



Regional Transport – a supply chain mapping exercise and Brexit exposure check of automotive, aerospace and rail value dependency in the WMCA region

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drive midlands
AUTOMOTIVE PARTNERSHIP

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Executive Summary

This report presents the findings and key policy recommendations of a combined supply chain mapping exercise and Brexit exposure check of the transport manufacturing sector in the Midlands, funded by the West Midlands Combined Authority.

These sectors consisted of automotive, rail and aerospace manufacturers and suppliers, for which 234 firms were surveyed between November 2019 and January 2020. Of these, 25 were exclusively involved in aerospace manufacture; 59 were exclusively involved in automotive manufacture; 3 were exclusively involved in non-auto road vehicles; 32 were exclusively involved in rail manufacture; 27 were mixed manufacturers and; 87 were freight/logistics firms.

Key aspects examined in the mapping exercise included: value of automotive businesses in the West Midlands split by vehicle company clients and local authorities; divisions between tiers one and two, and logistics and suppliers, employment mix (UK/EU), major challenges faced by supply chain e.g. transport infrastructure and paperwork; import/export ratios, transport route dependency, and 'Brexit readiness'.

Our findings suggest that the auto, rail and aerospace supply chains in the West Midlands are 'increasingly fragile' given their exposure to logistics dependency on the Channel Tunnel and ports in the South-East of the UK. In particular, we find that **transport manufacturing firms and their suppliers:**

- ***are particularly exposed to the operations of Jaguar Land Rover, given its dominance in the region***
- ***have significant exposure to other manufacturers, including Honda - who have already announced their intention to close down their Swindon plant by 2021***
- ***have a high dependency on EU workers, with EU nationals accounting for an average 31% of the workforce***
- ***have a high dependency on the Channel Tunnel, with 17% of exporters and 14% of importers exclusively using the Chunnel***
- ***have a high use on the ports of Liverpool, Southampton, Immingham and Felixstowe, placing additional pressure on regional transport networks in the event of a hard Brexit***

The exposure of the regional supply chain to JLR is critical, given that in contrast to other UK-based manufacturers, who focus on assembly, JLR conducts substantial R&D operations and value-added in the UK. This, added to the logistics constraints faced by a sector operating in a land-locked region, poses particular challenges for policymakers going forward.

Recommendations

In the event of a hard Brexit, there are important ramifications in terms of the UK's domestic transport architecture, with the A14, the A34, M3 and M1 likely to come under particular pressure in the event of traffic being routed away from the Dover-Calais strait, raising issues around infrastructure capacity and spend. At a national level, the UK Government should consider:

- *Boosting regional investment support schemes – this could be in the form of an extended or wider Regional Growth Fund (RGF) with preference given to companies which also committed to the use of domestic suppliers.*
- *Vehicle scrappage schemes to boost demand – these were seen as successful in boosting short term demand in the aftermath of the 2008-09 global financial crisis, keeping factories busy, but over the longer term simply brought forward demand, leading to reduced sales in the future.¹*
- *Short-time working support – something which the German government is considering implementing now, having done so back in 2008 as well. Several other countries also followed this route and helped vehicle companies and their suppliers with support for wages of workers on short time working.²*
- *Refunding tariffs levied on UK exports to (for example) the EU – in South Africa a very complex system exists to eliminate the tariff impact on exports of vehicle produced there.*
- *Writing-off of government loans, if made (as the US did in 2008 with GM and Chrysler).*
- *Preferential loans, commitment to covering operating losses for a specific period (again as done in the US in 2008).*
- *Bailouts to prevent financial collapse, along the lines of the support given to Chrysler and GM by the US government in 2008-09.*
- *Taking equity stakes in manufacturers (e.g. the French government took a stake in PSA when it was in financial trouble, alongside its existing stake in Renault); this may be difficult in the UK given the overseas ownership of all major vehicle producers.*

While the majority of policy action options open to support existing manufacturing will depend on UK Government policy and funding, there are some policy actions which local/regional government bodies can consider/enact around business, people and place. For automotive (the largest sector in this study):

- *Potential business tax/rates holidays – business rates are widely seen as a disproportionate cost burden borne by UK manufacturing companies especially when compared to equivalent taxes levied in continental Europe. Such support was pivotal in the wake of the global financial crisis.*
- *Training funding to help companies retrain and reskill workers for the transition to EV production and other production throughout the supply chain.*
- *Offer a loan fund for the supply chain to support otherwise viable firms find new markets. This was used in the case of the Rover Task Force and also in the wake of the global financial crisis.*

¹ <https://www.smmmt.co.uk/2009/10/the-uk-scrappage-incentive-scheme-the-facts/> - this provides an indication of the short term impact, boosting output in 2009 by the UK plants of Nissan and Honda especially; this report – <https://www.ft.com/content/49ea03b6-988f-11de-807a-00144feabdc0> – highlighted the short term nature of the scrappage scheme in Germany in terms of boosting manufacturing.

² <https://www.theguardian.com/business/2009/apr/16/european-short-time-working-unemployment>

- *Provide diversification support for firms in the industry. This was significant and important in both the MG Rover collapse³ and in the wake of the global financial crisis⁴, in the latter case through the Automotive Response Programme.*
- *Invest in expanding the on-road/car park EV charging infrastructure – this could be a major job creation policy as well as expanding the skill base in electrical workers.*
- *Establish an industry support taskforce – taskforces were set up around the Rover and LDV closures and also in the wake of the global financial crisis at a regional level. More recently, Swindon Borough Council and related bodies set up a taskforce in the aftermath of the announcement of the Honda factory closure – that said, WMCA needs to be careful that such a taskforce has a clear remit and resources to see this through.*
- *Consider local procurement strategies, in line with the UK’s commitments under international agreements.*
- *Establish special enterprise zones with excellent connectivity and a range of tax incentives. These should be centred on existing areas of automotive specialisation, building on existing clusters of expertise and support the growth of cutting-edge technologies in the region. Incubation of scale-up firms is another important area of focus.*
- *Look to win the setting up of a battery “gigafactory” to underpin battery production in the UK.*
- *Support the installation of an Arrival CV factory:⁵ Hyundai and Kia have recently announced a £100m investment in this new UK EV van company. The company claims its manufacturing system is based on small volume micro-factories and would therefore seem to be a potentially quick win for new investment.*

For aerospace, moving forwards, it is clear that the details of the UK’s future partnership with the EU will be crucial. Tariffs are less significant than for other sectors as the WTO Agreement on Trade in Civil Aircraft means that the overwhelming majority of components and final products do not attract tariffs. Three issues then are of much greater concern. Specifically:

- *Potential frictions and delays, particularly in transport*
- *Skills shortages, particularly given the challenges raised in relation to a substantial EU workforce.*
- *Possible regulatory barriers – the sector is keen to ensure that the UK remains under the aegis of the European Aviation Safety Agency.*

³ See: Bailey, D and S MacNeill (2008) The Rover Task Force: A Case Study in Proactive and Reactive Policy Intervention? *Regional Science Policy and Practice*. Vol.1, Iss.1, 2008, 1-16.

⁴ Bailey, D and N Berkeley (2014) Regional Responses to Recession: A Case Study of the West Midlands, *Regional Studies*, 48(11), 1797-1812.

⁵ <https://europe.autonews.com/automakers/hyundai-kia-invest-110-million-uk-electric-van-startup-arrival>

Background and Overview

The aim of this project was to conduct a transport supply chain mapping exercise and quantify accurately the dependency of the West Midlands Combined Authority (and proximate) area on the automotive, aerospace and rail industry, specifically the business derived from the each sector and key OEMs' manufacturing operations, both in the region and beyond. The current Brexit context (and the increased risk of leaving the EU with "no deal" or an otherwise hard Brexit consisting of a limited free trade agreement) along with the changing transport sector requirements including a drive toward electrification provides a renewed urgency to the undertaking of such an exercise.

Hence, this research will support WMCA's (and associated LEPs) work on its *West Midlands Local Industrial Strategy*. This rightly identifies the West Midlands as the UK's major centre of transport innovation. However, in order for this to continue, companies operating in and around the WMCA area must know their exposure to the variety of Brexit scenarios (and other potentially disruptive influences) that might unfold. As such, this research provides a more granular analysis to inform work in the automotive, transport and logistics, aerospace, rail and related sectors such as low-carbon technologies and metals and materials identified as "sector strengths" for the region.

The project:

- a) undertook a detailed supply chain mapping analysis of the transport sector in the WMCA (and proximate) areas
- b) and thereby enabled a robust understanding of the transport sector's supply chain exposure to Brexit

To understand more clearly the importance of the transport sector including automotive, aerospace and rail in the West Midlands, it was expedient to consider the overall trends in recent years and the impact of major challenges and opportunities in the future. This research sought to identify the breadth and depth of the transport supply chain in region and the resilience and impact of major factors on the supply chain.

- As such, the importance of the automotive industry to the UK economy was evident in that in 2018, the sector was directly worth £16.9bn to the UK economy and represented over 9% of total UK manufacturing⁶. Indeed, the UK is a major global manufacturer in the automotive industry when compared with total world production, being the 12th largest producer of automobiles by volume in the world and the 4th largest within Europe, producing over 1.6 million vehicles, of which 1.52 million were cars⁷. UK production was equivalent to £53.9bn (or 14.7% of total value) in the European industry in 2014⁸.
- "Other transport" contributed a further £10.6bn.
 - Of this £10.6bn, the overwhelming majority – some £7.6bn – relates to the aerospace industry. Repair and maintenance of aircraft and parts was also worth a further £2bn to the UK economy in 2016.

⁶ Office for National Statistics (ONS) (2019), '*Business Register and Employment Survey*'. Accessed on 2nd January 2020 at <https://www.nomisweb.co.uk/query/construct/summary.asp?mode=construct&version=0&dataset=189>

⁷ Society of Motor Manufacturers and Traders (SMMT) (2019), '*SMMT Motor Industry Facts 2019*'. Accessed on 2nd January 2020 at: <https://www.smmt.co.uk/wp-content/uploads/sites/2/SMMT-Motor-Industry-Facts-May-2019.pdf>

⁸ MarketLine (2015), '*Automotive Manufacturing in the United Kingdom*'. MarketLine Industry Profile. London.

- Precise figures for the manufacture of trains are not directly comparable, but the Annual Business Survey results suggested that the sector was worth some £554 million in 2016. Manufacture of rails and other parts is likely to be subsumed in the manufacture of basic metals and the manufacture of fabricated metals sectors (SIC codes 24 and 25). Manufacture of rails is not specifically identifiable from any official data source, not least because iron and steel manufacturers specialise in a wide variety of production (witness the recent collapse of British Steel).
- It should be noted that this only measured direct value generated by the industries and thus did not capture the whole supply chain - data suggest that in 2016, companies in the broader transport sectors bought over £68bn from suppliers in other sectors (the automotive industry was the largest, buying £44bn with aerospace next at some £18.5bn). This does not include the manufacture of rails and parts for the rail network.
- These sectors are particularly important in the Midlands. The West Midlands automotive industry added £7.1bn of value in 2018 representing 43.3% of the national total and the 'other transport' (mostly aerospace, but including the rail sector) sector added a further £0.96bn.
- For the East Midlands, these sectors were worth a combined £2.1bn and represent almost 2% of the total regional economy. Again it should be stressed that this does not include any other industries in their respective supply chains.
- In terms of employment, the automotive industry is a major employer in UK manufacturing, with 166,000 jobs in the broader motor vehicle manufacturing sector; equivalent to 6.8% of total manufacturing industry employment and 0.5% of total UK employment⁹. In turn, it has been argued that the UK workforce itself is a major factor that has promoted the success of the industry, in particular the flexibility the UK provides employers to meet changes in requirements and environment¹⁰.
- The aerospace sector comprised a further 6,000 and 18,000 jobs in the West and East Midlands, whilst the manufacture of trains accounted for 450 and 2500 jobs in the West and East Midlands respectively. Across the Midlands in excess of a further 4000 jobs exist maintaining transport equipment (not including shipping or the maintenance and repair of motor vehicles).
- Considering exports, the West Midlands is rather atypical insofar as it has witnessed dramatic growth in transport equipment exports to countries outside the EU (primarily road vehicles). This is likely to have been driven by a relatively small number of companies (exporting mainly to the US and China).
- In contrast the East Midlands appears much more EU-centric in terms of its exports, although it is worth cautioning that for companies with operations in multiple UK regions it is possible for exports to be booked from the final assembly plant even if the majority of work has been done elsewhere.

In this context, the decision of the UK to leave the EU has generated a high degree of uncertainty and anxiety by UK-based manufacturers. The automotive industry has been particularly vocal in this regard, with companies such as Jaguar Land Rover, Toyota and BMW warning of the threats to their

⁹ Office for National Statistics (ONS) (2019), 'Business Register and Employment Survey'. Accessed on 2nd January 2020 at <https://www.nomisweb.co.uk/query/construct/summary.asp?mode=construct&version=0&dataset=189>

¹⁰ Automotive Council (2013), 'Driving success – a strategy for growth and sustainability in the UK automotive sector'. Accessed on September 25th 2018 at https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/211901/13-975-driving-success-uk-automotive-strategy-for-growth-and-sustainability.pdf

continued viability to manufacture in the UK in the event of a hard Brexit¹¹. One manufacturer in the form of Honda, has already announced its intention to cease production at its Swindon plant by 2021^{12,13}. Indeed, there is potential for severe disruption to manufacturing supply chains and logistics (in addition to issues around HR and compliance). The automotive sector is particularly important to the West Midlands, with the region accounting for almost one third of all UK automotive employment and, given that the greater Birmingham area is inland (some 100 miles from ports), issues of supply chains, logistics and transporting goods become pivotal with any post-Brexit disruption.

