

West of England Economic Connectivity Executive Summary

Purpose

The purpose of this body of work is to provide strategic insights that will inform the priorities in the West of England's Local Industrial Strategy (LIS). This research has been conducted by PricewaterhouseCoopers (PwC) and has been brought together to strengthen the West of England's (WoE's) evidence base and help identify what makes the WoE region genuinely distinctive as well as the challenges it faces that could be addressed by the LIS.

The analysis explores the economic flows between the WoE region, the rest of the UK, and beyond, with a focus on four main areas:

1. Business linkages
2. Infrastructure connectivity
3. Movement of people
4. Flow of ideas

A deeper understanding of these interconnections could identify opportunities to strengthen the WoE's role in driving growth for the wider UK economy. In conducting this analysis we have reviewed published data across the region, engaged with a defined set of stakeholders and brought in our own innovative methodology based on experience of working with Government agencies and other Local Enterprise Partnership's (LEPs) on their LIS documents.

Key messages

There are numerous insights that can be drawn from this analysis. However, we see the stand out conclusions as follows:

1. **Business linkages:** Our analysis suggests that WoE has stronger economic linkages with Birmingham/London/Oxford/Cardiff as opposed to the South and South West of England. It also illustrates that for every £1 of GVA generated by WoE based businesses the rest of the UK gains by about 60p.
2. **Infrastructure connectivity:** There are congestion risks coupled with economic opportunity from the Severn Bridge toll removal. More specifically, Bristol is set to be the most affected by the Severn Bridge toll removal with traffic flows increasing by 41% by 2022 in DFT projections. In addition, a more consistent offering on digital infrastructure is required by ensuring more regular 4G reception and faster broadband connectivity in rural areas such as North Somerset.
3. **Movement of people:** The ONS forecasts that population growth in WoE will outstrip the rest of England, but this is partly offset by net outmigration. The region is also an attractive place for graduates, as over 70% of students from the WoE stay in the region after graduating (Bristol top 4 city for graduate retention).¹
4. **Flow of ideas:** The ESRC places the WoE within an academic 'arc' of collaboration stretching across the M4 corridor. Oxford, London (UCL and Imperial), and Cambridge have

¹ Higher Education Statistics Agency (HESA)

been identified as the universities with the highest levels of co-authorship with WoE universities.

The remainder of this summary document sets out our findings for each of the four areas (business linkages etc.) in more detail.

Business Linkages

The UK Industrial Strategy (UKIS) sets out an ambition to “*make better connections between high-performing businesses and their supply chains*”. Our analysis aims to provide insight into the role that WoE businesses play in the UK’s supply chain, its dynamic labour market and the market for ideas. It explores how important sectors in the WoE could strengthen these linkages and drive productivity growth by collaborating with businesses across the rest of the UK. We have also analysed the benefits to the rest of the UK from growth, investment and employment in the WoE region and as far as possible mapped its international trading partners.

Agglomeration Analysis

In this section we explore the likelihood of the presence of these effects in the WoE region and their strength relative to other economic hubs.

There are two key conclusions from our long-distance agglomeration econometrics:

- 1) The linkages between the WoE region and key hubs situated to the North and East (including London, Birmingham and Oxford) are much stronger than those to the South such as Exeter and Southampton.
- 2) The linkages on a per capita basis² between WoE-London and Birmingham-London are broadly of the same strength and actually potentially larger if we think of the WoE region collaborating with the Eastern end of the M4 corridor between London and Reading.

In this context, agglomeration refers to the economic benefits from concentrating economic output and housing in particular areas. Economic theory normally classifies these benefits into three different sources:³

1. **Labour market interactions** – local businesses are able to recruit from a larger pool of people with relevant skills.
2. **Knowledge spillovers** – larger concentrations of firms and workers makes it easier to exchange ideas and information, which often occurs over smaller geographies.
3. **Integrated supply chains** – stronger linkages lead to reduced transport costs, the ability to share resources, supply chains and infrastructure.

Figure 1 below maps an index of connectivity across the UK, as measured by an index of agglomeration. What we are measuring here is a region’s “access to economic mass” i.e. how easy it is for firms to communicate, compete, trade and access a pool of skilled labour. In terms of its raw interpretation, the index is measuring the travel time a firm or worker would need to undertake to access a consistently sized amount of economic activity (in this case a pool of labour of 1,000 workers). The shorter the travel time, the greater likelihood that agglomeration benefits are present.

