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Polycentricity and Regional Economic Development

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Abstract

This paper examines the role of geography in shaping regional economic development. More specifically, it is interested in whether economic performance depends on the presence of a dominant large city, or whether regions can achieve prosperity through cultivating a regional network of medium-sized cities and boroughs. The research also explores the strategies that polycentric regions – those with a network of medium-sized cities and boroughs – should pursue to generate the best possible economic outcomes for the people and businesses who live and work in them. While the focus is on regional economic development in England, the international evidence on which the paper draws offers lessons for developing and developed market economies more broadly.

Polycentricity and Regional Economic Development

Introducing monocentricity and polycentricity

Some cities are bigger than others. When you plot all the cities in a given territory on a graph and order them by size, you tend to see a relatively straight, diagonal line that shows cities getting proportionately and steadily larger in roughly equal increments. This is visualised in Figure 1 to the left (O'Connor, 2009[i]), which shows the populations of cities in the United States, India, Brazil, China, Russia and Nigeria. This pattern is known as Zipf's Law[ii].

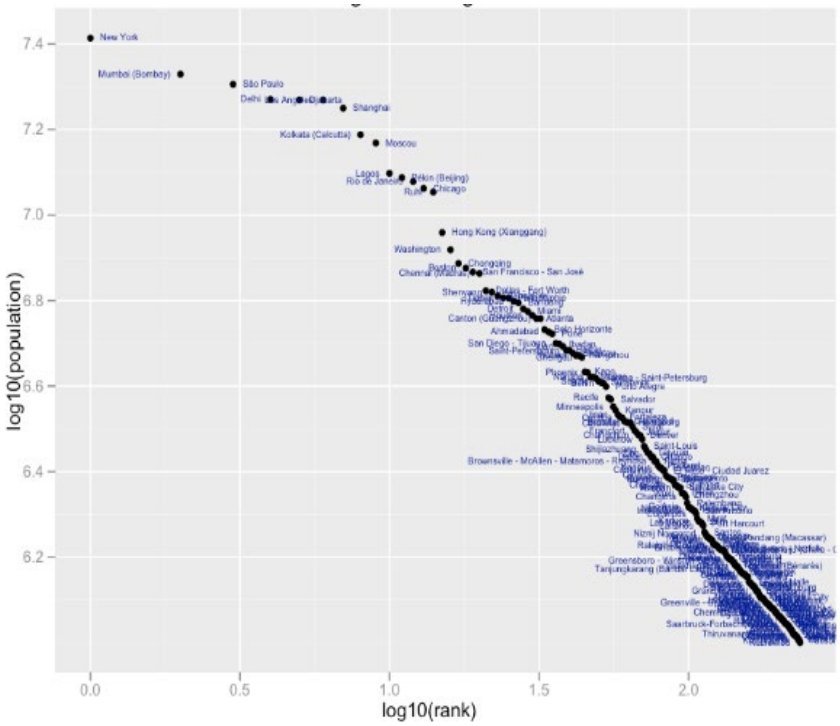


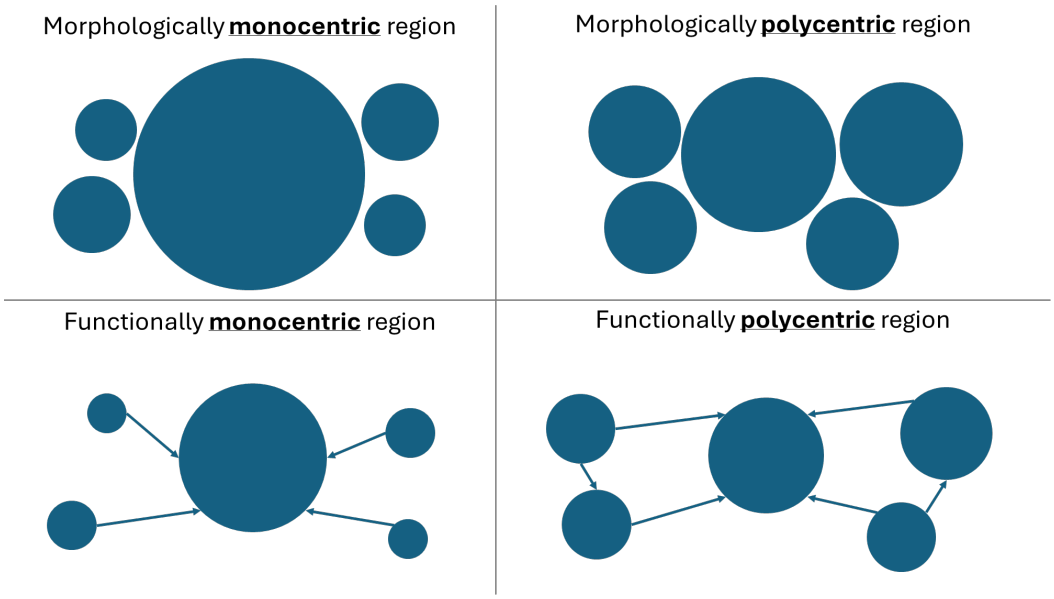
Figure 1: Zipf's law

Contemporary research suggests that Zipf's Law does not hold up everywhere[iii]. But for the purpose of this discussion, it is the basic core principle of it that matters. There is a size hierarchy between cities and some cities are bigger than others, at the national and regional levels.

Monocentric and polycentric regions buck this trend. In morphologically monocentric regions, the biggest city plays a relatively larger, outsized role in the regional economy. In morphologically polycentric regions, economic activities are more balanced across a range of cities and boroughs.