However, the EU remains the single largest destination for UK manufactured vehicles, accounting for over 50% of UK vehicle exports, with the rest of the world combined accounting for only 30%¹⁴. It is thus this situation that the prospect of Brexit poses considerable challenges to for an industry dominated by Just-in-Time (Lean) production techniques. In the next sections, we provide a more detailed depiction of trends in the two main employing sections in the Midlands: automotive and aerospace.

Profile of automotive

The importance of the UK motor industry can be analysed through its economic output, using GVA figures. GVA puts a value on goods and services that are produced within a region/ economy, less the cost of intermediate consumption. In 2017, the automotive sector was directly worth £15.2bn to the UK economy and represented over 8% of total manufacturing, as depicted in Table 1:

Table 1

	Current Prices (£bn)	Real terms (£bn)	% of manufacturing	% of UK total
1997	9.4	10.7	6.5	1.1
1998	9.0	11.2	6.3	1.0
1999	7.9	11.4	5.6	0.9
2000	9.4	10.8	6.6	1.0
2001	8.5	10.2	6.2	0.8
2002	8.1	11.1	6.0	0.8
2003	8.1	11.4	6.0	0.7
2004	7.6	11.5	5.7	0.6
2005	8.1	11.3	5.8	0.6
2006	8.1	10.9	5.8	0.6

¹¹ Business Energy and Industrial Strategy Committee (BEIS) (2018), *The impact of Brexit on the automotive sector*. Fifth Report of the Business, Energy and Industrial Strategy Committee Session 2017–19. London.

¹² BBC (2019), 'Honda confirms Swindon car plant closure', *BBC News*, 19th February 2019. Accessed on 2nd January 2020 at: <https://www.bbc.co.uk/news/business-47287386>

¹³ Although Honda denied Brexit as the deciding factor, citing broader industry trends, discussions of the potential impact of Brexit certainly played a part in lead-up conversations.

¹⁴ Bailey, D. and De Propriis, L. (2017), 'Brexit and the UK Automotive Industry', *National Institute Economic Review*, 242 (1): R51-R59.

2007	7.5	11.4	5.4	0.5
2008	8.2	10.8	5.7	0.6
2009	5.9	7.7	4.4	0.4
2010	8.4	9.2	6.0	0.6
2011	8.2	10.4	5.6	0.6
2012	8.6	10.8	5.8	0.6
2013	11.5	11.7	7.2	0.7
2014	13.3	12.7	8.2	0.8
2015	13.5	13.5	8.0	0.8
2016	14.6	14.2	8.3	0.8
2017	15.2	14.3	8.1	0.8

Source: Office for National Statistics

The UK automotive manufacturing sector experienced steady growth from 2010 to 2016, with recent highs in 2016 of almost 25% above its pre-downturn peak. During this time the UK automotive industry outpaced the total UK manufacturing growth. The UK Automotive manufacturing industry is dominated by the production of cars, accounting for 94.5% of total production volume (the rest being trucks and motorcycles). It is dominated by five major players, as shown in Table 2, which account for almost two-thirds of total production.

Table 2

United Kingdom automotive industry manufacturing share by volume 2017

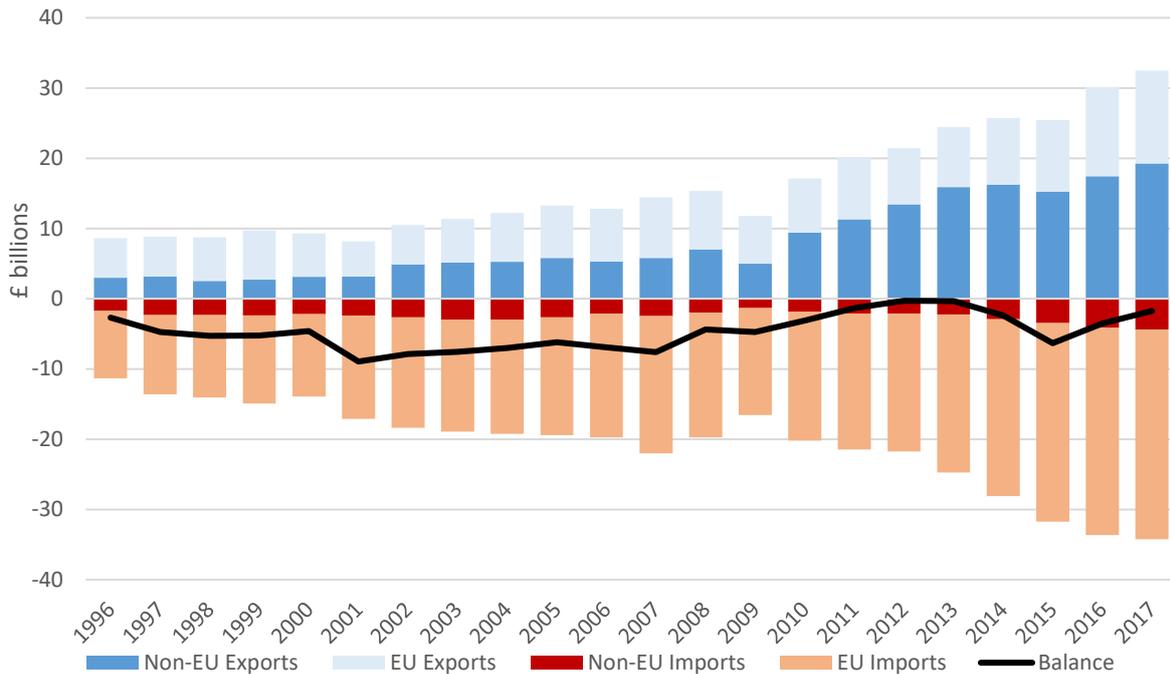
Jaguar Land Rover Automotive Plc	31.8%
Nissan Motor Manufacturing (UK) Ltd	29.6%
BMW UK Manufacturing Ltd	13.1%
Honda Motor Company Ltd	9.8%
Toyota Motor Corporation	8.6%
Other	36.8%

The UK automotive manufacturing industry has become, and is continuing to become more integrated within the global economy. 80% of total UK vehicle production was exported in 2017, up from 77% in 2015¹⁵, as shown in Figure 1.

Figure 1

¹⁵ Society of Motor Manufacturers and Traders (SMMT) (2019), 'SMMT Motor Industry Facts 2019'. Accessed on 2nd January 2020 at: <https://www.smmt.co.uk/wp-content/uploads/sites/2/SMMT-Motor-Industry-Facts-May-2019.pdf>

Trade in the Automotive Sector



(Her Majesty's Revenue and Customs)

Exports of passenger road vehicles to the EU (almost exclusively motor cars) increased by 133% in the 20 years from 1997 to 2017 to a total of £13.3 billion. Exports to non-EU countries have shown rapid growth of over 500% from £3.2 billion to £19.2 billion over the same period. Although both imports and exports have seen huge increases over time, the value of total imports has been consistently higher than exports. The UK trade deficit in road passenger vehicles reached a recent peak of £6.3bn in 2015 (the highest since 2007), although this has since fallen to just £1.7bn last year. The EU accounted for 87% of total UK vehicle imports by value and these have more than doubled from £11.3bn in 1997 to £ 29.8bn last year.

The UK automotive industry relies heavily on its international supply chain in order to add value, reduce costs, and provide innovation to final products. Key inputs required by manufacturers are typically commodity and pre-fabricated components, often produced by their third-party suppliers¹⁶.

The UK automotive supply chain consists of a wide range of companies, ranging from small specialists firms to large multinationals. Research conducted by the Figures from the Interdepartmental Business Register (IDBR) indicate that in 2017 a total of 1005 enterprises were involved in the manufacture of motor vehicles as their primary activity¹⁷. A further 1,385 businesses are primarily classed as manufacturers of parts for motor vehicles¹⁷. However, this is only part of the picture; many companies who provide inputs for the automotive industry categorise their business in terms of the materials they work with, and many of these suppliers will be further upstream, primarily selling to tier 1 supplier rather than the vehicle producers themselves. UK tier-one

¹⁶ MarketLine (2015), 'Automotive Manufacturing in the United Kingdom'. MarketLine Industry Profile. London.

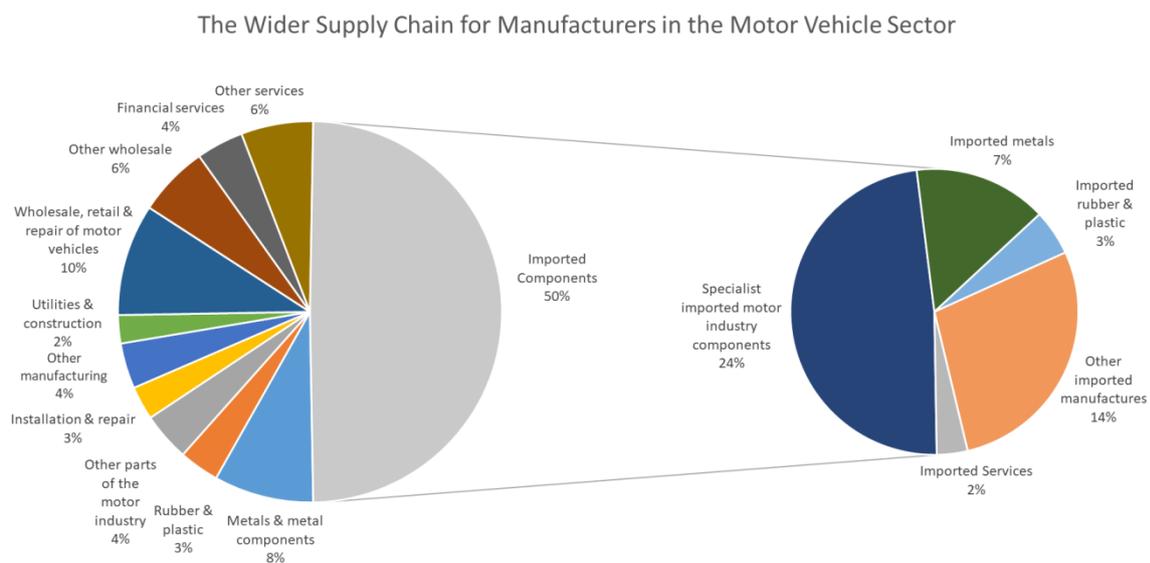
¹⁷ Office for National Statistics. (2018b). UK Business counts - enterprises by industry and employment size band. *NOMIS: Official labour market statistics*. Available from: NOMIS: Official labour market statistics. Retrieved from <https://www.nomisweb.co.uk/query/select/getdatasetbytheme.asp?opt=3&theme=&subgrp=>

companies are importing a large proportion of their inputs, including metals, plastics, glass and other products that are categorised elsewhere in trade statistics.

One fruitful official data source available are the input-output tables published by the ONS. The published figures pertain to the “manufacture of motor vehicles, trailers and semi-trailers”. Clearly this encompasses a significantly broader range of production than simply the automotive sector. It includes commercial vehicles and all parts used by road vehicles (including engines). As the detailed information necessary for I/O tables takes some time to collect, they are published some way in arrears. Nevertheless, they remain instructive.

The entire sector used £36bn of inputs in 2014, of which almost exactly half was imported (see Figure 2). Of that portion sourced domestically, by far the largest component (£3.5bn) was services provided by the “wholesale and retail trade of motor vehicles, including repair”. This sector is unlikely to be affected by Brexit – even in the most extreme scenarios, automotive companies will need to maintain dealer networks in the UK. Other technological changes (and an increasing desire to complete purchases online) are much more likely to reduce this over time.

Figure 2

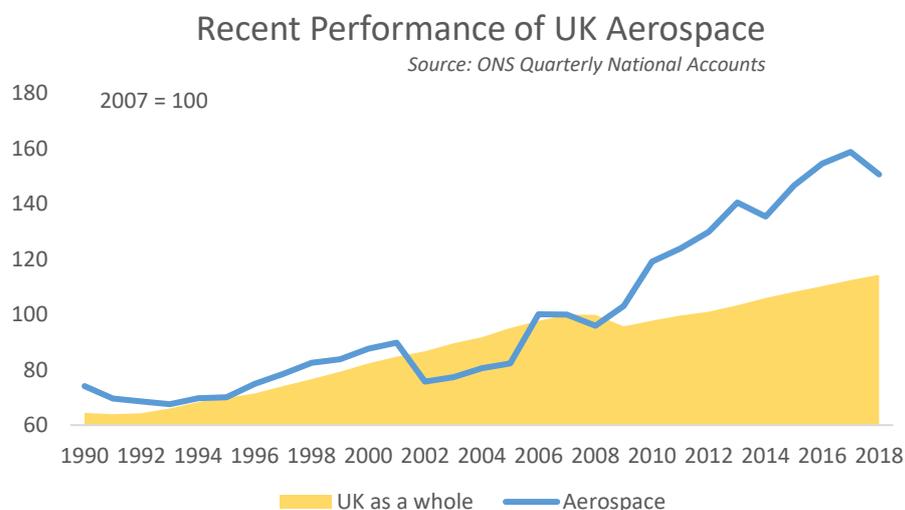


The second and third largest components were other wholesale trade (which includes the wholesale of machinery, equipment and supplies) and fabricated metal products (at £2.2bn and £2.1bn respectively).

