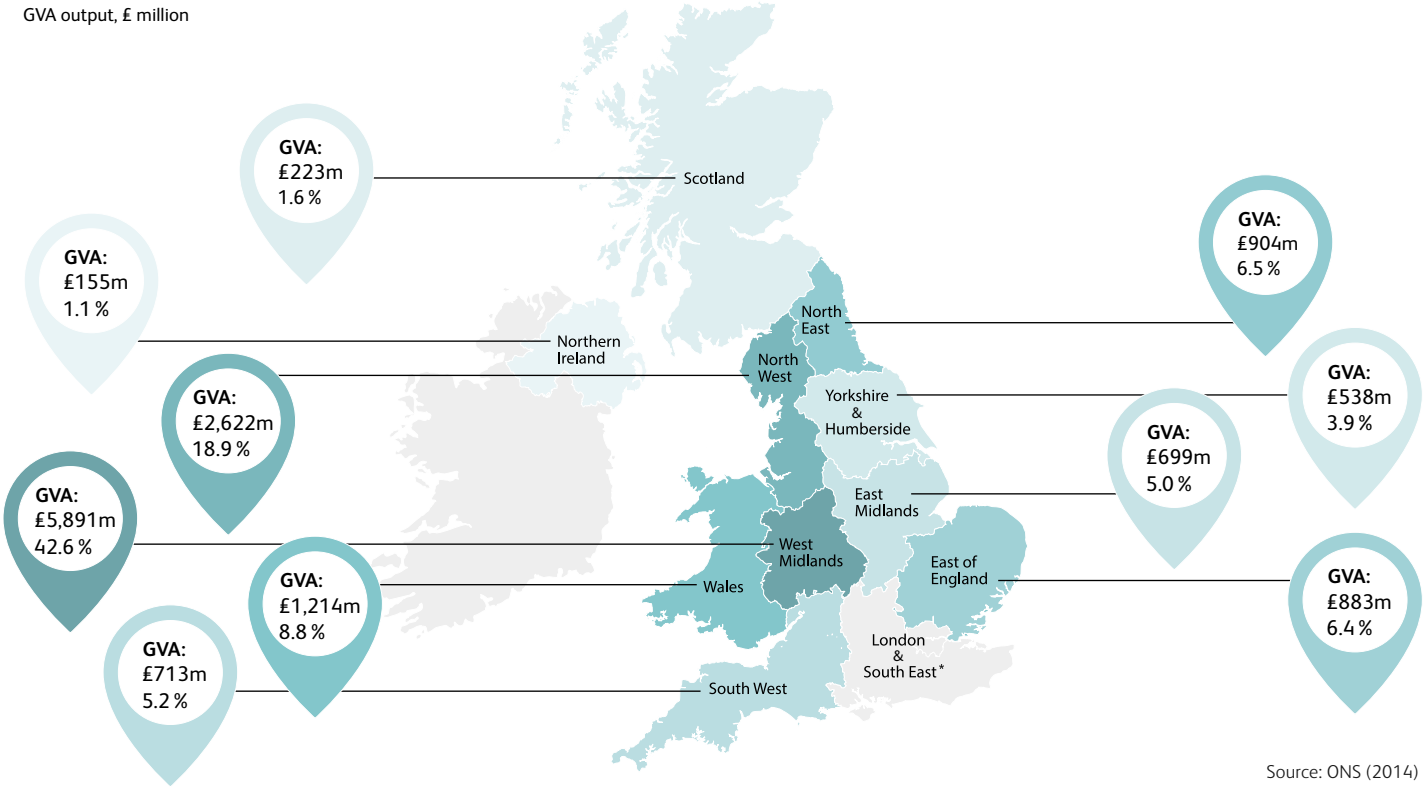
REGIONS STEERING AHEAD

The automotive industry has a presence across all UK regions. However, production is clustered around the West Midlands, where OEMs like BMW and JLR are located. The region accounts for 39 % of all automotive production in the UK. Another important cluster is located in the North West, which is responsible for 18 % of total UK production, and is the home of Bentley and Leyland Trucks, as well as JLR's Land Rover production line.

The North East is the third largest region for automotive, representing 13 % of total production, although agglomeration effects are less evident there. Rather the region's high production levels are mostly down to Nissan, which operates the most productive automotive plant in Europe, at its site in Sunderland.

Automotive distribution and major automotive manufacturers across UK regions

GVA output, £ million



Source: ONS (2014)

North East
Cummins
Nissan

Yorkshire and Humberside
Optare
Plaxton

East Midlands
Toyota

East of England
Lotus
Warnerbus

London and South East
Alexander Dennis
Caterham
Euromotive
Ford
John Dennis Coachbuilders
McLaren Automotive
Mini
Rolls-Royce

South West
Honda

Wales
Ford

West Midlands
Aston Martin
BMW
Dennis Eagle
Jaguar Land Rover
MG Motors
Morgan
The London Taxi Company

North West
Bentley
Jaguar Land Rover
Leyland Trucks
Mellor Coachcraft
Minibus Options
Vauxhall

Scotland
Alexander Dennis

Northern Ireland
Wrightbus

**Information supressed by ONS to avoid disclosure*

Source: SMMT

WHAT'S DRIVING TRADE

The UK is the 13th largest automotive manufacturer in the world. The UK exports a larger proportion of total automotive output than key competitors further up the table of major global producers, like France, Brazil, India and Thailand. This pushes the UK up to 9th place for exports by value.

The lion's share of exports are cars at 81%, or £25.5 billion, with the next largest – parts of motor vehicles – a mere 13%, or £4.2 billion. Seven out of ten of the UK's export markets are located in the EU. However, the UK's top two export markets are the US and China. Australia wraps up the top ten in last place, taking in just over 2% of all UK automotive exports.