There are other dimensions to monocentricity and polycentricity, too. Whereas morphology is about 'where things are', functional monocentricity and polycentricity looks at the 'flows' of economic activities between the cities and boroughs of a region. In functionally monocentric regions, most economic activities flow into the central city. In functionally polycentric regions, there is a greater flow of economic activities between a region's cities and boroughs. Countries can be monocentric and polycentric, too, but this is not the focus of this paper.

Figure 2: Morphological monocentricity and polycentricity[iv]



While these may seem like abstract concepts, they have real-world implications. The rest of this paper will evidence that ‘where things are’ (morphology) and ‘how economic activities flow between places’ (functional integration) affect how well a regional economy performs – and, ultimately, people’s quality of life.

These are not original observations. Researchers have been investigating monocentricity and polycentricity – what these concepts mean and what their implications are for economic development[v] – in detail for at least the past two decades. The purpose of this paper is not to try to do justice to the ground they have already covered. Rather, it is to try to build upon the work they have done and offer additional insights to assist local, regional and national practitioners to craft more effective and impactful policy, investment and governance strategies.

The morphology of England's regions

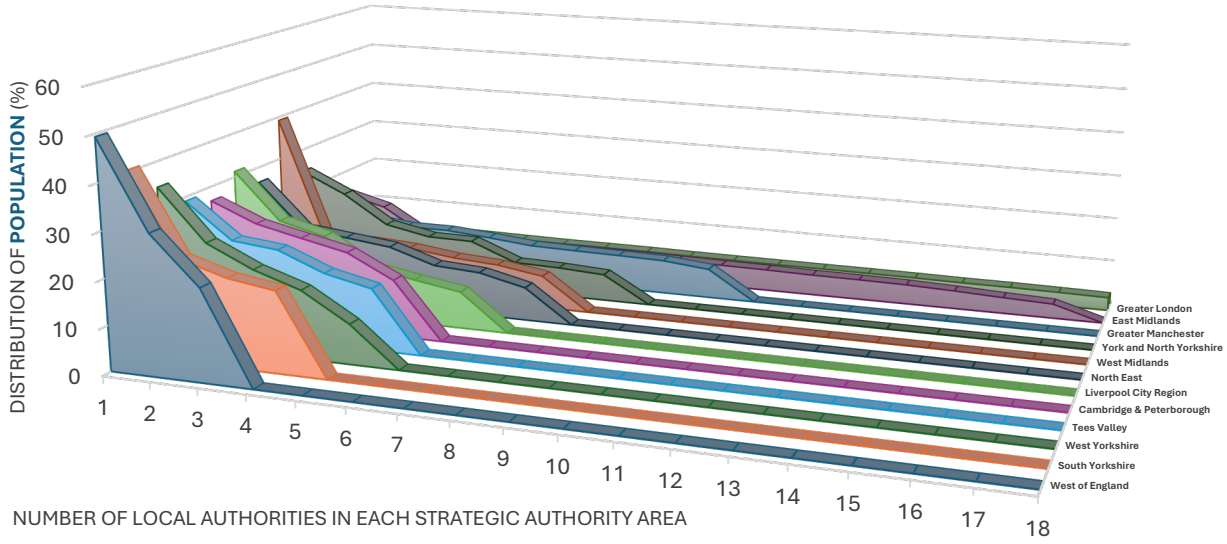
What is the morphology of England's regions, and which could be said to be monocentric or polycentric? This paper considers the question by looking at the geography of England's strategic authority regions, the regional tier of government in most parts of England. (For the purpose of this paper, this is what is meant when the term 'regional' is used.) At the time of writing, there are 16 strategic authorities in England[vi]. If the government's devolution plans are implemented, the country is on track for 77% of the population of England to be covered by a strategic authority over the coming years[vii].