Components from other companies in the sector were also significant (£1.5bn), but rubber, electricity and financial services were also significant suppliers to the sector (at over £1bn apiece). Beyond this, a plethora of both manufactured goods (iron and steel, other metals, petrochemicals, wood, paints and dyes et al.) and services (computer services, management consultancy and many others) are used by the sector. In short, supply chains are long and complex and heavily weaved into areas of the British economy where one might not initially expect them. From this £36bn of inputs, the sector generated a further £13.2bn of value-added, of which over two-thirds was paid out to employees in the form of wages.

Profile of aerospace

Figure 3



The UK's aerospace industry has been a notable industrial success in recent years, doubling in size since the mid-1990s¹⁸ as depicted in Figure 3. Growth has been particularly rapid since the global financial crisis, growing by over 50% since 2007, compared to just 14% for the economy as a whole. This has rendered it one of the most successful sectors of the UK economy in recent years and a rare “good news” story over the past decade. The closely related sector, “repair and maintenance of aircraft” has also grown more rapidly than the UK as a whole and the two now contribute almost £10bn to the UK economy¹⁸.

The aerospace industry is significantly more spatially diffuse than some others (e.g. automotive, which is clustered in the West Midlands or finance, which is clustered in central London). Nevertheless, certain concentrations are notable. In the context of the Midlands, by far the largest of these is in Derby, where some 16,000 manufacturing jobs are clustered (out of a total of 26,400 in the Midlands)¹⁹, many of which are directly related to the presence of Rolls-Royce.

Elsewhere, a significant number of jobs (approximately 1000 positions) are located in Wolverhampton, reflecting the longstanding presence of several companies, including Collins Aerospace (formerly UTC), HS Marston and Moog. This cluster extends into Staffordshire (which hosts a further 500 jobs), which is unsurprising given the location of the i54 site. Most repair and maintenance of aircraft in the West Midlands takes place in Birmingham and Solihull, probably reflecting proximity to region's primary international airport.

The aerospace sector accounted for 4.3% of the UK's goods exports in 2018, making it a significant exporting industry (Her Majesty's Revenue and Customs, 2018). It is also an industry in which the UK runs a trade surplus. Aerospace trade has grown dramatically in recent years. Civil aviation is closely related to the defence sector with a number of critical components being classified as “dual use”. As

¹⁸ Office for National Statistics. (2018a). Second estimate of GDP: October to December 2017.

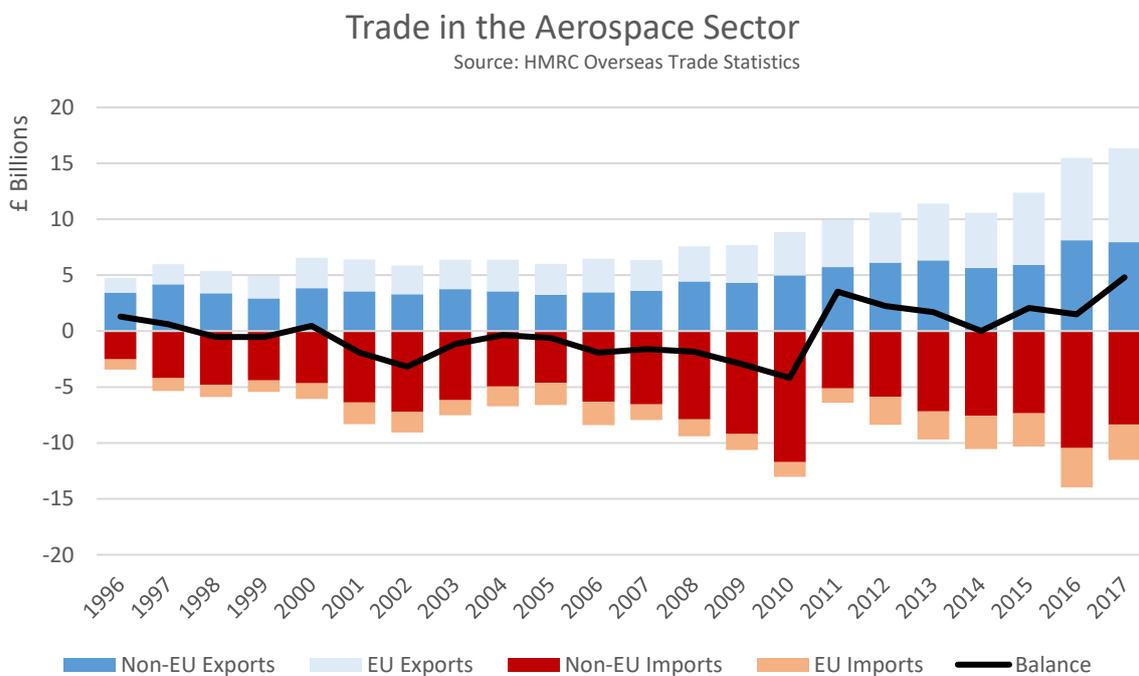
¹⁹ Office for National Statistics (ONS) (2019), ‘Business Register and Employment Survey’. Accessed on 2nd January 2020 at <https://www.nomisweb.co.uk/query/construct/summary.asp?mode=construct&version=0&dataset=189>

a result, trade is comparatively heavily regulated. On the civil side, safety is paramount with extremely tight specifications.

The sector has long been international in nature, although for large players, politics and perceptions of national security can play a role as large as (or even larger) commercial imperatives in determining locations and trade patterns. In the British context, the sector is heavily integrated in European supply chains with components criss-crossing borders multiple times during the course of manufacture. According to HMRC, exports to the EU increased by around 550% between 1996 and 2017, whilst imports from the EU increased by some 250% over the same period (Her Majesty's Revenue and Customs, 2018).

This may reflect export of partial assemblies and jet engines as exports to the EU have grown substantially more strongly than exports to the rest of the world. As can be seen, the UK actually runs a trade surplus in aircraft and components with the EU accounting for a particularly large portion of exports in this trade category.

Figure 4



As aerospace orders are typically extremely “lumpy”, the UK’s largest trade partners can vary substantially year to year, as shown in Figure 4. Aside from the EU, the US is also consistently a very large trade partner with both a large and sophisticated network of aerospace manufacturers of its own and is a huge market for jet engines.

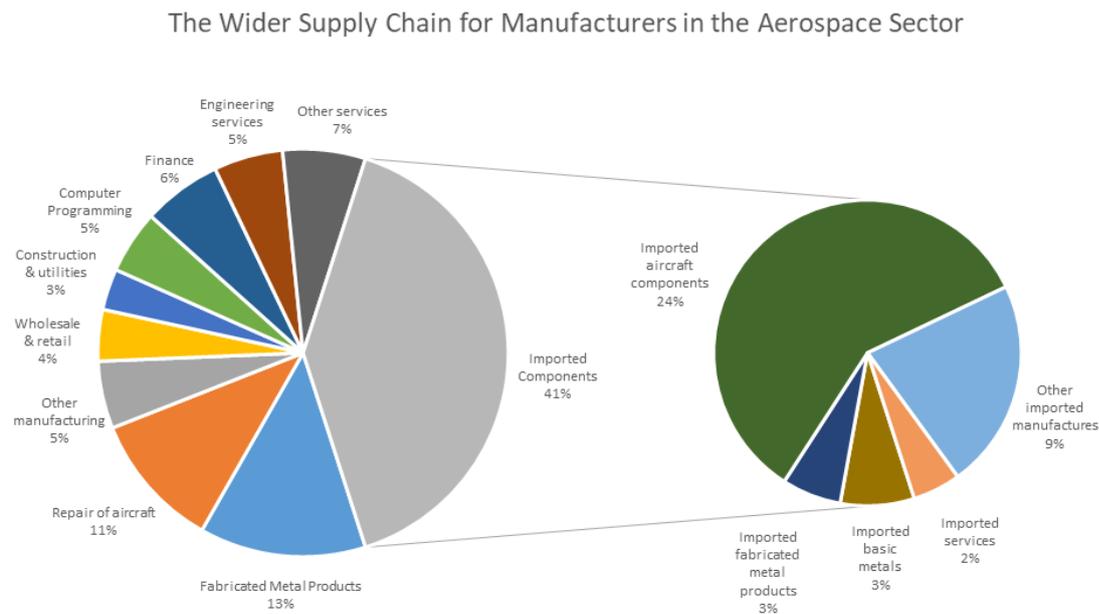
Within Europe, France and Germany are consistently the UK’s largest trading partners. A significant chunk of this almost certainly reflects the fact that final assembly of many Airbus aircraft occurs in France. Similarly, the fact that over half of Airbus’ annual output of the A320 family of aircraft is from Hamburg-Finkenwerder in Germany²⁰ is likely to account for a significant portion of UK

²⁰ Airbus SE. (2018). Airbus in Germany. Retrieved from: <http://www.airbus.com/company/worldwide-presence/germany.html>.

aerospace exports to that country. In recent years, imports from Spain and Italy have increased dramatically, again probably due to their growing relevance to the aerospace supply chain (particularly for Airbus).

Moreover, the UK sector is concentrated on certain key specialisms, particularly wings, engines and fuselages²¹.

Figure 5



As demonstrated above in Figure 5, the aerospace sector has an impact on a wide variety of parts of the economy. Over 40% of all intermediate purchases made by the sector are imports and of these a majority relate to specialist components. According to figures from the Inter-Departmental Business Register (IDBR), around 80% of enterprises in the sector employ fewer than 10 people²².

In general, many of these micro companies provide specific services to much larger firms (often outsourced). Whilst small firms may account for the bulk of enterprises in any given sector, the general pattern is for a large proportion of total value to be added by large firms. In fact, one standout feature of the aerospace industry in the UK is the number of very large firms (250+ employees).

²¹ Business Energy and Industrial Strategy Committee. (2018). *The impact of Brexit on the aerospace sector*. <https://publications.parliament.uk/pa/cm201719/cmselect/cmbeis/380/38002.htm>

²² Office for National Statistics. (2018). UK Business counts - enterprises by industry and employment size band. *NOMIS: Official labour market statistics*. Available from: NOMIS: Official labour market statistics. Retrieved from <https://www.nomisweb.co.uk/query/select/getdatasetbytheme.asp?opt=3&theme=&subgrp=>

The aerospace sector is a critical contributor to R&D in the UK, spending over £1.9bn in 2016²³. In 2016 it made up 8.6% of total business R&D expenditure in the UK behind only pharmaceuticals and the automotive industry²³. Moreover, compared to other sectors, a greater proportion of its R&D expenditure is “applied” in the sense of having direct commercial application. Indeed, the aerospace sector makes up around one-eighth of applied business R&D. As such, it is an excellent counter-example to the claim that the UK fails to commercialise innovation.

In contrast to the pharmaceutical and automotive sectors, a substantial majority of R&D is undertaken by UK-owned enterprises, although it is possible that a significant chunk of this is related to defence. Nevertheless, foreign-owned enterprises committed a substantial £750m to business R&D in the sector. In addition to this, the sector has benefitted significantly from EU R&D funding. The UK has secured some 15% of funds thus far available for the transport sector under the EU’s Horizon 2020 programme and aerospace alone benefits to the tune of £100m²⁴.

As with any internationally-facing industry, the aerospace sector relies intensely on its international supply chain in order to add value, provide product innovation and ensure rigorous quality benchmarks are met. Key inputs include pre-fabricated components and complex assemblies. Like the automotive and rail sectors, the supply chain consists of a complex array of players from tiny specialists to huge transnationals. Whilst cost is inevitably an important consideration, safety and quality benchmarks are overwhelmingly important. Reducing external noise in order to help airports meet stringent limits is another regulatory factor that matters for aerospace in a way that simply does not exist in other industries.

Although the UK remains a major player in the global aerospace industry, with an enviable record of productivity growth, skills shortages are a notable concern. These are particularly concentrated in the high-skilled design & engineering and R&D sectors, where around one third of companies are not confident they can access specific skills²⁵.

There is also a notable shortage of production and assembly workers as well as concerns around availability of staff specialising in data and analytics. Leaving the EU could make attracting and retaining skilled workers from other parts of Europe more challenging, with smaller companies likely to face particular issues in recruitment. Intra-company transfers are highly prevalent due to the cross-border nature of the aerospace industry. Airbus alone has around 600 EU27 employees working in the UK²⁴.

Skills shortages are presently apparent in certain areas, including composites and damage and fatigue tolerance²⁶ (The Aerospace Growth Partnership, 2016). These are likely to grow in coming years without a fresh influx of trained and experienced engineers. A substantial proportion of the industry’s workforce is over 45 and it is overwhelmingly male (The Aerospace Growth Partnership, 2016). Facilitating both graduate and non-graduate entry into the industry and attracting greater

²³ Office for National Statistics. (2017b). UK business enterprise research and development. Retrieved from <https://www.ons.gov.uk/economy/governmentpublicsectorandtaxes/researchanddevelopmentexpenditure/datasets/ukbusinessenterpriseresearchanddevelopment>

²⁴ Business Energy and Industrial Strategy Committee. (2018). *The impact of Brexit on the aerospace sector*. <https://publications.parliament.uk/pa/cm201719/cmselect/cmbeis/380/38002.htm>

²⁵ ADS Group. (2017). *UK Aerospace Outlook Report 2017*. <https://www.adsgroup.org.uk/facts/uk-aerospace-outlook-report-2017/>

²⁶ The Aerospace Growth Partnership. (2016). *Means of Ascent: The Aerospace Growth Partnership’s Industrial Strategy for UK Aerospace 2016*. <https://www.theagp.aero/wp-content/uploads/sites/9/2016/07/Means-of-Acscnt-2nd-Edition-LoRes-02-08-16.pdf>

numbers of women into the field will be crucial in order to alleviate skills shortages in the medium term. Up-skilling and retraining will also prove crucial, particularly to meet more immediate challenges (such as the loss of European labour).