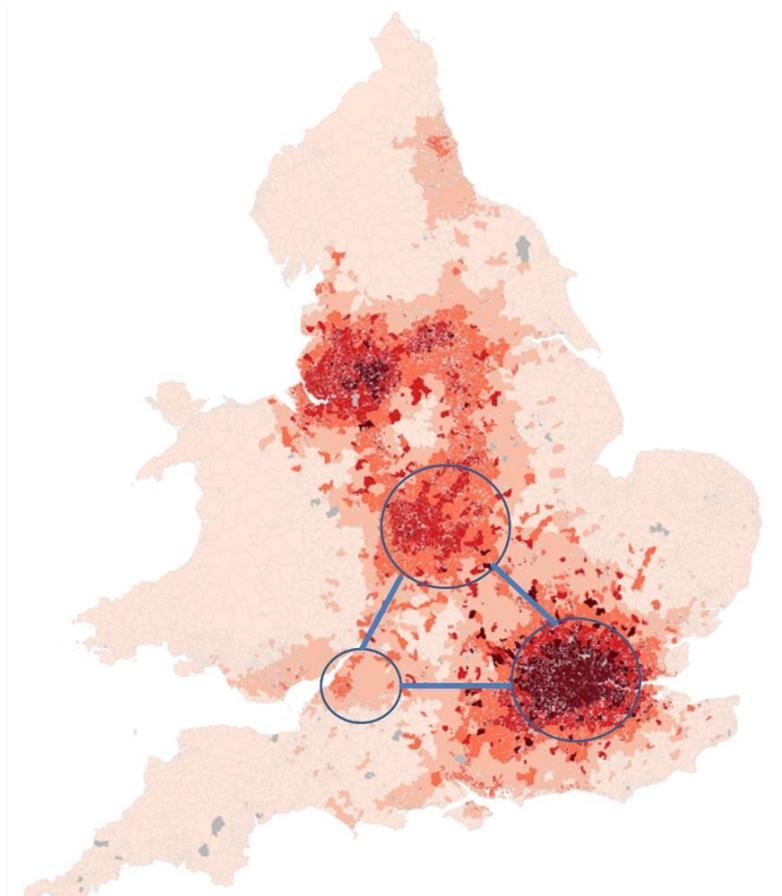
² Overall the flows of activity between Birmingham and London are going to be larger in magnitude, but when controlling for economic size the linkages are of similar strength.

³ It is important to note that this analysis does not allow for the disaggregation of these agglomeration benefits, and only allows for estimating the overall levels of agglomeration and connectivity.

On the map, the darker shaded areas show higher levels of connectivity relative to the UK average. There are roughly 2,400 sub areas on the map (referred to as Lower Super Output Areas, LSOA), each has an average population of about 1,500 people and relate to post code areas e.g. BS20, BA1. There are 5 shades of red on the map – the darkest red means that a business in that area has on average 40% or more connectedness than the national average. The bulk of the map is shaded light pink (e.g. Cornwall, Wales, Norfolk) which represents regions that are below average. The shades of red in between represent 10 percentile bands – of which there are three (i.e. 0-10% greater than average, 10%-20% etc.). LSOA's with no data availability are shaded out in a light grey colour.

We have highlighted a clear “triangle” that exists between the WoE region, greater London and Birmingham. In the areas between these three hubs, it can be seen that the index still remains a darker shade of red than that shown on the bulk of the map which implies that on the major routes between these hubs (the M4, M5, M40) there exists corridors of activity that support between region agglomeration.⁴

Figure 1: UK map of ‘short-distance’ connectivity by LSOA



Source: PwC analysis and ESRI road travel time

⁴ The presence and economic activity associated with these corridors is well documented elsewhere and we do not discuss this evidence in this paper.

The index presented in Figure 1 is a measure of short-distance agglomeration – it is not designed to capture linkages between major hubs, but instead takes a granular look at economic hotspots. However, it is possible to infer that adjacent hotspots on the map imply agglomerated areas as each mini shaded area will pull in economic activity from surrounding areas.

An alternative measure would be a measure of long-distance agglomeration. Short and long-distance can be measured in different ways. This is what we have done, meaning in this case the indexes are not directly comparable, but represent a pragmatic estimation strategy to a complex problem. In terms of the differences between the two:

Short-distance agglomeration: focused on very granular level data and captures localised and potential overlapping effects between neighbouring regions. It does not capture agglomeration effects over longer distances. The measure used for short-distance agglomeration in this study is travel time to economic mass.

Long-distance agglomeration: less granular in its approach as it is based on aggregated data. For this measure we run regressions on business revenue. Take two geographical regions – Bristol and Birmingham – if business revenues in the same sector grow/contract at the same rates and have the same drivers/characteristics underpinning them (e.g. population sizes, journey times, wages, number/type of employees, investment paths) then we can infer that they are in some way linked and therefore agglomerated. We estimate these linkages using a complex econometric model to test whether these co-movements are random or not. Non-random variance in economic activity levels between regions is an established measure of agglomeration.

We can draw two key conclusions from our long-distance agglomeration econometrics:

- 3) The linkages between the WECA region and key hubs such as London, Birmingham, Cardiff and Oxford are much stronger than those with Southern economic hubs such as Exeter, Southampton and Bournemouth/Poole.
- 4) The linkages on a per capita basis⁵ between WECA-London and Birmingham-London are broadly of the same strength and actually potentially larger if we think of the WECA region collaborating with the Eastern end of the M4 corridor between London and Reading. Links between WECA-Birmingham are still well above the national average, but not quite as strong. This point reinforces the conclusions drawn in Figure 1 about the importance of the triangle of economic activity between these three regions.