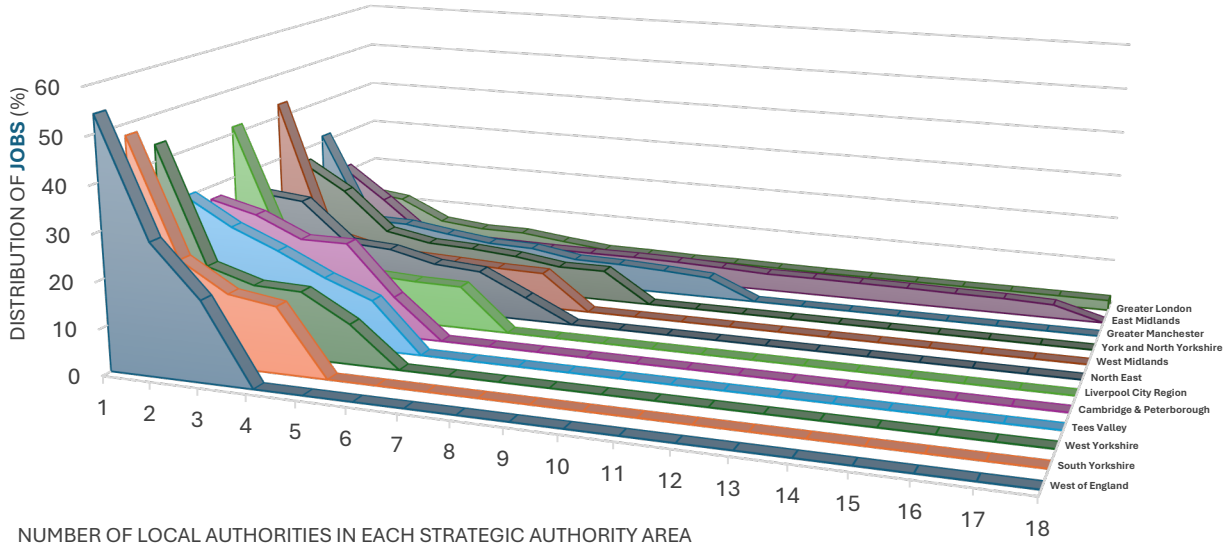
The number of people who live in an individual strategic authority region ranges widely from 678,300 (the smallest by population, Tees Valley) to 8,804,900 (the largest by population, Greater London). This makes strategic authorities comparable in scale to the smaller of Germany's länder, the smaller of France's régions and roughly equivalent in size to the Dutch provinces. Strategic authorities are responsible for a significant and growing number of public administration responsibilities, including, and most importantly for purpose of this paper, regional economic development.