Interestingly, whilst the state of technical education in the UK has long been criticised as lagging behind its continental counterparts, the aerospace sector has dramatically increased its provision of apprenticeships. Whilst in 2009 only 15% of companies in the sector provided apprenticeships, by 2015, this had risen to 62%.

In the sections that follow, we further consider how companies make supply-chain decisions in the sector, before turning to recent developments in the sector in the wake of the Brexit vote. We then introduce the findings of our own survey research on senior managers in the automotive industry in the UK who have some “ownership” of the issues raised by Brexit, before concluding with supply chain and wider policy (transport, infrastructure etc.) implications for the sector.

Understanding the impact on the supply chain: issues for practitioners and regional policymakers

Within discussions regarding the status of the UK transport manufacturing sector, and most notably the automotive industry, the possible impact of Brexit on supply chains has assumed particular urgency for analysis by academics and practitioners alike. For UK manufacturing, the most likely impact of Brexit is that costs will increase. This is because the UK Government’s withdrawal agreement with the EU only maintains the current status quo ante in a transition period due to expire at the end of December 2020 (although there is the option of an extension, if both parties agree by the end of June 2020). Given that it is unlikely that any comprehensive new trade agreement will be finalised in this time, the distinct prospect emerges of either an abrupt exit from the EU Single Market and Customs Union area and reversion to World Trade Organisation third-country status, or a minimalistic ‘bare-bones’ Canada style deal that just eliminates most tariffs.²⁷

The costs of a “no deal” exit at the end of 2020 are generally deemed by analysts to be considerable, with the National Institute for Economic and Social Research (NIESR), for example, predicting that the withdrawal agreement negotiated by the Johnson government would lead to the UK economy being 3.5% smaller than it otherwise would have been by staying in the EU, in the long-run²⁸. This could occur directly in the form of customs and excise duties.

For the auto industry, in the event of “no deal” at the end of 2020, a hard Brexit – taken as 10 per cent tariffs applied at the port of entry on the landed price of UK-made vehicles when they arrive in the EU – would hit EU demand for UK-made vehicles.

Ian Henry of AutoAnalysis (and Visiting Professor at CBS) forecasts additional costs of at least £3bn just in tariffs to UK output and far more when non-tariff barriers are added in: “we calculate that 1.5m vehicles would be lost from otherwise expected UK production from 2020 through to 2024; and, taking into account the different mix of vehicles involved, from Opel Astras through to Rolls

²⁷ Bailey, D, A de Ruyter, N Fowler and J Mair, (2020) eds., *‘Carmageddon? Brexit & Beyond for UK Auto’*. Bite-Size Books.

²⁸ <https://www.niesr.ac.uk/sites/default/files/UK%20Economy%20Press%20Release%20-NIER%20No250%20November%20-%20Embargoed%20till%2000.01%20Wednesday%2030%20October.pdf> accessed November 18th 2019.

Royces, the loss of economic value at the factory gate would be nearly £43bn, or more than £8bn a year on average.²⁹

“£3bn in additional costs a year and £8bn a year in lost economic value creation are sums which any industry would struggle to bear unscathed. Given the global headwinds battering UK vehicle production, we can expect further major challenges for this once thriving, but now troubled, sector” he says.

Longer term, in the event of “no deal” at the end of 2020 the loss of models made in the UK could see output in the latter part of the next decade being 500,000 units lower per year than in a base-case scenario of managed deal and orderly Brexit say Justin Cox and David Oakley of LMC Automotive. That would take output down to levels not seen since the global financial crisis with a big hit to jobs in assembly and the supply chain.

PSA has already indicated that “no deal” would see no investment at Ellesmere Port to make the new Astra model. And while “no deal” would be especially damaging for UK auto, the form of trade deal done with the EU will still be critical, as David Bailey (a co-author of this report) has noted recently:

*“Whilst ‘No Deal’ is seen by many in industry as highly damaging, even a limited trade deal that simply eliminates most tariffs – of the sort envisaged in the latest political declaration – could still cause severe headaches for industry given issues of regulatory divergence and through the UK being outside the EU Customs Union.”*³⁰

Beyond the immediate impact of the trading relationship, another potential impact of Brexit could be on human resources. EU skilled workers currently working in the UK could return to the EU should Freedom of Movement be rescinded – which in turn could exacerbate skills shortages in key sectors. In addition, some companies could close down UK branches due to shrinkage of the market, or even relocate their plants or/and R&D centre to other (EU) countries. Finally, inbound FDI to the UK could also decrease due to the loss of Single Market membership^{31,32}.

In response to the potential impacts of Brexit, conventional approaches to supporting the supply chain have been to emphasise increased resilience. As such, it is argued that enhancing supply chain integration could help to build up a higher resilient capability. With information sharing, the “bullwhip effect” - defined as the distortion of demand information as one moves upstream in the supply chain, causing severe inefficiencies within the whole supply chain³³ - could be minimised and companies would be able to make proper responses to different situations with enough evidence as support. In addition to integration, it has been argued that the implementation of lean

²⁹ Bailey, D, A de Ruyter, N Fowler and J Mair, (2020) ed.s, *Carmageddon? Brexit & Beyond for UK Auto*. Bite-Size Books.

³⁰ Bailey, D, A de Ruyter, N Fowler and J Mair, (2020) ed.s, *Carmageddon? Brexit & Beyond for UK Auto*. Bite-Size Books.

³¹ Bailey, D. and De Propriis, L. (2017), ‘Brexit and the UK Automotive Industry’, *National Institute Economic Review*, 242 (1): R51-R59.

³² Dhingra, S., Ottaviano, G., Sampson, T. and Van Reenen, J. (2016), ‘The impact of Brexit on foreign investment in the UK’, *BREXIT 2016*, 24.

³³ Costantino, F., Di Gravio, G., Shaban, A. and Tronci, M. (2013), ‘Exploring the bullwhip effect and inventory stability in a seasonal supply chain’, *International Journal of Engineering Business Management*, 5: 23.

principles of production, or supply chain segmentation³⁴ could comprise other approaches to enhance resilience.

Alternatively, the additional costs arising from Brexit could result in supplier re-evaluation as firms seek to optimise existing supply chains and hence prepare for the supplier “earthquake” that could be brought about by Brexit. When re-evaluating current suppliers, the total cost of ownership (TCO) could be one framework to help companies in choosing between suppliers. Some suppliers might be able to provide a lower price. However, if they are far away from the UK, then lengthy transportation times and low flexibility of changes could result in additional costs. Therefore, local suppliers might be able to provide a cheaper total cost to OEMs, even if their costs of production are higher. As such, a TCO approach might result in companies seeking to “re-shore” operations to the UK in the event of a hard Brexit³⁵.

Finally, new technology development and implementation could be another approach whereby companies could build up a long-term sustainable and stable supply chain which would be less exposed to an unfavourable external environment. For example, 3D printing technology, a feature of “Industry 4.0”, could provide an innovative approach to production - which has been widely used in aerospace industry³⁶. 3D printing could also help to enhance the vertical integration of production, as a result, the tiers of suppliers could be reduced³⁷. Hence, supply chains could become simpler and thus enhancing the capability to against urgent change of external environment.

However, none of these potential business responses takes place in a spatial vacuum and the logistics implications of any particular supply chain response are considerable – both for the businesses affected, and for policy makers concerned with the wider ramifications for the ability of regional infrastructure to cope with any alteration to the operations and logistics of firms responding to any Brexit shocks. The responses described above could entail changes in the route of transport or mode of transport – or both, depending on the situation facing any particular business. Small-scale niche producers such as Aston Martin in the Midlands, for example, have stated that they would look to airfreight in parts and components in order to overcome any disruptions at ports and the Eurotunnel³⁸. However, even if they did this, this could only be a short term solution as it would be uneconomic as a long-term policy.

As such, for landlocked regions such as the West Midlands, these concerns take on particular saliency for planners and policymakers, as disruptions arising elsewhere (namely the south-east of England) could have cumulatively negative knock-on effects as firms operating in the region have to contend with congested transport routes that pass around (typically via the M25) heavily-populated areas such as London. For regional planners then, connectivity (both in the physical and digital sense) is key; and any Brexit disruption might well incur a cost in terms of the need to upgrade

³⁴ Safonovs, R. and Upadhyay, A. (2017), ‘Is your Brexit supply chain resilient enough? The British footwear manufacturers’ perspective’, *Strategic Direction*, 33 (11): 34-36.

³⁵ Godsell, J., Ignatius, J., Karatzas, A., King, J., Li, D., Moore, J. (2017), ‘Realities of Reshoring: A UK Perspective’. Coventry: WMG, University of Warwick.

³⁶ Joshi, S. and Sheikh, A. (2015), ‘3D printing in aerospace and its long-term sustainability’, *Virtual and Physical Prototyping*, 10 (4): 175-185.

³⁷ Berman, B. (2012), ‘3-D printing: The new industrial revolution’, *Business Horizons*, 55 (2): 155-62.

³⁸ Pitas, C. (2019), ‘Exclusive: Aston Martin triggers contingency plans for no deal Brexit’, *Reuters*. Accessed on 2nd January 2020 at: <https://uk.reuters.com/article/uk-britain-eu-astonmartin-exclusive/exclusive-aston-martin-triggers-contingency-plans-for-no-deal-brexit-idUKKCN1P114N>

infrastructure, be it in terms of broadband coverage, or upgrading a major east-west road link such as the A5 or the A14. There are in turn implications for regional governance arrangements in terms of ensuring that current governance structures enable sufficient place leadership to ensure a rapid, coordinated response to any regional shocks.

That said, in contrast to understanding the exposure to Brexit at the macro-regional level for particular sectors (notably, for example, the work of Chen et al.³⁹), there has been virtually no work done on having a micro-understanding of the nature of the supply chain and related logistics issues for the sector at a regional level. Evidence at a micro-level is partial and fragmentary at best. Kerridge⁴⁰ cites a 2015 Institute for Government study that list lorry movements for most major ports in the UK; with the predominance of Dover and the Eurotunnel being all too manifest.

However, they shed no light on the nature of movements within the UK, or breakdown between inward and outward traffic. All too often, it is simply assumed that the sector has made adequate preparations for Brexit, and beyond expediting inward traffic through ports no further consideration is given to logistics issues. Indeed, it is widely assumed – particularly in UK Government circles that companies *are* preparing for Brexit as part of normal risk management and contingency planning exercises.

However, evident from previous research undertaken by the authors during 2018⁴¹ is that even the large OEMs in the region (e.g., Jaguar Land Rover) lack adequate knowledge of their supply chain, for example:

“We have a very strong understanding of who our suppliers are at Tier 1 and then direct to Tier 2, and visibility.... that means we worked with that supplier for the engineering, but we don’t own the commercial relationship, it goes through a Tier 1. Beyond that, we don’t really have much knowledge of who our suppliers are and where the parts come from, and therefore, we don’t have a working group at the moment with our suppliers, it’s every person for themselves”. (Senior Procurement Manager, large OEM);

OR, on the “understanding” of suppliers:

“Many of them are quite small business with very limited resources, and don’t really think through the strategies in in much depth, I mean, they just know that somebody gives them an order and they fulfil it... and some of them are very simple businesses and many of them aren’t even on, you know, on shore in the UK they...they will be simple businesses all over the world.” (Senior Procurement Manager, Tier 1).

Hence there was a manifest need for a more bespoke, granular analysis so as to enable the analysis of vital data that would help guide regional policymakers in terms of logistics issues pertaining to ensuring supply chains can mitigate the disruption arising from Brexit. In particular, the research sought to understand the exposure of suppliers to any particular individual Original Equipment Manufacturer (OEM) in terms of revenue/turnover sources.

³⁹ Chen, W., Los, B., McCann, P., Ortega-Argilés, R., Thissen, M., & van Oort, F. (2018), ‘The continental divide? Economic exposure to Brexit in regions and countries on both sides of The Channel’, *Papers in Regional Science*, 97 (1): 25-54.

⁴⁰ Kerridge, M. (2018), ‘The Impact of Brexit on the Transport Industry’, *Logistics and Transport*, 4 (40): 35-42.

⁴¹ Di Li, Shishank Shishank, Alex de Ruyter, Syed Ali, David Bailey, David Hearne, Sukhwinder Salh and Tom Leeson (2019), ‘Brexit and the Auto Industry: understanding the issues for supply chain management’. In De Ruyter, A. and Nielsen, B. (eds.) (2019) ‘Article 50 one year on: Evaluating Progress, Process and Impact’. Emerald: Bingley

Through this an understanding could be gained of the likely effect on turnover and employment for suppliers should a particular OEM engage in plant closure or otherwise downscale production at its plants. In addition, an understanding of sector logistics (in particular freight movements and mode of transport) could assist businesses and policymakers in devising strategies to find alternative transport solutions to these problems. Finally, an understanding of related HR and compliance issues could assist in the facilitation of more targeted policy approaches there.