Top exported products by value

Value (£ billion) and % share of total automotive exports

Cars and other vehicles designed for transport of persons:
80.7% **£25.5bn**

Parts and accessories of motor vehicles:
13.3% **£4.2bn**

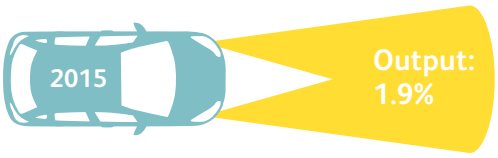
Motor vehicles for the transport of goods and special purpose motor vehicles:
4.4% **£1.4bn**

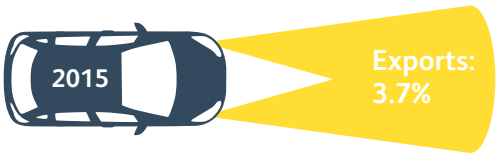
Trailers and semi-trailers and other vehicles:
1.1% **£0.3bn**

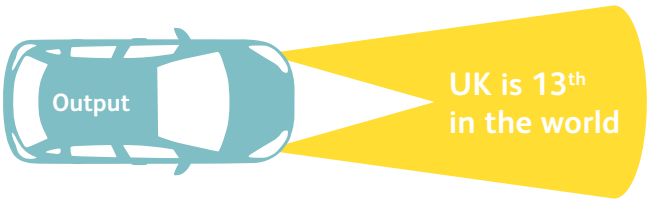
Road motor vehicles designed for transport of 10 or more persons; road tractors for semi-trailers:
0.6% **£0.2bn**

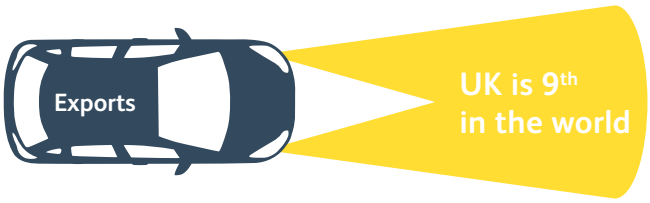
Source: uktradeinfo (2015)

Global market share





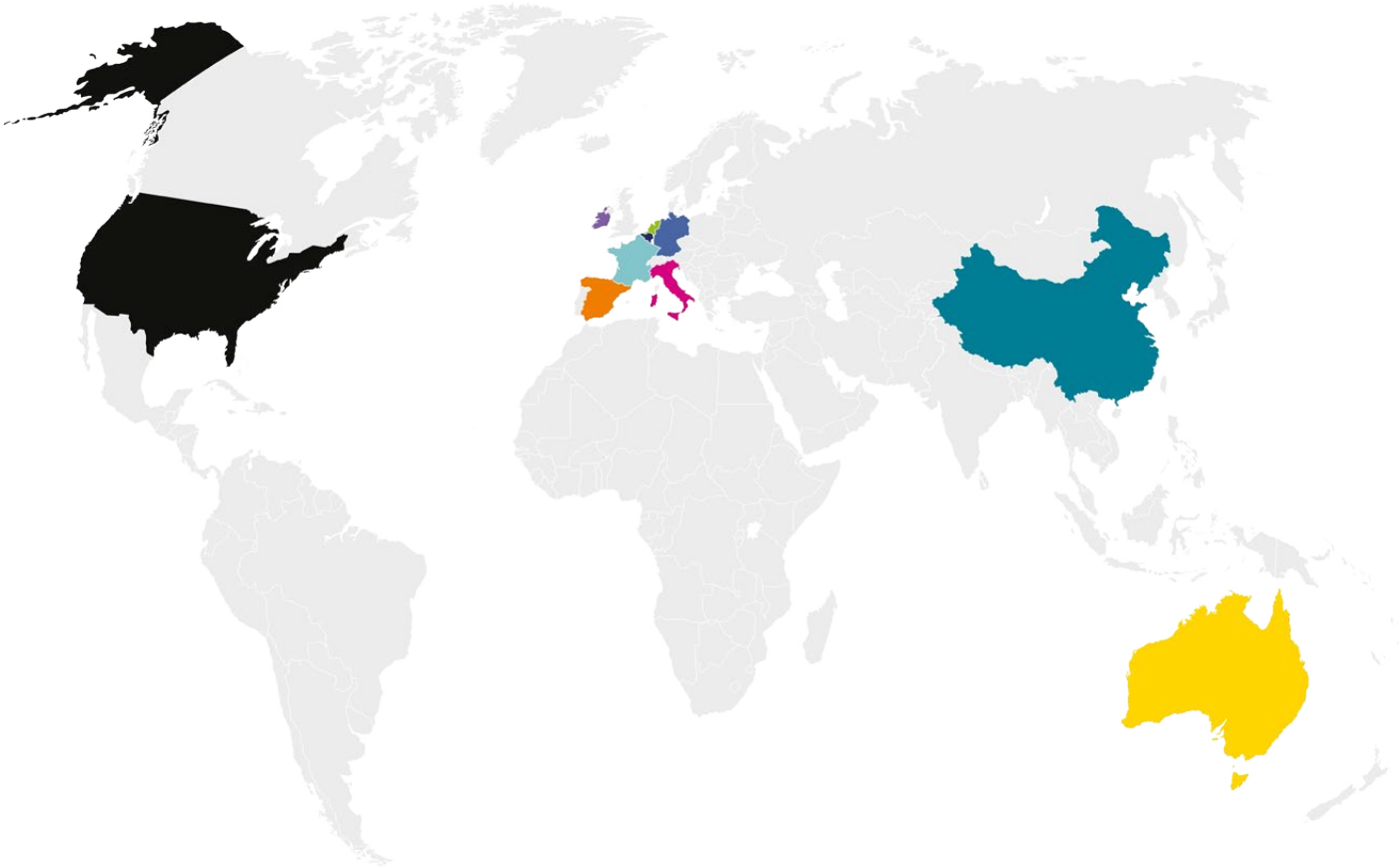




Source: OICA

Source: UNCTAD

Key export markets



United States: 16.5%
£5.2bn

China: 12.0%
£3.8bn

Germany: 8.6%
£2.7bn

Belgium: 8.0%
£2.5bn

Spain: 4.7%
£1.5bn

Italy: 4.5%
£1.4bn

Netherlands: 3.5%
£1.1bn

France: 3.4%
£1.1bn

Irish Republic: 2.7%
£0.9bn

Australia: 2.4%
£0.8bn

Source: uktradeinfo (2015)