Separately we also see that these linkages are just as strong as those between WoE and Cardiff. While the links between WoE and Oxford are as strong again as Birmingham's.

From these pieces of analysis we also might infer that WoE has a higher concentration of economic activities in higher value added sectors, such as finance and insurance. Economic literature backs this point, suggesting that economies with strong service sectors see greater benefits from agglomeration versus other more industrial based activities e.g. manufacturing. In addition, the WoE region may gain more from agglomeration than these other cities (Birmingham, Manchester etc.): while they are larger and have greater economic mass, they do tend to have a greater proportion of lower productivity sectors rather than more dynamic service sectors that make up a higher share of the WoE economy.

In conclusion this analysis points to **the WoE region's economic connectivity being more focused to the East and North as opposed to the South which it is often associated with**. Our analysis suggests that these linkages are stronger on a per capita basis and little has been said about their

⁵ Overall the flows of activity between Birmingham and London are going to be larger in magnitude, but when controlling for economic size the linkages are of similar strength.

relative size until now. **The implication of this connectivity is that the WoE plays a substantive role in driving the performance of the UK economy through creation of linkages in terms of people, ideas and supply chains.** Going forwards, the parts of the WoE economy that are focussed on services could provide a platform for greater collaboration between these regions.

Sectoral Analysis

The WoE ranks 15th out of all LEPs/CA's (38) for productivity levels (£34.50 of output per hour worked, 2015 nominal prices). This implies that the region's people and businesses are efficient turning inputs into valuable products and services which are then either consumed locally or sold to other economies. WoE's insurance services sector has a significantly higher level of productivity than other sectors with a GVA per job of £350,000⁶ - which is over seven times the WoE average.

The Office for National Statistics (ONS) define a particular sector – the “manufacture of other transport equipment” – and the data shows that this sector has the highest regional concentration of jobs in the WoE, three times greater than the rest of the UK. This is most likely influenced by large multinational businesses operating within the region, including Airbus and GKN Aerospace. Since 2009, this sector has grown robustly in the WoE, yet the broader industry has been in decline.⁷ This can be explained by the resilience of the relatively unique activities carried out across these businesses.

Other prominent sectors which have been identified across the region include: information services; financial services; and architecture and engineering activities. The information services sector has seen more than a 40% increase in its concentration in the region between 2009 and 2017. A strong services economy positions the WoE economy to ride the new wave of technological innovation over the coming years, including, digital health, quantum computing and new automation processes.

WoE businesses often play a specific and specialised role in their industry supply chain. From the five prominent sectors highlighted, the most relevant sub-sectors appear to be aerospace and spacecraft engineering; data hosting and processing; life insurance and; engineering and technical consultancy.

As part of the LIS process, other regions are assessing their relative strengths in terms of sector performance and examining opportunities for cross-fertilisation within their regions and across regions. In the WoE, research into collaborative innovation is seeking to understand the factors that promote and hinder such cross-linkages in the regional economy. e.g. within WoE how could financial services link in with data hosting and processing? Or facing outwards, how could spacecraft engineering businesses better collaborate with other space hubs in Oxford and Cambridge? Providing platforms for engagement and investment for these linkages to occur will be an essential part of a future growth strategy.

Benefits of growth in the West of England to the rest of the UK

An investment multiplier reflects the economic theory that an investment (public or private) has a more than proportionate impact on aggregate income and the general economy. More specifically, the multiplier attempts to quantify the additional effects of an investment beyond those which are immediately measurable. The larger an investment's or a business' multiplier, the more efficient a region is at creating and distributing wealth throughout the local and wider economy. For instance, our analysis suggests that for every £1 of GVA generated by WoE-based businesses, the rest of the UK gains by about 60p. This is roughly 15% higher than the M8 average (excl. London/Bristol).

⁶ WoE Input-Output table, 2014

⁷ According to shift-share analysis

In this instance, a specialist, but well respected technique known as Computable General Equilibrium (CGE) modelling⁸ has been used to calculate a range of economic multipliers for the WoE region. CGE models combine economic data and a complex system of equations to capture the interactions between economic agents – households, firms and the government - through different channels, such as labour markets, capital flows, consumption, product demand, taxes or fiscal transfers. This is different from previous work that WoE has engaged with to estimate multiplier effects in the region – these new multipliers are dynamic, account for displacement and are “net additional”.

Table 1: shows a set of economic multipliers for the WECA region (blue columns), including comparative multipliers for the rest of the M8 cities (excluding London and shown in the green columns) and the UK as a whole (red column). They show both the benefits which are retained within the WoE region as well as the economic spill over to the wider UK economy. These multipliers represent the total economic benefits (including direct, indirect and induced impacts).

The multipliers are interpreted as follows - take the blue column first row. For every £1 of business investment within the WECA region, it generates total economic benefits of approximately £2.20 within the region and a further c. 80p for the rest of the UK economy (based on the mid-point of the ranges presented in the table). Correspondingly, M8 (non-London/Bristol) equivalent figures are £1.90 and 75p. At the UK level, our modelling suggests that £1 of business investment yields roughly £1.65 – so the multipliers for business investment in the WECA region are considerably higher than comparable M8 cities and the national average.