Methods used

Given the focus of the study on the transport manufacturing sector, a quantitative survey questionnaire (with some open-ended questions) was conducted. The supply chain mapping analysis presented in this article focusses on a dataset of respondents from transport component manufacturers and suppliers in automotive, rail and aerospace, who were asked for data on their turnover and how this divided between:

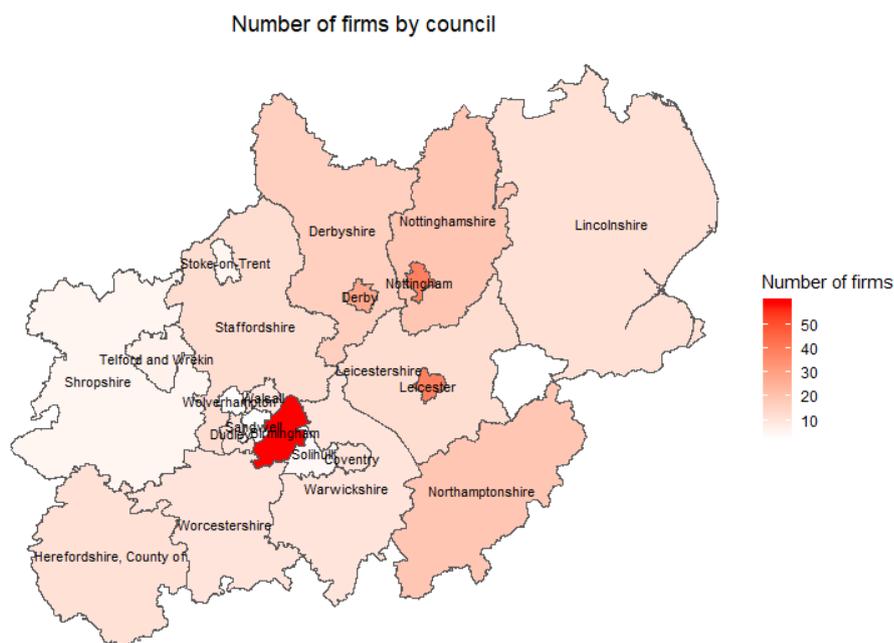
- The automotive, aerospace and rail sectors;
- Between major car companies, aerospace firms and manufacturers of rolling stock, and;
- And between local, Midlands customers, customers elsewhere in the UK, and customers in the EU and beyond.

Respondents were obtained via a number of methods, including direct mailings from sector from Drive Midlands and the Society of Motor Manufacturers and Traders (SMMT) and local chambers of commerce, direct canvassing and sourcing of participants at various networking events, direct emailing to personal contacts of the authors, and also via the use of a professional survey company, who used their network of partners and affiliates to contact sector firms on their databases to complete the survey (for which the average time to complete was approximately 10 minutes).

The survey questionnaire (see Appendix 1 for questionnaire template) specifically sought to assess: which of the rail, automotive and aerospace sectors respondents' firms operated in; the percentage turnover attributable to each of automotive, rail and aerospace; and for automotive, which OEMs accounted for a given percent of turnover; whether they imported and/or exported goods from the EU; what transport routes (e.g., trunk roads) were used in doing so; what ports/airports etc. they used for EU trade; and, a range of "Brexit exposure" questions relating to preparedness in terms of customs, VAT, HR, regulatory compliance, logistics and supply chain management issues. The survey also provided quite granular data (down to 5-digit SIC equivalent) on the specific industrial area that these firms operated in.

In terms of the profile of respondents, 234 completed responses were received in total. Of these, 25 were exclusively involved in aerospace manufacture; 59 were exclusively involved in automotive manufacture; 3 were exclusively involved in non-auto road vehicles; 32 were exclusively involved in rail manufacture; 27 were mixed manufacturers, and; 87 were freight/logistics firms. Of these, a majority of freight hauliers either were for aero manufacturers (58) or auto manufacturers. In terms of the geographic spread of respondents, this is depicted in Figure 6. Evident is a dominance of Birmingham City Council in terms of the number of respondents (though this should not obscure the importance of Solihull, or Coventry, Warwickshire or Telford as being the location for key OEMs such as Jaguar Land Rover).

Figure 6: Location of respondents by Local Authority/County



A breakdown of firm respondents by perceived position in the supply chain and employment size threshold is provided in Tables 3 and 4 below. For the firms in our sample, the average (mean) turnover reported was just under £500 million, though this is distorted by the presence of Jaguar Land Rover, with its reported turnover of £25bn. Within the sample, 22 firms reported a turnover greater than £1m per (estimated) employee, whilst the median turnover reported was £32.5 million. For automotive firms, the mean turnover reported (excluding JLR) approximately £170 million.

Table 3: Manufacturers – position in supply chain

Tier	Exclusively auto	Exclusively aero	Exclusively rail	Exclusively other road	Mixed
OEM *	24	1	14	0	4
Tier 1	18	5	10	1	10
Tier 2	12	14	11	1	13
Tier 3+	4	4	0	0	3
Industrial service provider	7	0	0	1	0

Table 4: Manufacturers – size distribution

Tier	Micro (<10 employees)	Small (11-50 employees)	Medium (51-250)	Large (251-500)	V. Large (500+)
OEM *	3	3	10	20	7
Tier 1	1	10	15	17	1

Tier 2	1	6	15	26	3
Tier 3+	0	0	5	5	1
Industrial service provider	1	1	1	2	3

NB: OEM here is based upon respondents' self-identification. As such, the term will include Vehicle Manufacturers (as the recognised brands) but also those who make complete products such as machine tools.

NB: the number of employees is estimated as the mid-point of a range, so the true turnover per employee can be substantially higher or lower than that given. For example, in one case, a business has a turnover of £40,000 and reports 1-10 employees. Since the mid-point of that is 5 employees, turnover per employee is calculated at £8000, which is implausibly low. However, if that business in fact only employs one person then the true turnover per employee is a much more reasonable £40k.

A further examination of the workforce revealed a high dependency on EU workers across the transport manufacturing sector. On average, 31% of the total manufacturing workforce accounted for by the survey (just over 60,000 people) was from the EU. However, this varied substantially by firm (and firm size), ranging from 32% for the very largest firms (500+ employees); 36% for large firms (251-500); 13% for medium firms (51-250), and 8% for small firms (fewer than 50 employees). Evident from some firms within the sample was what might be called an excessive reliance on EU workers, with one respondent reporting that over 80% of their workforce were from the EU. This one indicator of Brexit exposure reveals the fragility of the business model pursued by firms in the sector, explored further in the material that follows.

Findings

In this section, we explore the supply chain by examining supplier average revenue/turnover dependence on a given Vehicle Manufacturer for automotive sector respondents; transport mode dependency for manufacturers' trade (imports and exports with the rest of the EU) and consequent Brexit exposure for respondents in the themes highlighted previously. In considering the material in this sector, the dominance of one vehicle manufacturer (JLR), with its £25bn turnover and 20,000+ workforce in the Midlands should be borne in mind.

Revenue and purchasing by Vehicle Manufacturers in the West Midlands and wider UK

AutoAnalysis has developed a property set of information on purchasing policy and spend values at the European vehicle manufacturers, especially in the UK. This data has come from a variety of public sources (annual reports and company presentations) and from confidential interviews and consulting assignments. This detailed data is not for public dissemination, although the overall totals and percentages which can be calculated are highlighted here. This data has been used to underpin the AutoAnalysis Brexit Impact Assessment model, which is described in the book, *Keeping the Wheels on the Road*; it has also been used to underpin calculations cited in public statements by the SMMT .

In a typical year, certainly pre-Brexit, the UK vehicle manufacturers spend in the region of £29bn on externally sourced components. Clearly the actual number varies according to production volumes and the mix of vehicles made. An increase of, say, 5,000 JLR vehicles will boost the spend on components far more than would be lost by, for example, a decrease of 5,000 in the number of cheaper Astras made. The spend per Astra would be less than half that of the spend per JLR model. Furthermore, each vehicle company varies in terms of the percentage spend at UK-based tier 1s and in turn the varying levels of spend by the tier 1s at UK or non-UK tier 2s.

The UK spend at the tier 1s by vehicle companies varies between 25% and 50%, while the non-UK element of this spend in turn varies by vehicle company from 45% to 65%. By adjusting the spend figures for each vehicle by their UK tier 1 spending and the tier 1s own spend in the UK, the total of £29bn typical annual spend is reduced significantly.

The net result is that around £12bn, or 41%, of the £29bn annual spend, takes place with UK tier 1s. Stripping out the non-UK spend by these same tier 1s (they are spending money on sub-components on behalf of the vehicle companies) means that their net spend in the UK is around £6.9bn; this means that around 24% of the total spend effectively stays within the UK economy.

Based on our knowledge of the vehicle companies' principal suppliers and the overall sourcing patterns and policies at the UK vehicle manufacturers, we can next calculate how much of each vehicle manufacturer's net spend is in the WMCA (3 LEP) area specifically and the rest of the Midlands, including the East Midlands. UK vehicle companies' net spend ratio in the WMCA varies from 15% to 60% and for the rest of the Midlands area, it varies from a very small level, around just 2% to 35%. Applying the appropriate percentages to each vehicle company's spend value allows us to calculate that the typical annual net spend in the WMCA is just over £3.3bn, with a further £940m in the rest of the Midlands,

In turn this means that the WMCA area accounts for nearly 11.5% (£3.3bn divided by £29bn) of total spend by the UK vehicle manufacturers; but when adjusted to focus on the net spend (ie once the spend with overseas tier 1s is factored in), vehicle companies' spend in the WMCA area comes to represent almost 48% of the net spend in the UK (£3.3bn divided by £6.9bn). For the rest of the Midlands, the ratios are, respectively c3.3% and c13.5%, or for the entire Midlands area, close to 15% of total spend and just over 61% of net spend.

Clearly, therefore, whether we are speaking of the WMCA specifically or the broader Midlands area, there is a significant level of expenditure by the vehicle companies in the area. Their contribution to the local or regional economy is well-known and the figures shown further demonstrate their significance. Moreover, JLR is, unsurprisingly, the key element in these figures. We calculate that JLR accounts for almost 60% of the net spend in the WMCA area and nearly 53% in the rest of the Midlands, or 58% of the overall Midlands area spend. Nissan is second, accounting for nearly 22% of WMCA area spend, versus 21.5% for the Midlands as a whole.

With around 80% of the spend in the WMCA area accounted for by JLR and Nissan, what happens to these two companies is clearly of direct relevance to the WMCA in particular and the Midlands as a whole. By contrast, Mini, Honda and Toyota each account for between 3.5% and nearly 6% of WMCA spend; when the total Midlands area is factored in, Toyota become the most important of these three, largely because its use of suppliers located close to its factory for just-in-time and sequenced deliveries. The two Vauxhall plants (the car plant in Ellesmere Port and the van plant in Luton) have very low UK sourcing overall and limited sourcing within the WMCA or broader Midlands area; and as the new van is now a PSA-based vehicle, Vauxhall's UK sourcing is declining. Although significant for the UK's vehicle manufacturing sector overall, the potential loss of the Ellesmere Port production would have a minuscule impact on the WMCA economy.

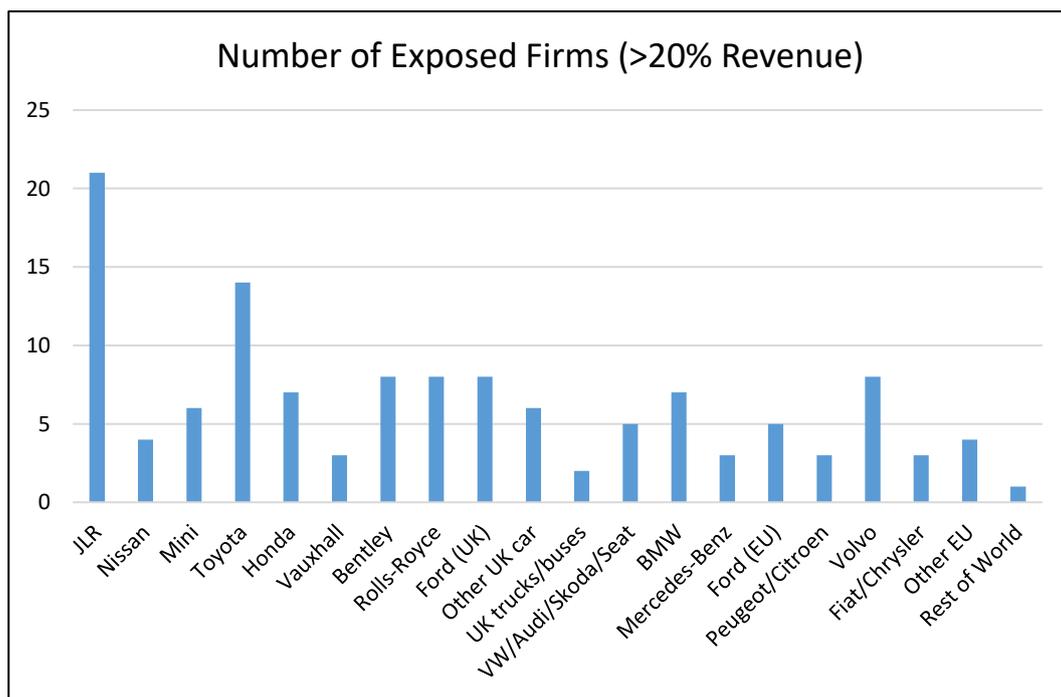
The loss of Honda, from sometime in 2021, will take between £125m of spending out of the WMCA area economy and another £40m or so from the rest of the Midlands economy. While this will be unwelcome for sure, a 10% decline in JLR volumes, or a 20% fall in Nissan volumes will have a far greater impact in terms of their spend in the WMCA area. Understanding what is happening at JLR and Nissan especially is clearly critical to how WMCA develops its post-Brexit strategy. Although factory closures in the region may seem unlikely just now, they are possible. However, what is more

than likely now is a continued decline in production volumes at JLR and Nissan, as model cycles, market conditions, and Brexit begin to take their toll. The spend figures cited here will decline in a fairly direct relationship with any fall in vehicle production, with a direct impact moreover on the level of economic activity in the region. Developing appropriate responses to likely further declines in vehicle production, and therefore declining spend by the vehicle companies in the region, will be central to the WMCA’s work over the next year or so.