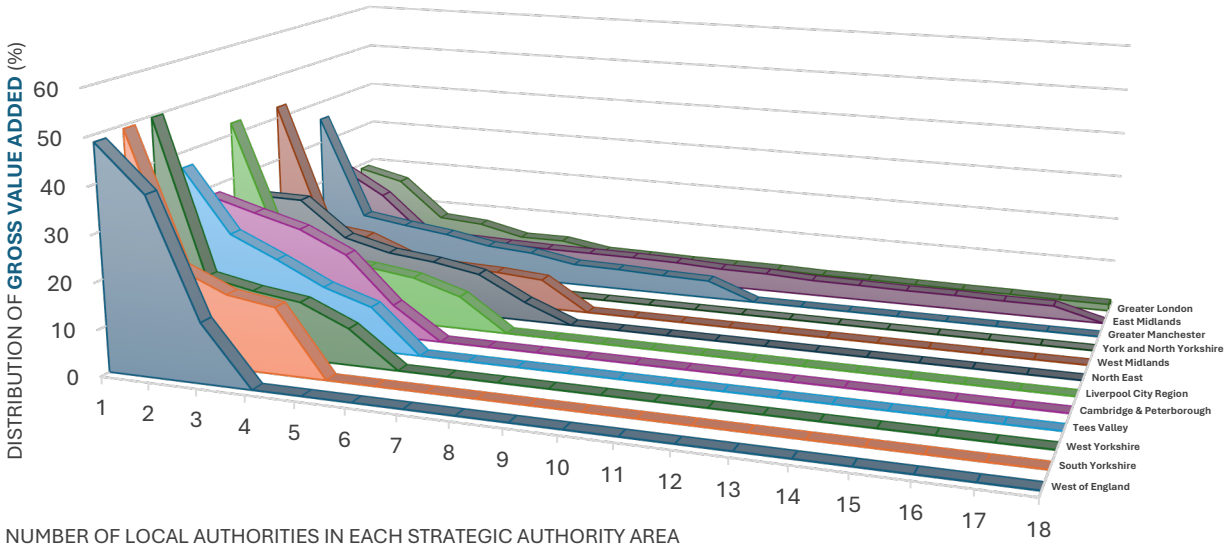
Figure 2 presents data on the morphology of 12 of England's strategic authority regions to suggest which are most monocentric[viii] on the basis of the spatial distribution of population, jobs and gross value added. Whereas most analyses of morphology focus just on the distribution of population alone, three measures are presented to provide the fullest possible picture. It is important to look at the distribution of gross value added alongside jobs because what matters to regional economic performance is not necessarily where all jobs are, but where high-value jobs are located.

For each of the measures, the regional total – population, number of jobs and gross value added – is disaggregated across the constituent local authorities that make up the strategic authority region. (Local authorities are the geographical and political building blocks of a strategic authority, akin to municipalities in much of Europe.) In Figure 2, the strategic authority regions are ordered so that those with the smallest number of local authorities are shown first and the largest number last, so that the charts are readable. Further details on the method are provided in the end notes.

Figure 3: The (morphology) of England's strategic authority regions[ix]







Upon first glance at Figure 2, a strategic authority region would seem to be monocentric where, on the left-hand side of each of the graphs, there is a sharp spike that slopes down rapidly. This shows that the largest local authority makes a large contribution to the regional economy, because there is a significant difference in the relative size of the first and second local authorities. This is most evident in the West of England, where Bristol is around 50% of the region's population, jobs and gross value added. Conversely, a region would be more polycentric where there is a gentler slope between the largest and next largest local area, indicating a more balanced distribution of economic activities[x].

While this is one way to read the data, and is the most intuitive, this approach makes it more likely that strategic authority regions made up of a smaller number of local authorities will look monocentric. What we are really looking for, to see which regions are most monocentric, is whether population, jobs and gross value added are more concentrated in the first local authority, relative to what a 'normal' distribution would look like considering to the total number of places in any given region – remember Zipf's Law. This can be illustrated using a line of best fit (r^2) analysis.

Using the same data as Figure 2, Figure 3 shows how closely the distribution of the population, jobs and gross value added matches the line of best fit for each strategic authority region.

- Regions with a higher r^2 number (closer to 1 and in lighter yellow) fit the line of best fit relatively well. They are not very monocentric. Economic activities have a normal spatial distribution.