Table 1: Economic multipliers for WoE, M8 Cities and the UK

Multiplier	Benefits kept within WoE region (range)	Spillover effect to rest of UK (range)	Total benefits kept within M8 cities – excluding London/Bristol (range)	Total spillover effect to rest of UK (range)	Average multiplier for UK (average of CGE model and literature review)
£1 of business investment	£2.15 - £2.25	£0.60 - £0.95	£1.65 - £2.30	£0.50 - £1.00	£1.65
£1 of external trade	£1.90 - £2.10	£0.35 - £0.45	£1.55 - £2.00	£0.40 - £0.55	£1.82
£1 GVA growth	£1.60 - £1.75	£0.50 - £0.70	£1.35 - £1.65	£0.35 - £0.55	£1.35
1 FTE employment growth	1.3 - 1.35	0.5 - 0.7	1.2 - 1.4	0.40 - 0.60	1.2

Across all metrics, the WoE region generates at least as good and in most instances greater levels of economic benefit for the wider UK economy when compared to the rest of the M8 group. They imply **strong value for money relative to other parts of the UK from a wider economy perspective if policy measures that can boost business investment, trade, GVA or employment growth are effectively implemented.**

It is important to note that these are the results from an economic model, albeit a relatively sophisticated one, and do not represent a full scale evaluation of the success of business investment, international trade policy etc. in the WoE. We have tested critical assumptions and data in the model (hence results are provided as a range rather than point estimates) and the ranking of the results do not alter substantially. That is not to say that the overall robustness of this narrative could be increased by supplementing it with supporting evaluation evidence. However, as far as we have seen, this is the first analysis of this type at the UK regional level.

⁸ This is the same technique used by Government to calculate the impact of large infrastructure investments or policy changes e.g. devolution of fiscal powers to Scotland or the economic effects of Brexit.

Trade Flows

The WoE economy currently runs a net trade surplus of £894m, largely driven by service exports. This trade surplus is higher than that of many other major economic hubs, such as Manchester, Cambridgeshire, and neighbouring cities like Cardiff. All of which present trade deficits. Within Bristol, trade is driven by the export of services. Oppositely, in Bath and North East Somerset, North Somerset and South Gloucestershire, the export of goods is the main driver.

Imported goods make up a considerable proportion of international trade for the WoE, however, this is quite typical of higher growth economic areas, where households have higher disposable income and therefore have a greater demand for more diverse imported goods. The trade ratios for the WoE as a proportion of GVA is 19.7% for exports and 18.5% for imports, which is on par with other high performing regions e.g. Manchester and Birmingham.

Goods and service exports in the WoE are worth 20.7% of GVA which is broadly in line with other regions such as Manchester (16.4%) and Birmingham (23%). While the WoE's exporting performance is strong, the UK's exit from the EU may bring risks to the region's trading position; as most of the WoE's goods trade is with the EU partners (£2.85bn of exports). This highlights the importance for WoE's businesses to look at trading opportunities not just in EU markets but across other fast growing economies such as Brazil, India and China.

Our analysis suggests that the WoE is a region that demonstrates strong net positive levels of trade with other countries relative to similar core economic hubs. These linkages could be further built on as part of the WoE LIS.

Data from the ONS indicates that the WoE's main EU trading partners are Germany, France, Spain and the Republic of Ireland, totalling an export value for the wider region of £3.66bn. Outside of Europe, the US and UAE are the largest Non-EU export countries contributing £2.69bn to the wider NUTS2 region, which may present future trading opportunities. However, we must be careful about the conclusions that we can draw. There is no data on the specific partner countries that the WoE trades with or the specific goods and services. We can only infer potential trading partners based on more aggregate NUTS2 level data (which includes Swindon, Wiltshire and Gloucestershire).

Infrastructure Connectivity

As the WoE develops its LIS to achieve long-term sustainable growth, it will be critical to build lasting infrastructure that connects the WoE to key economic corridors across the country. Greater connectivity with other regions will better connect people to more suitable jobs and enable stronger supply chain linkages for businesses. Furthermore, it is crucial to note that high performing regions, such as the WoE, may experience a slow down or even negative growth if they don't invest in infrastructure. This could lead to the region becoming too congested and subsequently deter investors.

In this Section, our analysis covers two main components (i) the Severn Bridge toll removal and potential implications and (ii) an assessment of current digital infrastructure across the region. These topics have been highlighted as areas to uncover with the wider view of upgrading the region's infrastructure which is set to be a key lever for unlocking faster economic growth.