Vehicle companies have different levels in terms of risk to their UK manufacturing operations in the Brexit environment. Honda, for example, is a 100% certain risk as it has already announced closure of its Swindon plant in the UK, due in 2021 and therefore will have clear effects on its suppliers. Ford engine production at Bridgend is also ceasing. Vauxhall can be considered as at high risk given recent pronouncements by Peugeot, whilst Toyota, Nissan and Mini could be considered as medium risk given current developments.

Moreover, we cannot be certain how the closure of any one plant would impact on individual suppliers. A measure of suppliers’ exposure is the percentage of a supplier’s business generated from a particular OEM. A standard accepted measure of exposure is when a particular customer accounts for at least 20 percent of a supplier’s revenue, which is a measure accepted across widely-read business texts.⁴² Evidence for this from our survey is depicted in Figure 7 below.

Figure 7



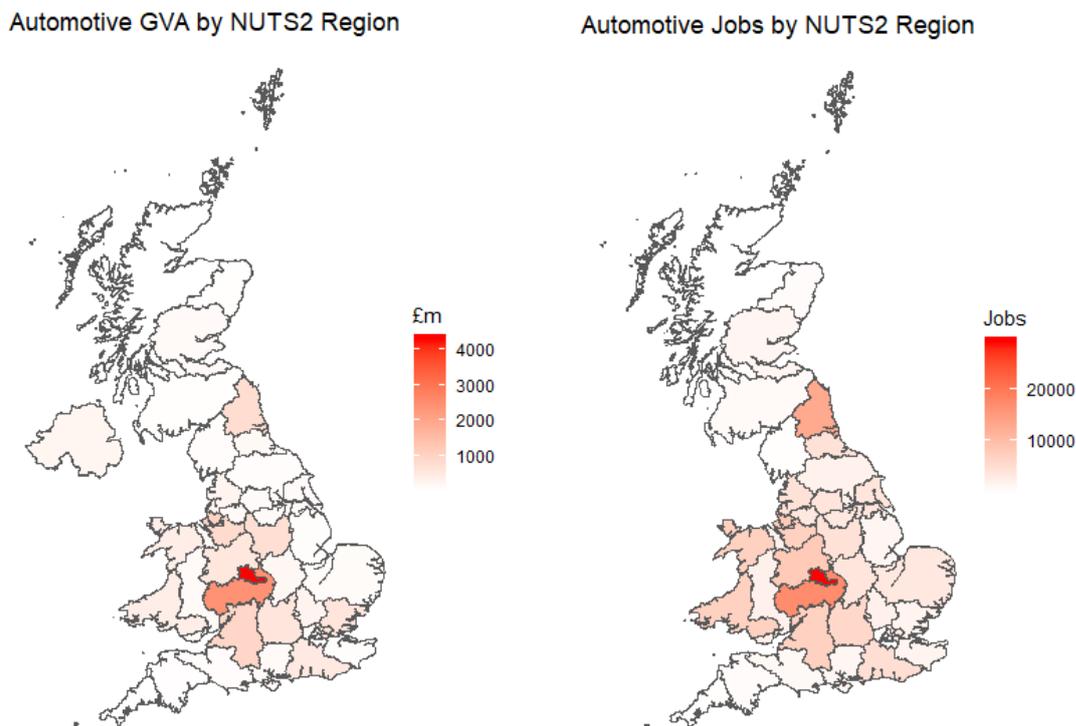
Not surprisingly, Figure 7 demonstrates the expected pattern of high exposure to firms with a substantial UK-based manufacturing presence (note, firms can be “exposed” to more than one

⁴² For example, see: <https://www.dummies.com/business/corporate-finance/mergers-and-acquisitions/ma-offering-document-recurring-revenue-and-customer-concentration/>
https://www.eulerhermes.com/en_US/resources-and-insights/economic-insights/avoid-high-customer-concentration.html
<https://www.msn.com/en-sg/money/news/what-you-need-to-know-about-customer-concentration-risk/ar-BBVmlNk>

OEM), and particularly acute exposure to those with manufacturing plants in the region (namely, JLR and Toyota).

The predominance of JLR is further underscored by this analysis and reiterates the vital importance of this vehicle manufacturer to the continued viability of the automotive manufacturing sector in the West Midlands. Indeed, such is the volume of value-added that JLR undertake in the Region (in contrast to other Vehicle Manufacturers) that it should be considered as a ‘strategic asset’ for the UK – which we will come back to in terms of policy prescriptions to mitigate the impact of a hard Brexit. The concentration of automotive GVA in the West Midlands is apparent in Figure 8 below, which only reiterates the importance of JLR as a “jewel in the crown” for UK manufacturing.

Figure 8



Of course, JLR have significant investment (and hence sunk costs) that will likely see it having to continue to hold substantive manufacturing operations in the West Midlands in the event of a hard Brexit (in the short-term at least). However, the costs of a hard Brexit (particularly the default no-deal scenario at the end of 2020) would be considerable for the firm (of the order of £1.2bn a year for the firm). This would be unsustainable with current UK operations. This reiterates the need for both supply chain diversification and support for JLR’s domestic operations (a theme taken up further in the policy section later). Next, we turn to examining the nature of importing and exporting to other EU states, in order to ascertain the nature of Brexit “exposure”. Following this, we then offer an analysis of the nature of jobs exposure for the sector.

Importing from and exporting to the EU: transport mode dependency for manufacturers’ trade

The EU is the UK’s largest trading partner and this is even more pertinent for the transport manufacturing sector, with supply chains embedded deep into EU countries (especially Germany). In terms of our manufacturers, a large majority (127 firms) import from the EU. In contrast, only 16 stated that they did not (a further 3 did not answer the question). Almost all (93%) of the larger manufacturers imported from the EU, whilst 89% of medium-sized firms imported from the EU. In contrast, only 67% of small manufacturers did so. The findings were very similar for exporters (92% of larger manufacturers, 85% of medium ones but only 60% of smaller ones).

In terms of the mode of transport used to import and export products or components, approximately half of the survey respondents (52%) imported components via rail. This figure was somewhat higher for freight/logistics firms involved in the auto/aero/rail manufacturing sectors (at 63%) and lower for manufacturers (45%). Of those manufacturers that imported and manufacturers that exported, the figures (in terms of the size of firms by employee numbers) are disaggregated as follows in Table 5 below.

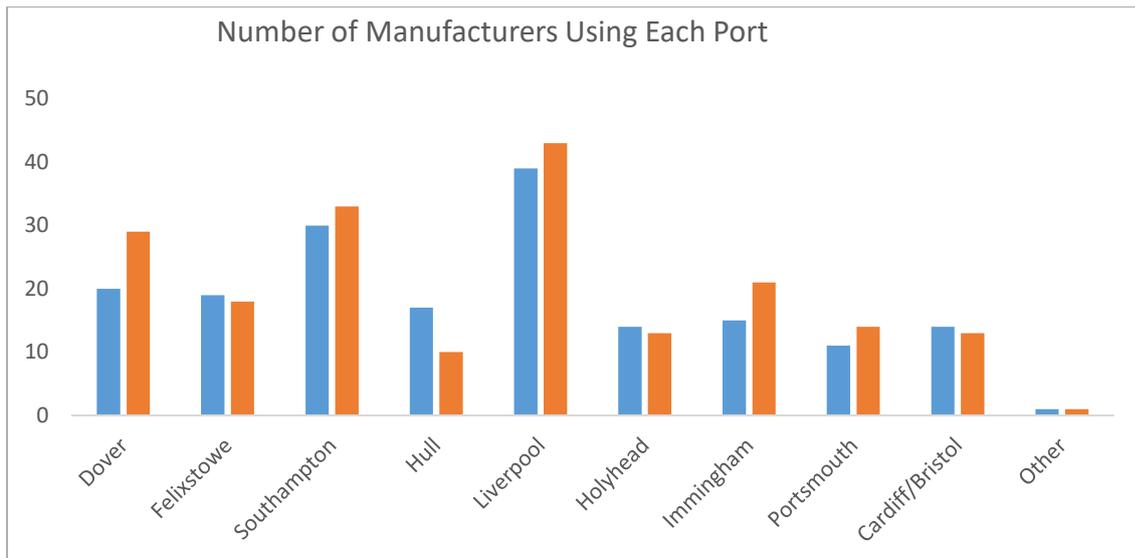
Table 5

<i>Import Type</i>	<i>Firm Size</i>			<i>Export Type</i>	<i>Firm Size</i>		
	<i>Small (<50)</i>	<i>Medium (51-250)</i>	<i>Large (250+)</i>		<i>Small (<50)</i>	<i>Medium (51-250)</i>	<i>Large (250+)</i>
Rail	67%	64%	43%	Rail	71%	58%	45%
Sea	56%	51%	76%	Sea	43%	44%	73%
Air	33%	33%	61%	Air	14%	44%	54%

In considering the mode of transport used to move freight to and from the EU to the UK, only freight shipped by air is likely to be unaffected by Brexit. For all firms and particularly for SMEs, heavy dependence on the Channel Tunnel rail link is of particular concern as its combination of speed and cost is unlikely to be replicable via any other source. These firms are likely to be highly vulnerable. In contrast to the prevailing media narrative, product shipped by sea is somewhat less vulnerable in many cases, being more cost sensitive (and commensurately less time sensitive). In contrast, perhaps, to expectations, only 20% of all exporting firms used Dover at all and only 2.4% used it exclusively. For importers, the figures were broadly similar (at 23% and 3.8% respectively). For manufacturers, these figures are similar at 16.5% for exporters and 23% for importers.

As such, the analysis suggests that for companies in the sample, the continental rail link is vastly more important for just-in-time components than the Dover-Calais ferry service. The number of manufacturers using a given port in the sample is reproduced in Figure 9. What is likely to occur in the event of a hard Brexit, however, is rerouting of freight traffic through alternative ports. In this sense, Felixstowe/Harwich (depending on whether Ro-Ro or Lo-Lo traffic is required) and Southampton are likely to prove key ports, with the A14 and A34/M3 trunk roads likely to provide several “pinch points”. In a similar fashion, the analysis strongly suggests that issues might also arise on freight rail links. Amongst the sample, the ports of Felixstowe (57 firms), Southampton (56 firms) and Liverpool (73 firms) were (at the time of writing) already used by more firms than the port of Dover (49 firms).

Figure 9



In terms of the likely impact of a hard Brexit, this is most likely to be felt on the EU side of the “border”, as the UK Government would retain considerable control over what tariff and checking regime it would apply to imported parts and components coming from EU countries into the UK. However, it would have no control over what happens in other EU countries. In this context the, the relevant block is at Calais. If an EU checking regime were to lead to hold-ups here, it seems probable that either a major French port with more capacity (potentially Dunkirk or Le Havre) or Rotterdam could be used as cross-Channel alternatives.

On the UK side, to reiterate, this would put high pressure on road links to and from Southampton, Immingham/Grimsby and Felixstowe, with the implication being that the A34/M3, A14 and M1/M18 trunk roads could potentially see significant additional traffic. As such, in the next section, the analysis explores respondents’ Brexit exposure and mitigating actions.

Brexit exposure

The nature of exposure to a hard Brexit and consequent mitigating actions by firms suggested that some progress had been made in this regard. For example, 44% of firms have developed alternative logistics arrangements. There were no significant differences between large firms and smaller ones. Approximately half of all manufacturers had developed new customs practices and procedures. Once again, there was no difference between larger and smaller firms.

Turning to HR-related issues, there were modest differences between larger and smaller manufacturers in terms of the rules and regulations relating to their workforce in the EU. Some 51% of larger manufacturers know precisely what the rules are for their staff compared with 57% of smaller manufacturers. This difference is very modest in practical terms. The figures are similar for freight and logistics firms at 54%. Only 44% of manufacturers are fully ready to remain compliant with EU regulations post-Brexit. There was no significant difference between larger and smaller firms, although far more freight firms (55%) were confident that they knew what needed to be done in order to remain compliant.

With regards to VAT compliance, there was a distinction between larger and smaller firms. Whilst 55% of larger manufacturers had fully established VAT compliance, only 46% of smaller manufacturers had. This is likely to be a considerable concern for smaller firms in the event of a hard Brexit. Just under half of all manufacturers were fully ready in terms of insurance, whereas over half

of all freight & logistics firms were. In most of the other areas, freight and logistics firms were ready by definition.

In contrast, only a modest number of firms had fully prepared for the impact of Brexit on their suppliers. In particular, just 36% of manufacturers had fully prepared in this regard and there were no significant differences between larger and smaller manufacturers. The overwhelming majority of firms (89%) had stockpiled and have proactively informed employees about the settled status scheme. Of greater concern was the fact that only 24% had completed detailed and accurate activities around commodity code and product classification. Similarly, only 16% of respondents felt that their organisation was completely prepared with the necessary skills to complete new customs requirements related to trade with the EU. A large majority felt that they were at medium risk (70%), with the remainder of firms highly exposed on this front.

Finally, in considering actions to mitigate the potential impact of Brexit, respondents were asked what policy actions from government would be helpful. The analysis identified that the “most helpful” activities that could be undertaken by government (whether local, regional or national) were further investment in regional and national transport infrastructure needed, direct business funding to cover the cost of Brexit and further information regarding precise procedures related to importing and exporting. Tackling skills gaps (primarily via funding for staff training) was also felt to be an imperative. In addition, some respondents felt that the business tax regime could be adjusted to help alleviate the expected negative impact of Brexit. As such, in the next section, the implications of the analysis for manufacturers and policymakers are considered further.