Top 10 high growth markets

Country	% Growth in exports (2010-2015)*
Saudi Arabia	307.2 %
South Korea	300.0 %
Hungary	282.5 %
Qatar	253.9 %
New Zealand	197.1 %
UAE	176.4 %
China	130.8 %
Kuwait	97.1 %
Denmark	76.8 %
Australia	73.0 %

**>0.5% of total UK automotive exports*

Source: uktradeinfo (2015)

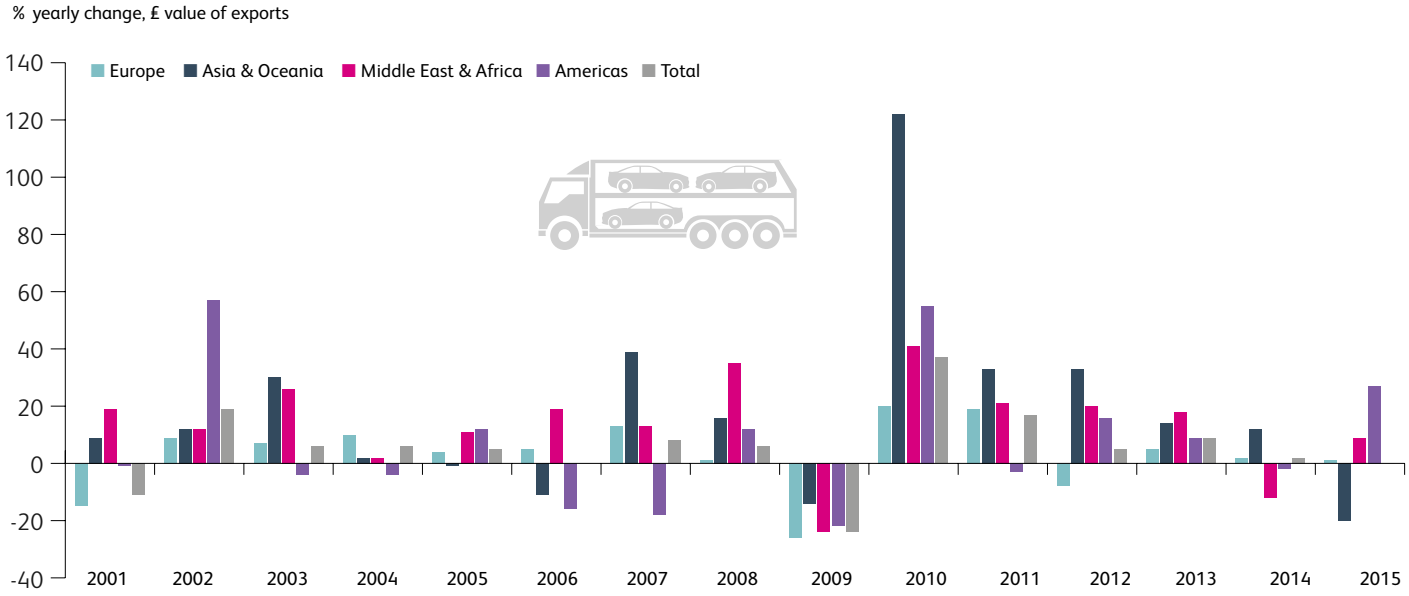
EXPORT TRENDS

UK automotive exports have grown spectacularly since the start of the new millennium. Between 2000 and 2015, the value of total UK automotive exports has more than doubled. There has been positive growth across continents, although most of this growth has come from emerging markets. Overseas sales to Asia & Oceania have grown by a stellar 690% since 2000, overtaking America as the second largest market for UK automotive sales in 2011.

Exports to the Middle East & Africa have also increased significantly, by 504% since 2000, but it remains the smallest market at 9% of total automotive exports in 2015.

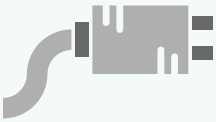
Europe is still the top destination for automotive exports at 50% of all international sales, and growth since 2000 has been solid at 40%.

Automotive export growth



Source: uktradeinfo (2015)

BM CATALYSTS DRIVING SALES ACROSS THE WORLD



BM Catalysts manufactures catalytic convertors and diesel particulate filters for the automotive sector. Exports represent 53% of the company's annual turnover and they sell to nearly 40 countries across the world. The vast majority of markets they sell to are in Europe, but have export links right across the globe.

BM Catalyst's export strategy is to achieve the same market share as they have in the UK (currently 25%) in each of the major European markets. Their choice of export markets to target has always been driven by demand, but another vital consideration is the logistics, as they need to be able to ensure they can efficiently and effectively send their goods over to that market for onward distribution.

The only route to market for the goods that BM Catalysts sell overseas is via distributors, as they are dictated to by the way in which car parts are bought. They focus on selling into the major car markets and ensuring they get as much stock on the distributors' shelves as is possible.