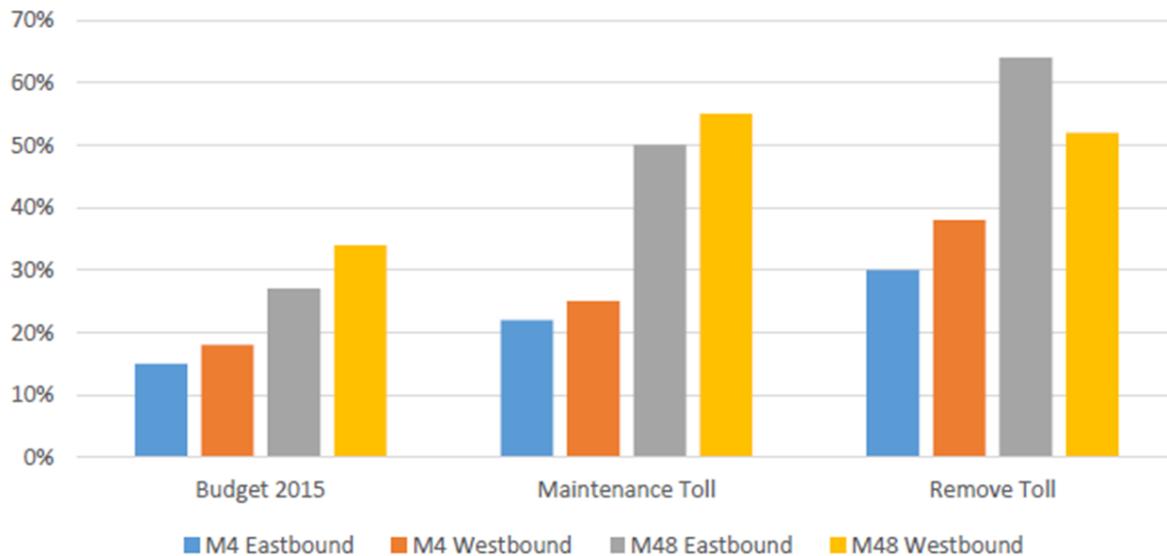
Severn Bridge Toll Case Study

The Severn Bridge toll was removed on the 17th December 2018, with little publicly available information on the potential impacts of the removal. There were two primary reports available: The impact of the Severn Tolls on the Welsh economy (2012), Welsh Government and The Severn

Crossings: Reducing toll prices and other issues consultation documents (2017), Department for Transport (DfT).

Both reports concluded that there would be an increase in traffic flows across the bridge but disagreed on how significant this growth may be e.g. 12% (2028) for full toll removal in the report by the Welsh Government; and 17% (2027) for a reduction in toll costs by 50% by the DfT consultation document. Due to the wide array of assumptions used across these two documents, it is difficult to triangulate any findings with the view to give an accurate representation of the impacts the WoE may face as a result of the toll removal. The Welsh Government report had a primary focus on evaluating economic impacts, however, these were concentrated on the impacts of the Welsh Severnside.

Figure 2: DfT projections in traffic volume changes (Source: DfT FOI request)



Source: DfT FOI

A model released by DfT shows that the removal of the Severn Bridge toll could increase traffic crossing the M48 by over 50% by 2022; with all bridges seeing at least a 30% increase in traffic flow. Within the WoE, the biggest impact in traffic flow will be seen in Bristol and South Gloucestershire with traffic flows increasing by 41% and 31% respectively in the toll-vs-no toll scenarios. In July 2018, an FOI request was made to DfT asking to see the traffic modelling that Central Government had undertaken on the impact of the removal of the Severn Bridge toll. There was great interest in how this change would impact the road network around the Bridges and in the South Wales and North Bristol (M4/M5 corridor) corridors. Within DfT's response it states: *"The decision to abolish tolling at the Severn Crossings was to support motorists, residents and businesses across Wales and the South-West, to help rebalance the economy as part of the Industrial Strategy."*

WoE authorities commissioned Atkins to look at the high-level impacts of increased traffic flows on the WoE network as a result of toll removal, and to assess the extent to which existing components in the Transport Vision could contribute towards mitigating the impacts. Atkins engineering consultancy highlighted a number of interventions such as: Park & Ride for Bristol and Bath; Freight consolidation (general policy measures; and Financial measures and other controls (e.g. workplace parking levy etc.) from the existing Transport Vision which would mitigate the risks around increased traffic flows but also identified other initiatives such as: Intercept residual trips to Bristol urban area using M48; Intercept trips towards Bath; and Expanded scope of demand management measures for the region to consider.

In summary, Bristol is forecast to be the most affected by the Severn Bridge toll removal with traffic flows increasing by 41% by 2022 according to DfT projections. The DfT rationale is built on "rebalancing the economy" – reducing commuting costs by up to 25% if doing short distances either end of the bridge crossing. This further supports the argument that Bristol and the wider WoE region can expect higher volumes of cars on roads. Impacts of this are two-fold – the region could benefit from the additional road passenger flows and the economic activity that is associated with it, but conversely these flows increase risk of greater congestion, potentially deterring new investment from outside the region.

Digital Connectivity

The WoE has a significantly higher proportion of internet users than the national average; with both Bristol (92.8%) and Bath and North East Somerset, North Somerset and South Gloucestershire (93%) landing in the top 20% of all NUTS3 regions. Nationally, the proportion of internet users has grown by 11% since 2012 to 89.8% in 2018. This means 89.8% of people aged 16 or over have used the internet within the last three months. With the number of internet users continuing to grow, regionally and nationally, it is important that digital infrastructure improvements keep pace with this trend.