Policy considerations for the WMCA and UK Government

The findings of our analysis have highlighted questions of disparity in Brexit readiness levels amongst the OEMs and suppliers who participated in this survey. At one end of the spectrum were companies with no or minimum understanding of readiness to Brexit, whilst on the other are companies that have thought through and may even be prepared to mitigate the impact of Brexit. In the discussion that follows, we focus on automotive and aerospace (rail is a far less significant presence in the Region and concerns here are similar to the automotive sector).

WMCA’s policy options for the automotive manufacturing sector will be constrained or enabled by central government policy and the degree to which permitted intervention is delegated or devolved from Westminster to the regions. Based on the experience of the automotive support policies adopted in the aftermath of the global financial crisis, it is likely that significant policy actions for the automotive industry post-Brexit, especially in a hard Brexit, will be directed and controlled from London, if government decides to support the industry; that said, regional bodies such as WMCA need to understand what the potential automotive policy options are and decide on its own priorities for lobbying national government to implement and understand where it can take unilateral action.

This section starts with a review of the key broad policy actions for the automotive sector which governments took in response to the global financial crisis (the most recent economic shock and best recent guide as to how policy could be developed post-Brexit) and the challenge which these policies pose vis-à-vis state aid rules, whether under EU or WTO rules; this is followed by consideration of which policies, or modifications thereof, the UK government might consider, especially in the event of a hard/“no deal” Brexit; consideration of which policy options WMCA

should consider, for action either alone or in association with other regional agencies; and finally particular measures for aerospace.

Historic policy actions for automotive in response to economic shocks

The impact of an economic downturn is often quickly seen in vehicle manufacturing which is often seen as a bellwether for the economy as a whole. This was the case in the major manufacturing economies in aftermath of the global financial crisis and subsequent recession.

The 2008 crash affected the global economy and was caused by the failure of the global financial system. By contrast, the negative impact of Brexit will be primarily felt in the UK, although parts of Europe will also be hit if tariffs are imposed and border disruption impacts the finely tuned just-in-time delivery systems which underpin the many sectors, not just automotive. Whereas it is possible to see the global financial crisis as an external or exogenous event, the economic costs of Brexit will likely be seen as self-inflicted, internally generated by the UK; this is potentially significant in terms of both developing policy responses in the UK and the potential reaction to such policies when viewed from abroad, especially in Brussels.

In 2008-09, governments across the world took a variety of actions to stimulate their economies, some specifically designed to boost car demand and keep factory lights on; many actions actually ran counter to the provisions and accepted conventions of WTO and/or EU rules on state aid. However, because almost every major government adopted one or more of these policies, there were no objections to these policies lodged with either the WTO appeals court nor at or by the authorities in Brussels.

By contrast, were the UK government to adopt some or all of the policies adopted elsewhere in 2008 in the event of Brexit-induced economic dislocation, it is highly likely in our view that objections will be raised, or actions taken in response. Moreover, despite the current uncertainty over the future of the WTO and its appellate court, the EU or individual countries outside the EU **could** take unilateral action against the UK if they felt UK policy actions were unlawful or harmed their own interests. Because the UK will be looking for trade deals with countries or regions outside the EU – as well as with the EU – the UK government will need to carefully assess the risk that any aid it gives to the automotive industry could be seen as illegal state aid, thereby hampering the UK's ability to strike trade deals; it will also fear triggering reactions against UK exports especially – for example counter-vailing duties, or anti-subsidy measures, such as increased tariffs or the imposition of quotas on UK exports.

Nevertheless, even with these risks in mind, the UK government should be considering some or all of the following actions⁴³ (this is not intended to be an exhaustive list but indicative of what we think are the most likely to be considered):

⁴³ These policies and their legal status vis-à-vis EU and WTO rules in the light of the 2008 crash are discussed in ***Money for the Auto Industry: Consistent with WTO Rules?*** by Claire Brunel and Gary Clyde Hufbauer available at <https://www.piie.com/sites/default/files/publications/pb/pb09-4.pdf> and ***Shifting Gears: Industry Policy and Automotive Industry after the 2008 Financial Crisis***, by Seung-Youn Oh available at http://repository.brynmawr.edu/cgi/viewcontent.cgi?article=1028&context=polisci_pubs – it is clear that many of the policies adopted post 2008 were technically in breach of WTO and other state aid rules but these breaches were not challenged.

- Refund of tariffs levied on UK exports to (for example) the EU – in South Africa a very complex system exists to eliminate the tariff impact on exports of vehicle produced there.⁴⁴
- Writing-off of government loans, if made (as the US did in 2008 with GM and Chrysler).
- Preferential loans, commitment to covering operating losses for a specific period (again as done in the US in 2008).
- Short-time working support – something which the German government is considering implementing now, having done so back in 2008 as well.⁴⁵ Several other countries also followed this route and helped vehicle companies and their suppliers with support for wages of workers on short time working.⁴⁶
- Bailouts to prevent financial collapse, along the lines of the support given to Chrysler and GM by the US government in 2008-09.
- Taking equity stakes in manufacturers (eg the French government took a stake in PSA when it was in financial trouble, alongside its existing stake in Renault); this may be difficult in the UK given the overseas ownership of all major vehicle producers.
- Scrappage schemes to boost demand – these were seen as successful in terms of boosting short term demand in the aftermath of the 2008-09 crash, keeping factories busy, but over the longer term simply brought forward demand, leading to reduced sales in the future.⁴⁷
- Regional investment support schemes – this could in the form of an extended or wider RGF with preference given to companies which also committed to the use of domestic suppliers. The French government adopted a policy along these lines in the aftermath of the 2008 crash giving preference to vehicle companies who used French suppliers, despite it being non-compliant with WTO rules. Similarly, the US government had a policy to buy trucks and commercial vehicles from any truck manufacturer, so long as the vehicles used US-made engines, a policy which was clearly designed to support domestic manufacturers, but which was also not WTO-compliant. That said, in neither case was any objection lodged.

Potential national policy actions for UK automotive

Work undertaken by AutoAnalysis in 2019 suggests that many of the policy actions referred to above were being actively considered by relevant government departments prior to the general election in 2019; whether they are still being considered is not known.

⁴⁴ The scheme and other aspects of the South African government's automotive industry strategy is explained here: <https://www.engineeringnews.co.za/print-version/new-look-apdp-could-change-face-of-the-local-auto-industry-says-naacam-2019-02-01> - it is possible that this scheme would be found non-compliant if challenged but the EU has accepted the scheme because of its policy of helping developing or emerging economies grow.

⁴⁵ <https://europe.autonews.com/automakers/germany-plans-aid-struggling-auto-industry>, January 16, 2020

⁴⁶ <https://www.theguardian.com/business/2009/apr/16/european-short-time-working-unemployment>

⁴⁷ <https://www.smmmt.co.uk/2009/10/the-uk-scrappage-incentive-scheme-the-facts/> - this provides an indication of the short term impact, boosting output in 2009 by the UK plants of Nissan and Honda especially; this report – <https://www.ft.com/content/49ea03b6-988f-11de-807a-00144feabdc0> – highlighted the short term nature of the scrappage scheme in Germany in terms of boosting manufacturing.

However, there are signs that Prime Minister Boris Johnson is willing to be interventionist. The Prime Minister indicated his support for the idea of state aid during the general election campaign⁴⁸ although there may be limits as to how far this would actually go. It may be, contrary to expectations, that the current government will offer wider practical support to UK industry, making greater intervention in certain industries than might have been expected. For example, during the election campaign Johnson told workers in the north-east of England that Nissan would be supported, post-Brexit⁴⁹: what form this support might turn out to be, or indeed whether the Government follows through on an election campaign “promises”, remain to be seen. That said, political commentators believe that the government will need to be seen to support key sectors or companies in regions where it has won seats if it is to retain them in the long term.⁵⁰ And moreover, it will need to implement such policies early on this parliament for their effect to be seen.

Given the importance of the automotive manufacturing sector in the West Midlands – and the number of seats which it has won there in or near automotive-strong constituencies – it is reasonable to expect the new government’s policy to reflect the pressure to maintain existing automotive operations if the nature of the Brexit deal from January 1, 2021 undermines the existing operating model for the industry. Disruption to the current operating environment for automotive manufacturing seems increasingly likely in the light of statements by the Chancellor who told the Financial Times that the UK would divert from EU regulations.⁵¹ The SMMT quickly warned that such a move would cost the industry “billions”; quite what the government has in mind for the new regulatory environment for the industry remains to be seen – but while this is developed it seems likely that the investment climate for the industry will worsen while its cost base with mushroom.⁵²

The previous Conservative administration had an industrial policy with some automotive content.⁵³ This centred on “sector deals” which feature targeted investment or support for new and emerging automotive technologies, e.g., through the Advanced Propulsion Centre, R&D funding for low emission technologies, the Faraday Battery Challenge and funds for plug-in hybrid systems and developing the electric vehicle charging infrastructure. To date this strategy has seen more than £1bn committed to the sector.

However, with its focus on R&D and new technologies, the strategy’s support for the industry in the automotive sector deal does NOT cover specific companies or even regions; crucially the automotive sector deal is NOT concerned with support for existing manufacturing operations and it is these operations which would most likely need support in the event of economic dislocation following a hard Brexit with the UK switching to trading on WTO terms from January 1st 2021.

A hard Brexit and operating on WTO terms will mean tariffs on UK-made vehicles exported to the EU especially. A 10% tariff on cars’ landed value in the EU will translate into a 6-7% retail price increase; in view of the highly competitive car market, UK manufacturers will either have to cut prices to remain price competitive (something which could open manufacturers or the industry as a whole to

⁴⁸ <https://www.ft.com/content/e46f977e-12b5-11ea-a7e6-62bf4f9e548a>, November 29, 2019 and <https://www.theguardian.com/business/2019/dec/01/johnson-spots-an-opportunity-over-state-aid-and-it-may-work>, December 1, 2019

⁴⁹ <https://europe.autonews.com/automakers/nissans-uk-plant-will-be-protected-after-brexit-johnson-says>

⁵⁰ <https://www.theguardian.com/business/2020/jan/12/sajid-javid-must-deliver-a-uk-budget-that-works-quickly-a-tricky-task>, January 12, 2020

⁵¹ <https://www.ft.com/content/18ddc610-3940-11ea-a6d3-9a26f8c3cba4>, January 18, 2020

⁵² <https://www.ft.com/content/10ec1b28-39f4-11ea-b232-000f4477fbca>, January 19, 2020

⁵³ <https://researchbriefings.parliament.uk/ResearchBriefing/Summary/CBP-7682>

accusations of dumping) or see reduced sales in response to tariff-induced price rises; production volumes would be hit, with disruption also caused by interruption to just-in-time supply chains.

The increased costs from tariffs and disruption caused the expected end to seamless just-in-time supply systems will have a significant economic impact. Work by AutoAnalysis for SMMT⁵⁴ shows that the UK could lose production of as many as 1.5m vehicles by 2024, at a cost of over £40bn in terms of factory gate prices or economic value creation⁵⁵. More specifically, as much as 30% of the lost volume and 40% of this lost economic value would be in the Midlands area⁵⁶, with clear economic and social consequences for the region.

Policy actions which the government has in place now focus, as noted above, on future technologies; they are of limited relevance to existing operations. However, unless existing operations are supported and retained, there may be few or no viable companies able to profit from the government's strategy for future technologies. The practical consequence of not providing a supportive environment for existing industrial structures while they adjust to a new economic model for the country is, in our view, not be fully understood in Westminster. In this regard, WMCA needs to work with the existing automotive industry to persuade central government to provide transitional support in one form or another in the event of hard Brexit.

The challenge will be, as noted above, is that many of the policy actions which industry might like to see could fall foul of WTO or state aid terms, even when the UK is outside the EU. However, some "good news" in this regard comes from Germany – recent reports suggest that the German government is considering reviving help (ie state aid) along the lines of support which it gave to the automotive industry in 2008-09⁵⁷. This would focus initially providing wage subsidies for companies which put workers on short time working. Such policies have been adopted on a limited scale in the UK in the wake of the GFC via the ProAct scheme in Wales, but they were not adopted on national scale in the UK 2008-09⁵⁸; however, given that it is clearly something which the EU has accepted in the past (and is likely to do so again), this is a policy which the UK could quickly adopt to support struggling companies. It seems reasonable to expect that the EU would again treat is as compliant with state aid rules (or it would have to sanction Germany), even when the UK is outside the EU, we believe this measure is something which the WMCA should prepare to lobby government to adopt, along with other measures suggested below.

In addition to encouraging reduced wages support for the industry, the WMCA should, in the event of macro-policies being required to help the industry, encourage government to:

1. Reintroduce a scrappage scheme, with specific support for hybrid or full electric vehicles.
2. Refocus Regional Growth Fund (RGF) and related support for investment in the EV sector especially and boost the Sectoral Deal for automotive.

⁵⁴ <https://www.smmt.co.uk/2019/11/only-ambitious-brexit-deal-will-safeguard-jobs-and-britains-green-future/>

⁵⁵ The data quoted by SMMT was based on a hard Brexit beginning on February 1, 2020 – delaying this to January 1, 2021 would simply delay the economic impact but not reduce it.

⁵⁶ Based on the AutoAnalysis Brexit Impact Assessment model – see Chapter 3 in *Keeping the Wheels on the Road*

⁵⁷ <https://europe.autonews.com/automakers/germany-plans-aid-struggling-auto-industry>

⁵⁸ Bailey, D and N Berkeley (2014) Regional Responses to Recession: A Case Study of the West Midlands, *Regional Studies*, 48(11), 1797-1812.

3. Tariff rebate schemes – this is a very complicated area and the South African scheme referred to above (which is effectively an investment related tariff rebate scheme) may not be accepted by the EU as appropriate for the UK.