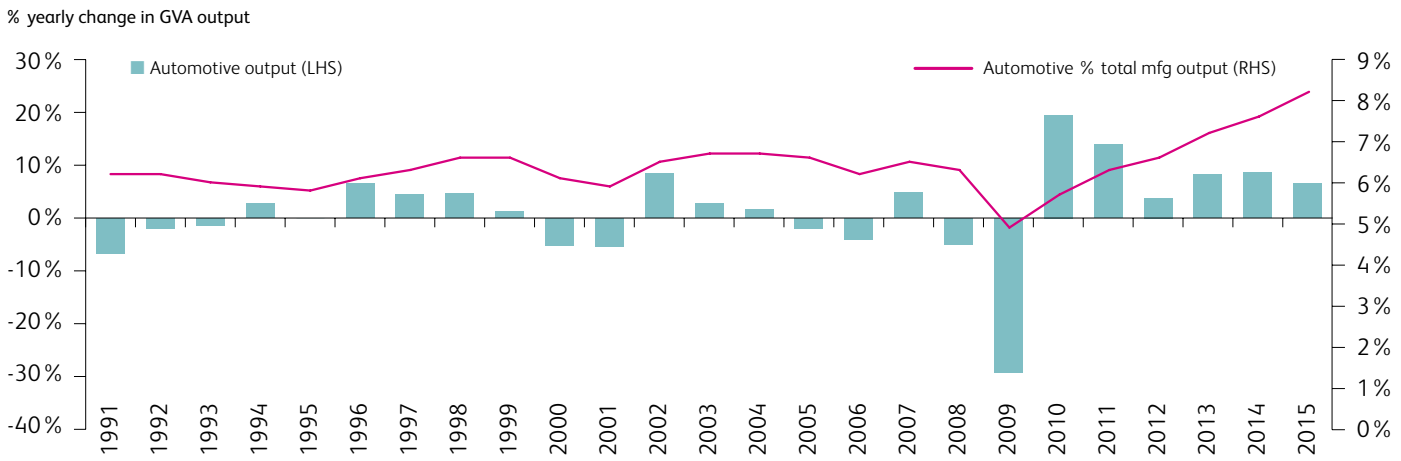
SECTOR PERFORMANCE

The automotive industry has been one of the best performing sectors in UK manufacturing. Output has grown by a total of 31% since 1990, the fourth highest in manufacturing after other transport, pharmaceuticals and chemicals.

Between 2010 and 2015, automotive output increased at the fastest pace of any manufacturing sector at 48%, fully offsetting the large decline during the financial crisis, where output fell by 29% from 2008 to 2009. The hefty drop during the recession was the result of a change in consumer spending patterns, with the deterioration in household disposable incomes weighing heavily on demand for big-ticket durable items like motor vehicles. However, consumer spending has more than recovered since 2010 both domestically and internationally, with household consumption in the UK growing by an annual average of 1.1% since 2010.

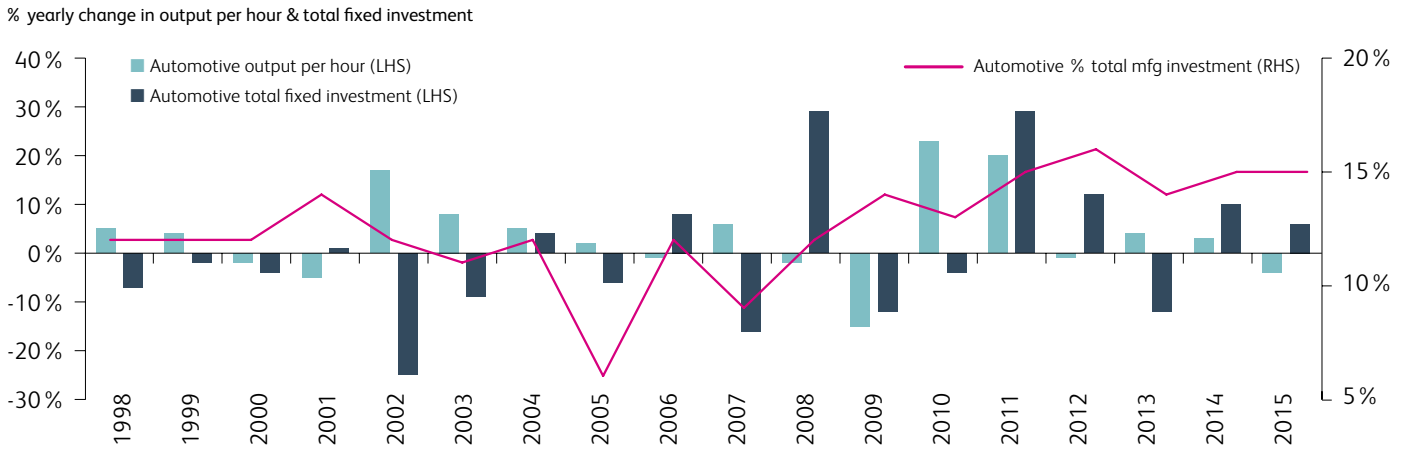
The uptick in demand has been met with some significant R&D spending and productivity improvements by UK manufacturers. Strong growth in automotive output over the past five years has been driven by the introduction of new models from a range of OEMs with a manufacturing base in the UK. As a result, the share of automotive output in total UK manufacturing has increased to 8.2% in 2015 from 6.4% in 1990 and it is now the third largest manufacturing sector.

Automotive output has grown rapidly since the financial crisis



Source: ONS (2016)

Automotive is a high-productivity, investment-intensive sector



Source: ONS, Eurostat & EEF analysis (2015)

INVESTMENT-INTENSIVE

The automotive industry is the second most investment-intensive sector (total fixed investment as a proportion of gross value-added) in UK manufacturing after other transport. However, it's the top sector in value terms, investing over £3.6 billion in 2015.

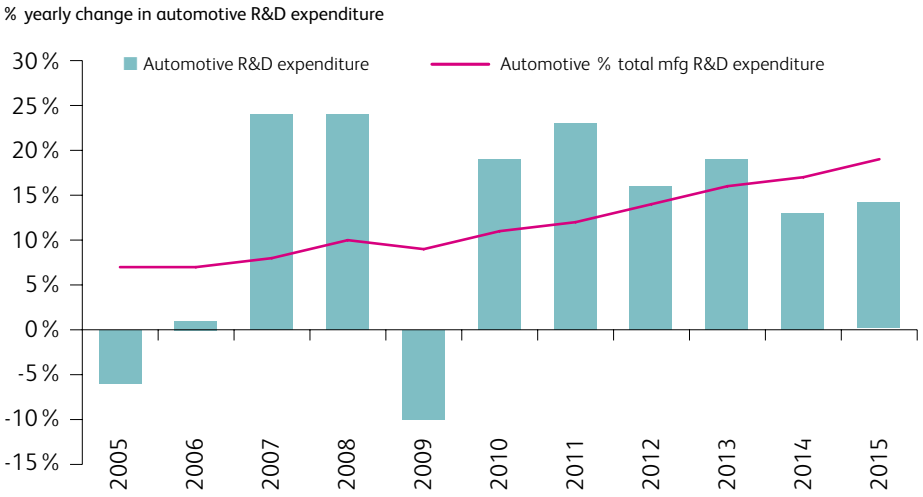
A good chunk of this investment has been driven by continuous improvement initiatives. The automotive industry is highly automated, illustrated by a growth in productivity (output per hour) of 50% since 2009.