When considering fixed broadband, South Gloucestershire has the best Ultrafast broadband availability in WoE (approximately 60% coverage) with Bristol close behind at 47% coverage. These numbers are above other high-performing areas such as: Cardiff (43%); Cambridge (36%); and Manchester (41%). However, there seems to be significant disparity across the WoE landscape, particularly for areas which are more rural. For example, North Somerset only has a 1% Ultrafast broadband coverage, well below the WoE average. In a survey of businesses by CBI, 67% of national businesses have identified strong digital connectivity as 'Critical'.⁹ It is important to note that this is a fast changing landscape with rapid improvements underway e.g. the ultrafast BB programme by BT. Nonetheless, the WoE should consider further measures to expand digital connectivity across rural areas, as this is likely to improve business connectivity, rebalance growth and overall performance.

Bristol has high rates of 4G availability (with 98.9% coverage outside and 77.3% inside). This is on par with other high-performing areas. However, similar to fixed broadband connectivity, areas within the region e.g. North Somerset, are lagging behind. With the rise of smartphones, laptops and tablets; the amount of people accessing internet 'on the go' nationally has increased by 28% since 2013. Strong mobile data availability is now imperative for businesses and commuters who rely on mobile connectivity to be effective in the way they work. According to Ofcom, seven in ten commuters are now using their smartphone on their journey (Ofcom Communications Market Report 2018).

In the WECA Business Plan for 2018/19¹⁰, it outlines the ambition to have world-leading digital connections across the region. If the region is to achieve this, interventions that upgrade digital connectivity in more rural areas must be prioritised. Improving digital connectivity across the region will boost worker productivity and the capacity of local businesses, which will have a significant positive impact on both the regional and national economies.

Going forward, the WoE will need to rebalance 4G and ultrafast broadband availability so that rural coverage is on par with urban coverage in the likes of South Gloucestershire and Bristol. Addressing these disparities will bring direct benefits to smaller businesses and workers across the region, promoting more digital and collaborative ways of working, which will ultimately help the economy operate at its full productive capacity.

Movement of People

In order to promote clean and inclusive growth, the WoE economy needs to prepare for rapidly changing social demographics and understand the potential impact on its workforce and infrastructure. This section reveals insights into how people travel for work and what sectors are in need of support to facilitate higher growth. It also explores the flow of people with other areas in the UK to identify areas of potential collaboration with other Local Industrial Strategies.

⁹ CBI Infrastructure report 2017

¹⁰ <https://www.westofengland-ca.gov.uk/wp-content/uploads/2018/05/Business-Plan-May-2018-1.pdf>

Commuting Patterns

On average, across all sectors in the WoE, 81.7% of residents commute for work, which is similar to the average across England/ Wales of 81.2%. More specifically, the proportion of residents that commute for work varies by sector, from 47% in construction to 95% in the finance and public sectors. With an average propensity to commute to work, the WoE should continue to prioritise actions on congestion and investment in infrastructure.

In the finance and insurance sector, 12% more people in the WoE travel under 10km to work compared to the England and Wales average for the sector. Similarly, 13% more working professionals in the WoE travel less than 10km to get to work versus England and Wales. These shorter commuting distances can have a significant impact on quality of life, and adds to the region's reputation as a desirable place to work. However, this can vary depending on the industry that is worked in. For example, 32% of people who work in manufacturing commute over 10km to get to work whereas only 24% of people who work within public administration commute over 10km.

The Travel to Work survey¹¹ estimates that 44% of employees working in the WoE favour their car to commute versus other modes of transport. With average levels of commuting, and more people using cars as the primary transport, WoE should continue to consider initiatives to encourage the use of alternative modes of transport. Public bus (44%) and trains (45%) currently have the lowest percentages of people satisfied with their normal journeys to and from work. Respondents in Bristol and South Gloucestershire explained the main reasons they travel by car versus public transport, walking, cycling or car sharing, is (i) it is too far to walk, (ii) they have a quicker journey time travelling by car and lastly (iii) car sharing would not give them sufficient flexibility.

Short-term International Migration

The overall growth in short-term international migration for the WoE region has largely been driven by international students moving to South Gloucestershire, with the area experiencing a significant rise in students between 2011 and 2016. Since 2011, people moving to the WoE for employment has also increased significantly, driving up the overall levels of short-term international migration. Bristol is responsible for around 64% of this increase. Historically, the majority of short-term international migration has comprised of students into the WoE area. However, over recent years this is not as pronounced with shares of short-term international migration more evenly split between people moving for employment and for study. This change in reason for migration could impact accommodation and housing, as students and employees will have different housing needs.

Long term International Migration

Since 2015, the WoE's long term international migration has fallen sharply across all areas in the region, decreasing by 13% in 2017. This pattern aligns with the announcement of the of the EU exit referendum, but data is too recent to claim a direct cause. The WoE had the fifth highest outflow of long-term international migration compared to other LEPs in 2017, primarily driven by Bristol, which seen increased outflows of 28% between 2015 and 2016. This suggests that the area has an encouragingly high level of international connectivity, but WoE could consider initiatives to help retain skilled people in the region.