Potential policy actions for WMCA

While the majority of policy action options open to support existing manufacturing will depend on central government policy and funding, there are some policy actions which local government bodies can consider/enact with regard to business, people and place:

- Potential business tax/rates holidays – business rates are widely seen as a disproportionate cost burden borne by UK manufacturing companies especially when compared to equivalent taxes levied in continental Europe.
- Training funding to help companies retrain and reskill workers for the transition to EV production throughout the supply chain.
- Offer a loan fund for the supply chain. This was used in the case of the Rover Task Force and also in the wake of the GFC.
- Provide diversification support for firms in the industry. This was significant and important in both the MG Rover collapse⁵⁹ and in the wake of the GFC⁶⁰, in the latter case through the Automotive Response Programme.
- Invest in expanding the on-road/car park EV charging infrastructure – this could be a major job creation policy as well as expanding the skill base in electrical workers.
- Establish an industry support task force. Taskforces were set up around Rover and LDV and at region levels in the wake of the GFC. Swindon Borough Council and related bodies set up a taskforce in the aftermath of the announcement of the Honda factory closure – that said, WMCA needs to be careful that such a task force has a clear remit and resources to see this through.
- Consider local procurement strategies in line with the UK's obligations under international agreements.
- Establish special enterprise zones with excellent connectivity and a range of tax incentives. These should be centred on existing areas of automotive specialisation, building on existing clusters of expertise and support the growth of cutting-edge technologies in the region. Incubation of scale-up firms is another important area of focus.
- Look to attract a battery giga-factory to the region to underpin low cost battery production in the UK.
- And look to win the installation of an Arrival CV factory:⁶¹ Hyundai and Kia have recently announced a £100m investment in this new UK EV van company. The company claims its

⁵⁹ See: Bailey, D and S MacNeill (2008) The Rover Task Force: A Case Study in Proactive and Reactive Policy Intervention? *Regional Science Policy and Practice*. Vol.1, Iss.1, 2008, 1-16.

⁶⁰ Bailey, D and N Berkeley (2014) Regional Responses to Recession: A Case Study of the West Midlands, *Regional Studies*, 48(11), 1797-1812.

⁶¹ <https://europe.autonews.com/automakers/hyundai-kia-invest-110-million-uk-electric-van-startup-arrival>

manufacturing system is based on small volume micro-factories and would therefore seem to be a potentially quick win for new investment.

Considerations for Aerospace

Moving forwards, it is clear that the details of the UK's future partnership with the EU will be crucial. Tariffs are less significant than for other sectors as international agreements mean that components and final products do not attract tariffs. Three issues then are of much greater concern. Specifically:

- Potential frictions and delays, particularly in transport
- Skills shortages, particularly given the challenges raised in relation to a substantial EU workforce.
- Possible regulatory barriers – the sector is keen to ensure that the UK remains under the aegis of the European Aviation Safety Agency.

The consequences of Brexit for the sector will be far-reaching and therefore regional government will want to work with central government to ensure that certain key objectives are met. In common with other transport manufacturing industries (notably automotive), avoiding excessive border delays will be key. “[A]ny additional customs procedures resulting even in relatively short delays could detract from the UK's industry's ability to compete for work and investment”⁶².

Once again, there are important ramifications in terms of the UK's domestic transport architecture, with the A14, the A34, M3 and M1 likely to come under particular pressure in the event of traffic being routed away from the Dover-Calais strait. In the immediate term, the sector needs to ensure that movement of key personnel between sites in Europe can continue unfettered.

In the longer-term, it is highly desirable that the UK's domestic skills base is enhanced. This will mean close cooperation between regional and national government to ensure enhanced provision of employment-specific skills for the sector. Such an approach, however, must also recognise that a large portion of this potential labour is spatially rooted: there is a crucial need to work between actual (and potential) regional employers and trainees.

In the short term, there is a need for continued easy access to skilled EU labour. Upskilling the workforce will take years and, in order not to lose business in the interim the region will need to continue to rely on EU labour. Due to the value of the industry, there is a vested interest on the part of European governments in enabling smooth operation of the broader aerospace supply chain.

As such, significant efforts will need to be made by both private sector enterprises and governments in the UK and EU to avoid supply chain disruption. In the case of the aerospace sector, a matter of considerable urgency that will need addressing in any one of the scenarios envisaged is UK membership of EASA.

Continued membership of EASA is not automatic: it requires action on the part of the UK Government. The UK's own Civil Aviation Authority does not presently have the capacity to take over the current functions of EASA in certification and other areas. Indeed, it is not even undertaking preparatory work at present as taking over the responsibilities of EASA is not considered a viable option⁶³.

Outside of EASA, in the short-term recertification would need to be done by a major agency (in practice probably the EASA). However, the costs associated with doing so would be substantial. This

⁶² Business Energy and Industrial Strategy Committee. (2018). *The impact of Brexit on the aerospace sector*. <https://publications.parliament.uk/pa/cm201719/cmselect/cmbeis/380/38002.htm>

would threaten the medium-term viability of the UK's aerospace supply chain. There would also be immediate, short-term threats to the UK's position in aircraft servicing and repair given the importance of EASA oversight.

Appendix 1: Survey questionnaire template

Supply Chain Mapping & Brexit Exposure Survey

Q1 Please specify which broad sector your company operates in:

- Agriculture
- Extractive industry (mining, quarrying, oil etc.) or utilities
- Manufacturing
- Construction
- Wholesale/Retail
- Freight transport or logistics
- Passenger transport
- Accommodation & food
- ICT (including telecoms)
- Finance (including insurance)
- Property
- Legal/accounting
- Engineering
- Business admin & support
- Arts, entertainment et al.
- Education
- Health
- Other public sector

Other services

Q2 Which of the following descriptions best matches your role?

Executive role (e.g. CEO, CFO, COO)

Professional

Procurement manager

Operations manager

Technical

Sales

Other

Q3 In which regions of the UK does your company have substantial operations?

Scotland

Wales

Northern Ireland

North East England

North West England

Yorkshire & Humberside

East Midlands

West Midlands

East Anglia

London

South East England

South West England

Q37 Please select which sectors your company is involved in:

Automotive manufacture

Aerospace manufacture

Rail manufacture

Other road vehicle manufacture (lorries, buses etc.)

Manufacture of furniture

Civil engineering

Manufacture of food/drink products

Manufacture of textiles (incl. leather)

Road transport of goods within the UK

Other

Q5 Thinking now about your company's operations in the West Midlands in particular:

Q6 In which districts does your company have significant operations?

Derby

Derbyshire

Nottingham

Nottinghamshire

Leicester

Leicestershire/Rutland

Northamptonshire

- Lincolnshire
- Herefordshire
- Worcestershire
- Warwickshire
- Telford & Wrekin
- Shropshire
- Stoke-on-Trent
- Staffordshire
- Birmingham
- Solihull
- Coventry
- Dudley
- Sandwell
- Walsall
- Wolverhampton

Q9 Approximately how many people does your company employ?

- Self-employed (no employees)
- 1-10
- 11-50
- 51-250
- 251-500

500+

Q7 Which specific industrial areas does your company work in?

Manufacture of motor vehicles

Freight transport

Manufacture of bodies (coachwork) for motor vehicles; manufacture of trailers and semitrailers

Manufacture of parts and accessories for motor vehicles

Logistics services (including freight forwarding/customs and compliance)

Manufacture of railway locomotives and rolling stock

Manufacture of parts and accessories for railways locomotives and rolling stock

Manufacture of air and spacecraft and related machinery (including parts thereof)

Manufacture of other transport equipment

Manufacture of glass and glass products

Manufacture of non-metallic mineral products

Manufacture of abrasive products

Manufacture of steel tubes, pipes, hollow profiles and related products

Manufacture of other products of first processing of steel

Manufacture of steel or ferro-alloys

Manufacture of non-ferrous metals

Casting of metals

Forging, pressing, stamping and roll-forming of metal

- Powder metallurgy
- Treatment and coating of metals
- Machining
- Manufacture of other fabricated metal products
- Manufacture of electronic components
- Manufacture of electric motors, generators, transformers and control apparatus
- Manufacture of metal forming machinery and machine tools
- Manufacture of other special-purpose machinery
- Manufacture of rubber products
- Manufacture of plastic products
- Engineering and technical consultancy
- Other

Q8 Which of the following best applies to your company?

- OEM
- Tier 1 supplier
- Tier 2 supplier
- Tier 3+ supplier
- Industrial service provider

Q10 Approximately what percentage of your company's employees are citizens of an EU27 member state? (The EU27 comprises Austria, Belgium, Bulgaria, Croatia, Republic of Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain and Sweden)

Q11 Turnover at parent company or site

Q12 Please select whether this relates to parent company or site

Parent

Site

Q13 Please give the approximate percentage of your company's turnover from the following sectors (must total 100%):

_____ Automotive (cars, LCVs, trucks, buses, off-highway)

_____ Aerospace

_____ Rail (track, locomotives, rolling stock, other)

_____ Other

Q16 Thinking specifically about the portion of your company's business related to the automotive sector:

Q15 Of that portion of your business related to the automotive sector, please give the approximate business split by vehicle company:

Jaguar/Land Rover (JLR) : _____

Nissan : _____

Mini : _____

Toyota : _____

Honda : _____

Vauxhall : _____

Bentley : _____

Rolls Royce (cars) : _____

Ford (UK) : _____

Other UK cars : _____

Other UK (trucks, buses etc.) : _____

Volkswagen Automotive Group (Volkswagen, Audi, Skoda, Seat, Lamborghini etc) : _____

BMW : _____

Mercedes-Benz : _____

Ford (non-UK operations) : _____

Peugeot, Citroen & DS : _____

- Volvo : _____
- Fiat-Chrysler Automotive (Fiat, Jeep, Alfa Romeo, Lancia, Chrysler and Maserati) : _____
- Other EU car manufacturer : _____
- EU truck/bus : _____
- Rest of World : _____
- Unknown : _____
- Total : _____

Q18 Does your company import goods from (or via) the EU?

- Yes
- No

Q17 Please specify which mode(s) of transport are used when goods enter the UK (tick all that apply)?

- Rail
- Sea
- Air
- Unknown

Q20 Which port(s) are used?

- Dover
- Felixstowe
- Southampton
- Hull
- Liverpool
- Holyhead
- Immingham

Portsmouth

Cardiff/Bristol

Other

Q21 Which airports are used?

Birmingham International

East Midlands

Heathrow

Stansted

Gatwick

Manchester

Other

Q19 Does your company export goods to (or via) the EU?

Yes

No

Q36 Please specify which mode(s) of transport are used when goods leave the UK (tick all that apply)?

Rail

Sea

Air

Unknown

Q38 Which port(s) are used?

Dover

Felixstowe

Southampton

Hull

Liverpool

Holyhead

Immingham

Portsmouth

Cardiff/Bristol

Other

Q39 Which airports are used?

Birmingham International

East Midlands

Heathrow

Stansted

Gatwick

Manchester

Other

Q22 Which of the following does your company regularly use to transport goods?

M6

M1

M42

M40

M25

M20

A14

A34

A41

A5

Unknown

Other trunk road(s)

Q23 For each of the following measures, please indicate whether you have started or not, are part way through or are fully prepared

	Not yet started	Started but not finished	Fully ready	Not applicable
Are your existing suppliers able to supply you in a seamless manner in a no deal Brexit?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Have you developed alternative logistics solutions, e.g., new routes or modes of transport?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Have you developed new customs practices and procedures?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Do you understand the rules regarding your staff working in EU, e.g., the need for their own work permits and related passport issues?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Have you begun work to remain compliant with EU regulations?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Have you established your EU VAT status and future VAT compliance?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Have you investigated the need for additional insurance etc.?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q24 To what extent has your organisation prepared for the potential impact on your suppliers?

- Not reviewed supply base
- Partial review of key suppliers
- 100% strategically reviewed, risks identified and appropriate measures could be actioned
- Not applicable

Q25 Has your organisation actively increased inventory levels of raw materials or finished products to mitigate risk of disruption at ports?

- Yes
- No

Not applicable

Q27 Has your organisation developed any contingency plans should there be restrictions on the Free Movement of people?

No such plans

Basic plans

100% detailed planning completed

Not applicable

Q28 Has your organisation received its EORI identification which will be a prerequisite for international trade into EU markets post-Brexit?

Yes

No

Q29 Please make any comments on challenges or problems involved in your Brexit preparations

Q30 How detailed and accurate have your Brexit activities been around commodity code/product classification cleansing?

- No plans at present
- Partial planning complete
- 100% completed and no risks envisaged
- Not applicable

Q31 To what extent is your organisation prepared with the necessary skills to be able to complete new customs requirements on import and export administration, complete Certificates of Origin, Long Term Supplier Declarations etc.?

- Exposed
- Medium risk
- Risks mitigated
- Not applicable

Q32 Has your organisation simulated the impact on cash flow resulting from additional cost exposure such as import VAT, duties, capital tie-up, overtime for stock-builds, additional warehouse capacity?

- Yes
- No

Q33 Has your organisation set up a "Deferment Account" to pay for customs duties, import VAT and excise duties?

- Yes
- No

Q34 In the event of a "no-deal" Brexit, what help (if any) would you like from government (whether local, regional or national)?

- None
- Specific Brexit advice
- Click to write Choice 8
- Further investment in regional transport infrastructure

Further investment in national transport infrastructure, including ports

Direct business funding

Adjustment to business rates and taxes

Further information regarding precise procedures

Funding for staff training to fill general skills gaps

Q35 Please add any further comments below