The requirement for the standardisation of components so that models are adjusted to individual customer requirements and delivery schedules, enabling OEMs to produce multiple models in high volumes at the same manufacturing facility, has fuelled investment in capital equipment and new technologies throughout the automotive supply chain.

154,000 PEOPLE ARE EMPLOYED IN THE AUTOMOTIVE SECTOR IN THE UK

Source: ONS (2015)

Automotive production is R&D driven



Source: ONS (2015)

R&D-DRIVEN

The automotive industry accounts for 19% of all manufacturing R&D, the second highest of any manufacturing sector.

The sector invested £2.7 billion in R&D over 2015 or 20% of GVA output, and expenditure in R&D accounted for 5.6% of all automotive sales in 2015.

The automotive sector's investment in R&D has increased by a staggering 243% since 2004.

R&D expenditure in the sector has been largely driven by increased activity in product innovation, with OEMs developing a host of new models over the past few years. Nevertheless, significant R&D funds have also been invested in process innovation, with manufacturers gearing up for the integration of digital technologies into production.

UK AUTOMOTIVE SECTOR: A SUCCESS STORY

The UK's automotive industry has experienced a significant transformation over the past decade. The closure of major automotive plants in the 2000s, like MG Rover and Renault, was considered by many as the end of volume manufacturing in the UK. The rise of low-cost manufacturing locations with large domestic markets (e.g. China, India) placed significant pressures on automotive OEMs to offshore capacity at the expense of UK production. The onset of the Great Financial Crisis exacerbated these supply-side problems as consumer demand for durables in advanced economies plummeted.

Nevertheless, most automotive OEMS retained their footprint in the UK and through a range of initiatives or investments have led a renaissance in the industry. A rationalisation of supply chains, laser focus on productivity improvements and most importantly, heavy emphasis on new product development has seen the automotive industry boom since 2010. Automotive manufacturers have leveraged the UK's flexible workforce, reputation for design and specialisation in low-carbon technologies to manufacture personalised vehicles that customers want to buy.

Between 2009 and 2015, the industry has invested over £12 billion in R&D, turned over £347 billion, nearly doubled exports and increased labour productivity by 50%. The UK is now the home to more automotive manufacturers than any other European country.

SHORT TERM RISKS & OPPORTUNITIES

The automotive industry has achieved some sizable growth rates since the financial crisis. This has been mainly driven by the production of new models by OEMs in UK plants and solid growth in consumer spending over this period. We expect this growth rate to moderate in 2017 to 1.8%, from around 5% in 2016. This is largely but not exclusively down to the current pipeline of new models running out, generating disruptions in production processes during the second half of the year, as manufacturers gear up for the development of the next round of models. However, there is also a range of new risks and opportunities that automotive manufacturers will need to grapple with, not least the challenges emerging from the vote to leave the EU.

RISKS

Trade channels

About 44% (or £13.9 billion) of all UK automotive exports travel to the EU. This makes the EU the largest market for the UK automotive industry by some distance. If Brexit leads to a reversion to WTO rules, this would slap a 10% tariff on all car exports, potentially making it uneconomic for some companies to continue to manufacture in the UK.

But that's not the whole picture. The UK runs a deficit of £21 billion in automotive trade with the EU. About 80% of all parts and accessories imported for use in UK production are sourced from the EU, highlighting important supply chain linkages which have been developed over decades. The complex nature of international supply chains means that for the manufacture of one car, a company might pay the 10% tariff multiple times, as components move to and fro before the final product is assembled.

RISKS

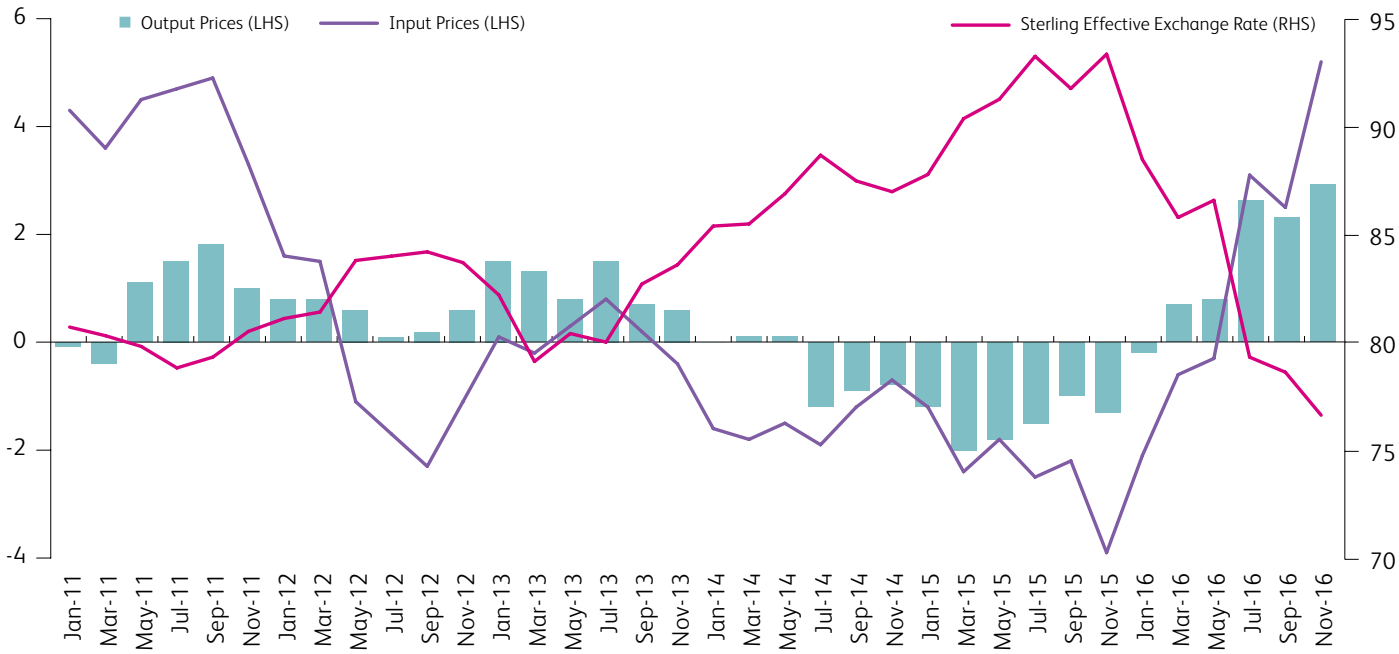
Access to skills

The UK manufacturing sector has been faced with chronic skills shortages. This is no truer than in the automotive sector where R&D-intensive production with a large engineering content requires highly skilled labour. Government policy has so far failed to address this skills gap and manufacturers of all sectors have consistently rated the shortage of skilled labour as one of the top threats to future growth.