¹¹ Travel West, 2018 - https://s3-eu-west-1.amazonaws.com/travelwest/wp-content/uploads/2017/11/All-Organisations_2018.pdf

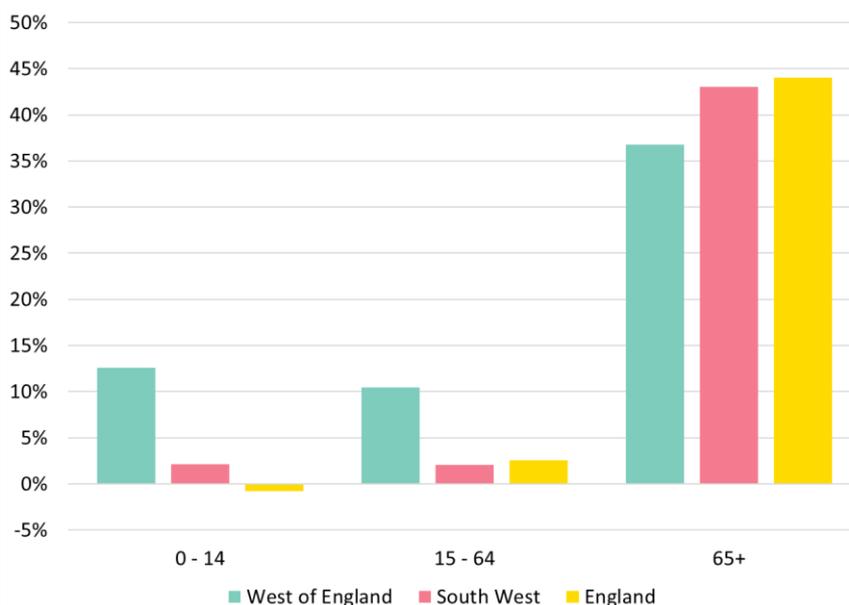
The WoE attracts more international migrants than its neighbours, with a larger net inflow than Swindon and Wiltshire LEP, and Gloucestershire LEP. However, the region does have lower net inflows compared to other high performing regions like Greater Birmingham and Solihull, and Greater Manchester. This suggests that more could be done to build the region’s brand as a great place to both work and live.

Internal Migration and Population Projections

The WoE’s consistent inflow of young people suggests that the region remains an attractive place to study and start a career. The WoE has consistently had a positive net inflow of people moving into the region each year since 2005. When looking at internal migration broken down by age, there is a positive inflow with the 15-24 (+5,220) and 25-44 (+1,090) age categories; and all other age categories experiencing a net outflow in 2017.

The WoE is an attractive place in the M4 corridor for innovation and development, with consistent inflows of young people from London and the South East boosting connectivity. When considering the overall net flows of people, the WoE attracts people from London (950) and the South East (870) but loses people to neighbouring areas in the West. This is an interesting pattern, as net inflows tend to be for younger people from the North and the East, while outflows tend to consist of older generations moving to the South and West.

Figure 3: Population projects by broad age group, 2018 – 2038



Source: ONS

The expected growth in working age population, and continued attractiveness for students, suggests that the WoE has an opportunity to take advantage of a significant demographic dividend. Based on ONS projections, the WoE is forecast to see growth in its working age population of 10.4%. This is significantly higher than the South West (2.4%) and England (2.6%). The WoE can expect to have a proportionately larger pool of workers to support businesses in their growth plans. Over 70% of

students from the WoE stay in the region immediately after graduating. Bristol also gains the third highest number of graduates of cities outside London - ahead of Oxford, Cambridge and Edinburgh.¹²

Flow of Ideas

The WoE's LIS should set out how it could help the UK to achieve its ambition of being "the world's most innovative economy". This analysis provides strategic insight into the whole innovation life cycle from seeding an idea; to testing and developing; and finally to scaling and commercialisation. It demonstrates the impact of collaboration between universities and businesses and how this could further drive productivity growth across the country.

Academic Collaboration

The first step in the innovation lifecycle is coming up with a compelling idea. The WoE has a strong and well-connected academic base for seeding these ideas. To explore this, we looked at the extent to which universities in the WoE collaborate. We were interested to see how they worked with each other, how they worked with other institutions in the UK, and how they worked with universities in the rest of the world.

We found that WoE universities tend to collaborate more than other universities do, both nationally and internationally. In terms of the proportion of papers written in collaboration with other UK universities, the Universities of Bristol and Bath average around 9% points higher than the UK average. They have also kept pace with the growth in international collaboration in the last 15 years. They have grown their proportion of papers with international research partners by around 60% since 2002. While UWE and Bath Spa do fare lower on these measures of international collaboration, they interact strongly with Bristol and Bath, suggesting that there is a compelling local academic hub underpinning innovation in the WoE.