With controls on immigration a key pillar of the UK's Brexit negotiations, there's a risk that the pipeline of overseas talent into the UK automotive industry will be further restricted.

Automotive manufacturers' margins squeezed by pound depreciation

% year on year increase in input & output prices, Sterling monthly average effective exchange rate index (Jan 2005=100)



Source: ONS & Bank of England (2016)

RISKS

Rising input costs

The pound depreciation should provide a considerable boost to export competitiveness in the medium term. However, the flip side in the drop of the value of the pound comes through imported inflation. Manufacturers are already seeing an increase in input costs filtering through the supply chain.

The impact on the automotive industry is less pronounced than in other manufacturing sectors but remains significant.

About 4 in 10 inputs into automotive production are imported components and materials. Input prices in November 2016 were 5.2% higher than the same month a year ago, while output prices increased by 2.9% over the same period. What's more, input prices increased faster than output prices in July 2016, by more than 0.2 percentage points, for the first time since 2012. This will inevitably put margins under considerable pressure, which could potentially impact on production levels.

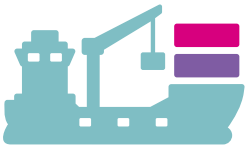
RISKS

Slowdown in consumer spending

Consumer spending has been the engine of growth for the UK economy over the past few years, if not decades. Given that automotive output is by and large a consumer good, this has benefited the industry greatly. However, the projected increase in inflation (driven by the increase in fuel costs and the depreciation of the pound) will lead to a squeeze on household disposable incomes.

How large this impact will be will depend on the potential effect of Brexit uncertainty on labour market dynamics. Should wage growth continue at its current rate or slow as companies respond to Brexit uncertainty by reviewing recruitment levels, we're likely to have negative real wage growth by April 2017. This will prompt consumers to reduce their spending, especially on expensive items like cars.

OPPORTUNITIES



A boost to exports

The slowdown in emerging markets and weak consumer spending in Europe has led to lacklustre performance in UK automotive exports during 2016. However, with emerging markets coming off the bottom and growth in Europe picking up, we expect stronger performance for automotive exports during the next two years.

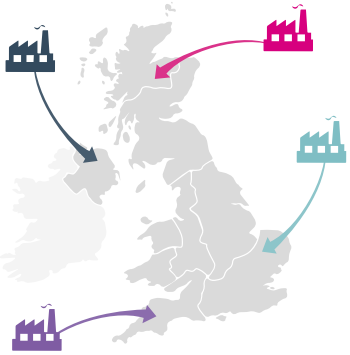
Undoubtedly, the depreciation in the pound will – in time – provide an additional boost to export competitiveness. However, with a range of political events that could make or break the Eurozone economy over the next year, there is significant uncertainty about demand conditions across the channel. Should Eurosceptic parties rise in power following general elections in Germany and France, there are likely to be repercussions for economic growth. Still, there are plenty of opportunities for manufacturers to offset this potential risk by tapping into other markets, including high-growth countries in the Middle East and Asia.

More scope for reshoring

A study by the UK Automotive Council in 2012 found that there was significant scope to reshore the production of vehicle components. Since then, UK vehicle makers have already reshored in excess of £1 billion-worth of purchasing components. Yet as the industry continues to grow, the opportunities to invest are even greater, with up to £4 billion in unfulfilled potential for Tier-1 suppliers.

Currently the average UK content in British built cars is 41%, up from 36% in 2011. But with 80% of components able to be produced in the UK, the aim to increase UK content in British cars up to 60% – in line with other major European countries – is both viable and realistic.

The case for reshoring production to the UK is once again centred on proximity, with reshoring of the supply chain helping to increase responsiveness and reduce risk and lead times, as well as bring wider benefits to the UK economy through job creation in the domestic supply chain.



RISKS

OEM investment decisions

One of the largest Brexit-related risks is that losing access to the Customs Union could affect the decisions of automotive OEMs on whether to manufacture their next round of models in the UK. Most OEMs have a footing in multiple production locations, making it easier to switch production from the UK to other plants in Europe. This is more likely given that a 10% tariff on exports would require some monstrous productivity improvements to maintain profit margins.

Critically, if one OEM decides to move, that will affect large parts of the supply chain that depend on OEMs for sales. Nissan's commitment to continue to manufacture in the UK following assurances by the UK government is undoubtedly a big boost for the automotive industry. However, this leaves a host of other OEMs looking for the same assurances to continue to produce in the UK. This injects a great deal of uncertainty about the future shape of the UK's automotive industry.

OPPORTUNITIES

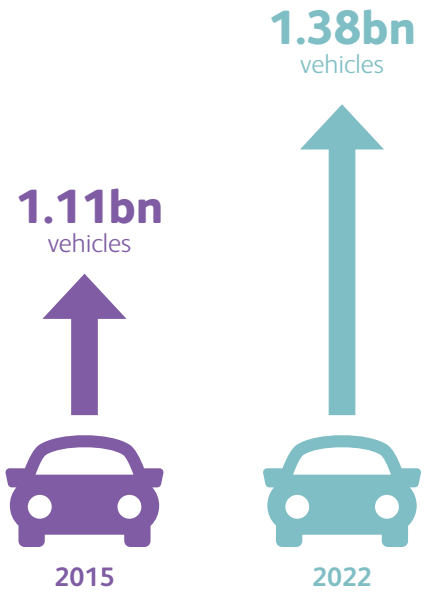
Emerging markets & aftermarkets

The world's total car and light commercial vehicle population is predicted to grow by 25% from 1.11 billion in 2015 to 1.38 billion in 2022, according to a study by SMMT.