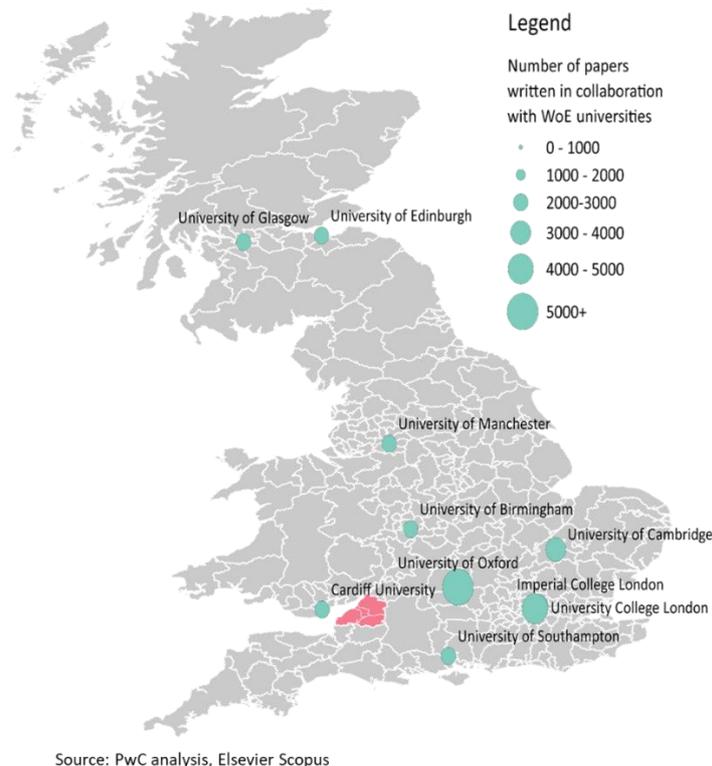
In terms of who WoE collaborates with, the Economic and Social Research Council (ESRC) have identified that the WoE sits in an 'innovation arc' stretching across the M4 corridor, from London to Cardiff. The WoE contributes significantly to the strength of this arc as WoE universities tend to collaborate most often with Oxford, Imperial College, and University College London, as highlighted in Figure 5 below. The universities in the WoE also appear to have strong working relationships with businesses, particularly in manufacturing, aerospace, and transport. The University of Bristol has the seventh highest level of income from business services of all UK universities.

Our research suggests that collaboration between universities and businesses is one of the major factors contributing to the region's high innovation performance. The National Composites Centre (NCC) is an example of this in practice: based in University of Bristol, but tied to innovation in aerospace. A study of the NCC highlighted that the WoE is a national leader in high value manufacturing, with over 200 academics dedicated to ground-breaking composites research. Going forward it will be important to build out these case studies in more detail and link their relevance to the Industrial Strategy's Grand Challenges.¹³

¹² Centre for Cities report, 2016

¹³ <https://www.gov.uk/government/publications/industrial-strategy-the-grand-challenges/industrial-strategy-the-grand-challenges>

Figure 4: Location of top-10 collaborating institutions for the WoE universities (2010-2018)



Connectivity in Business Innovation

The next stage of the innovation lifecycle is testing and scaling an idea. We considered this by looking at the connectivity of innovative businesses in the WoE. WoE businesses appear to be well-connected to public investors, for example, with the WoE earning the third highest value of Innovate UK grants across all LEPs. Scale-up businesses, i.e. those businesses that are disrupting existing industries and pushing to scale-up activities, are often most dependent on finance for future growth. SETsquared, a scale-up incubator largely led by activity from Bath and Bristol universities, was set up to help connect innovators to investors. The organisation has been a huge success for the region, and has been recognised by UBI Global as the number one university-managed incubator platform in the world. These kinds of connections help build a supportive ecosystem for scaling innovative businesses.

Connectivity to public finance appears to be strong in the region, but insights from Engine Shed, a scale-up incubator based in Bristol, suggests that greater availability of private finance could lead to more growth in innovation. That said, the WoE is starting from a good base of private innovation, as the region had the second fastest growth in scale-up density over the last five years. Scale-up activity is considered a leading indicator for growth, so this may help position WoE for resilient growth in the future economy. To continue this success WoE could consider methods to overcome some of the barriers to scale-up growth identified by the ScaleUp Institute, namely restrictions on talent, infrastructure, and access to international markets.

Research and development activity is strong in the WoE with the area having the fourth highest proportion of R&D employment across all LEPs at 10% versus the average of 7%. This is especially interesting considering that WoE businesses only spend an average amount on R&D. This could

indicate a high level of productivity for WoE 'Ideas' workers. This potentially opens up an area for further investigation in the LIS.

Innovation and Patents

The final stage of the innovation lifecycle lies in commercialisation of the idea. We have looked at patents as a way of understanding how successful the region is at protecting and commercialising its ideas. We found that the WoE files over twice the number of patent applications per million inhabitants than the UK average.

This success in patent filings is partly driven by some large, highly innovative firms like Airbus and Rolls-Royce. Data on individual patent inventors, however, shows that the WoE has also consistently supported high numbers of individual inventors over time. **In 2015 they had the fourth highest number of registered inventors on patents developed over the last three years. This suggests that the WoE is equally effective at facilitating innovation on a large and small scale.**