Despite the recent slowdown in some emerging markets, this growth is still likely to be driven by the economies of China, India and the Middle East where rising GDP and household incomes will result in tens of millions of people becoming vehicle owners for the first time in the coming years. This therefore represents an expanding market that UK suppliers can turn to.

Global vehicle population

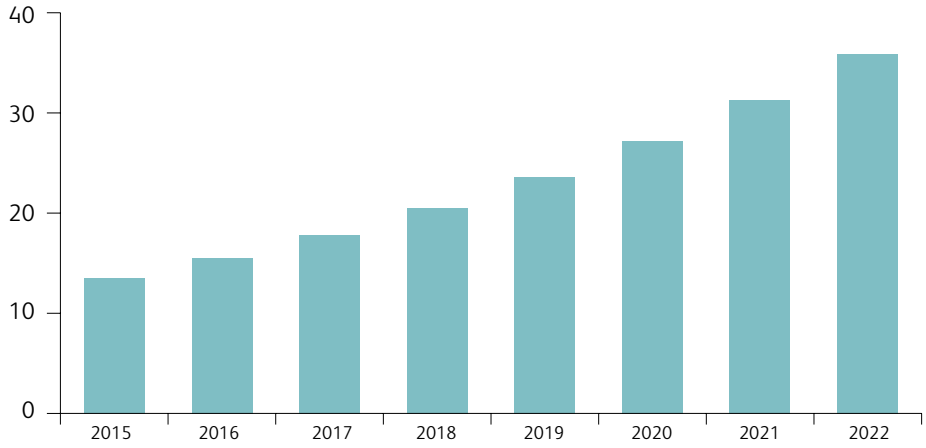
Cars and light commercial vehicles



Source: SMMT and Frost & Sullivan

Projected sales of UK aftermarket parts in India

UK Aftermarket projected size in India (£ million)



Source: SMMT and Frost & Sullivan

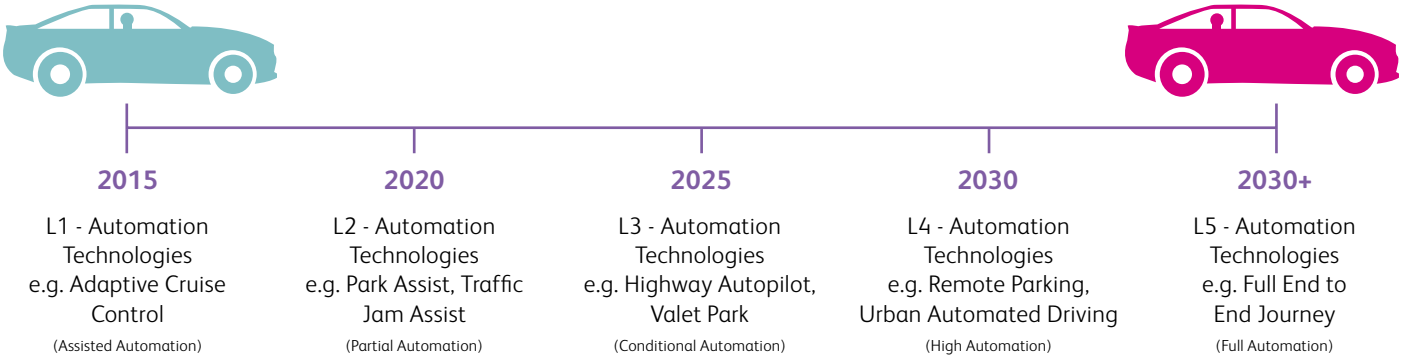
The growing vehicle base in countries such as India and China also represents an opportunity for the UK automotive aftermarket. As a result of rising vehicle ownership, consumers in these countries will face an increasing need for high quality aftermarket parts. With British makes generally regarded favourably throughout Asia, UK-based parts suppliers could find a large market of new customers who will be keen for high quality parts as opposed to low quality counterfeits or expensive original equipment parts. The aftermarket in India is a good example of the opportunities on offer. India's vehicle population is expected to double over the next 7 years to more than 50 million cars. A study by the consultancy firm Frost and Sullivan expects that sales of UK component parts to India will grow by as much as 15% annually over the 2016-2022 period, five times more than the domestic British aftermarket. There is therefore a clear opportunity and role for UK suppliers in modernising the automotive aftermarket industry in emerging regions, and enjoying the high growth rates and revenue that go with it.

Nurturing the competitive advantage in R&D

The pace of technological change in the automotive industry is accelerating. Within the next 15-20 years there will be huge changes in vehicle technology and the automotive production process. These include the development of connected and autonomous vehicles, as well as ultra-low emission vehicles (see Long Term Trends). It is therefore crucial that the UK maintains its comparative advantage in R&D-intensive high-value manufacturing, which saw £2.7 billion invested in automotive R&D in 2015 alone.

The current Government is also getting behind the efforts of automotive manufacturers to embrace new technologies. In the Autumn Statement, the Chancellor announced up to £2 billion extra per year on R&D funding by the end of the Parliament. This includes £390 million for the development of low emission and connected autonomous vehicles, plus a 100% first year capital allowance for the installation of electric vehicle charging infrastructure.

LONG TERM TRENDS



Source: KPMG

INNOVATIONS: AUTONOMOUS AND CONNECTED CARS

The automotive sector is innovating fast, with autonomous and connected vehicles very much the future. Vehicles today already have varying degrees of autonomy with technologies such as Traffic Jam Assist being introduced by Audi, BMW, Daimler and Volvo in 2015. Full autonomy, or driverless vehicles are not expected to be available until 2030, but as our vehicle technology roadmap illustrates, UK production of autonomous cars is expected to grow significantly, with current trends indicating that all vehicles produced in the UK by 2027 will have at least L3 technologies.

The economic benefits of investing in this technology are great and widespread. A study by SMMT predicted that that the annual economic benefit of connected and autonomous vehicles will grow to £51 billion by 2030. These economic benefits come through the transformed driving experience autonomy brings, with fewer accidents and increased productivity. The production of autonomous and connected vehicles could also lead to an increase of 25,000 jobs in the automotive sector according to SMMT, as well as a cumulative increase of 1% in GDP by 2030.

JAGUAR LAND ROVER PUSHING VIRTUAL INNOVATION UP A GEAR

Jaguar Land Rover is the UK's largest automotive manufacturer built around two iconic British car brands: Land Rover, the world's leading manufacturer of premium all-wheel-drive vehicles; and Jaguar, one of the world's premier luxury sports saloon and sports car marques.

It created its first virtual environment in 2008 and has since invested a further £3 million to enhance the capabilities of its Virtual Innovation Centre, which is based at its engineering, design and test facility in Gaydon. The Virtual Innovation Centre is made up of the 3D Virtual Reality CAVE, Driving Simulator and the Virtual Reality Ergonomics Laboratory, the benefits of the virtual technologies include:

- A reduction in expensive physical prototypes and real-world testing
- Ability to perfect designs ensuring that when physical prototypes are produced they are correct first time
- More reliable results when compared to traditional physical engineering, design and testing
- Greater flexibility in design, allowing engineers to customise designs to cater for different tastes across markets

Ultimately, the Virtual Innovation Centre has enabled vehicles to get to market faster due to quicker development time.

4IR 4TH INDUSTRIAL REVOLUTION

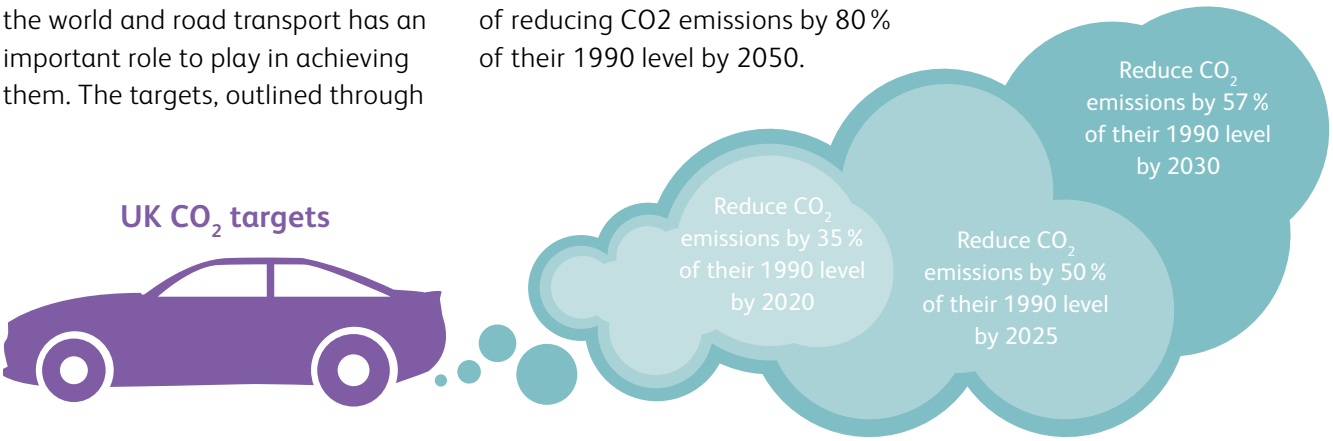
Innovation is not just taking place on the final products, the process by which they are made is also becoming highly automated and connected, through the development of 4IR technologies. Factories of the future will be transformed; they will implement new techniques and technologies, including autonomous robots, multi-purpose production lines as well as advanced information and computer systems. As a result, automotive manufacturers will require a workforce with a very different skillset to todays.

The availability of skilled labour is a concern. The average age of employees in the automotive supply industry worldwide is around 50 years old. At a time when new technologies and new processes are driving manufacturing and product development, keeping current skills and attracting new talent into the sector is crucial. There will be a need for the 'de-skilling' of traditional processes and craft skills such as machining and welding, but an 'up-skilling' of staff operating new advanced technologies.

ENVIRONMENTAL CHANGES

Emissions

The UK has some of the most ambitious national CO2 targets in the world and road transport has an important role to play in achieving them. The targets, outlined through 5 "carbon budgets" (three of which are shown below), has the overall aim of reducing CO2 emissions by 80% of their 1990 level by 2050.



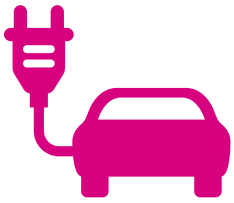
Electric vehicles

In order to achieve these emissions targets, there will need to be further electrification of the vehicle fleet through increased adoption of ultra-low emission vehicles (ULEV). ULEVs are defined as any vehicle that uses low carbon technologies and emits less than 75g of CO2/km at the tailpipe. They are also capable of operating in zero tailpipe emission mode for a range of at least ten miles. ULEV's encompass the following technologies:

- Battery Electric Vehicles (BEVs)
- Plug-in Hybrid Electric Vehicles (PHEVs)
- Extended-Range Electric Vehicles (E-REVs) and
- Fuel Cell Electric Vehicles (FCEVs)

The market for electric vehicles in the UK has been expanding dramatically in the last few years. Registrations of pure electric and plug-in hybrid vehicles rose by 94% in 2014 to account for more than 1% of the total market, while the alternatively fuelled vehicle (including hybrids) market share reached a new high of 2.8%.

This trend is being reflected across the globe with Bloomberg forecasting that:



By 2040 Electric vehicles will make up

of global new car sales.

EEF is dedicated to the future of manufacturing. Everything we do is designed to help manufacturing businesses evolve, innovate and compete in a fast-changing world. With our unique combination of business services, government representation and industry intelligence, no other organisation is better placed to provide the skills, knowledge and networks they need to thrive.

We work with the UK's manufacturers from the largest to the smallest, to help them work better, compete harder and innovate faster. Because we understand manufacturers so well, policy-makers trust our advice and welcome our involvement in their deliberations. We work with them to create policies that are in the best interests of manufacturing, that encourage a high growth industry and boost its ability to make a positive contribution to the UK's real economy.

Our policy work delivers real business value for our members, giving us a unique insight into the way changing legislation will affect their business. This insight, complemented by intelligence gathered through our ongoing member research and networking programmes, informs our broad portfolio of services; services that unlock business potential by creating highly productive workplaces in which innovation, creativity and competitiveness can thrive.

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