- Regions with a lower r^2 number (closer to 0 and in darker orange) do not fit with the line of best fit. They are more monocentric. Economic activities are disproportionately skewed towards the largest city (or cities*).

Figure 4: Population, jobs and gross value added – line of best fit analysis

Region	Population	Jobs	Gross value added
Cambridgeshire and Peterborough	0.98	0.87	0.91
East Midlands	0.54	0.45	0.5
Greater London	0.88	0.54	0.45
Greater Manchester	0.66	0.55	0.56
Liverpool City Region	0.91	0.62	0.62
North East	0.85	0.92	0.94
South Yorkshire	0.77	0.79	0.74
Tees Valley	0.93	1	0.92
West Midlands	0.51	0.49	0.58
West of England	0.97	0.95	0.94
West Yorkshire	0.95	0.72	0.67
York and North Yorkshire	0.88	0.77	NA

Using a line of best fit analysis takes account of the different number of places in each region. For example, Greater London, with 33 local authorities, looks the least monocentric in Figure 3, but the disproportionate concentration of economic activities in Westminster and the City of London comes through in Figure 3.

However, what Figure 3 does not show, but Figure 2 does, is that in Greater London and the East Midlands there is a close second lead city or borough. In Greater London, this is Westminster and the City of London, interchangeably on different measures. These are the political and economic capitals of the UK. While they are part of the same functional labour market, the data suggests London is more polycentric than the conventional narrative suggests[xi], with its two core metropolitan functions served by different places – akin to how the financial and legal centres of the Randstad region of the Netherlands are split across Amsterdam and the Hague, respectively. In the East Midlands, the close second city to Nottingham is Derby. This shows one of the weaknesses and blinds pots of the line of best fit analysis and illustrates why the data should be interpreted from multiple different angles.

While these methods provide simple, England-wide comparisons, they are crude and need to be taken with a heavy pinch of salt. Local authorities are an imperfect and inconsistent geographic unit of analysis for

understanding the spatial distribution of activities at the regional level. The East Midlands and York and North Yorkshire regions are comprised of very small district authorities in the way that other strategic authorities are not, because of how they were founded. In addition, the composition of strategic authorities says as much about the negotiated politics of place as it does about the purity of functional economic areas – a factor we will return to in a later chapter. Much more sophisticated analyses have been undertaken of regions' economic geographies, not least Manchester's independent economic review, which evidenced how the Greater Manchester economy centres around the monocentric orbit of the city of Manchester[xii]; the West Midlands' analysis of its internal economic geographies[xiii], which evidences the region's three distinctive functional economic areas; and a University College London analysis of how people move within distinctive transport corridors in Greater London[xiv].

The best way to interpret Figures 2 and 3 is not to take them as deterministic or conclusive, but to read them together, interpret their respective strengths and weaknesses and use them to inform a discussion that also draws on contextualised and local perspectives about where a strategic authority region sits on the monocentricity-polycentricity spectrum. The important takeaway is that local, regional and national policymakers and practitioners should engage with this question. This is because, as we will see, where economic activities happen and how they are spatially distributed has implications for their economic performance.

The economic implications of monocentricity and polycentricity

This paper is interested in monocentricity and polycentricity not because they are interesting concepts, but because they have implications for regional economic performance.

In the 1960s, urban anthropologist Jane Jacobs evidenced and extolled the economic and social benefits of locating people and businesses close to one another[xv]. She observed that, in New York, this led to high levels of footfall and spending in and round local shops; and, because of the greater number of 'eyes of the street', lower levels of crime and higher social cohesion. Jacobs' pronouncements bring to life the meaning of agglomeration economics, the core principle of which is that "spatial concentration increases productivity" (Rosenthal and Strange, 2020). Monocentric regions, where economic activities are disproportionately concentrated in a single district, are the embodiment of agglomeration economics.

Agglomeration and monocentricity have been major organising principles for regional economic development for the best part of 60 years. Over the past 20 or so, however, European researchers have explored polycentricity as an alternative to the monocentric model, one that more closely reflects the urban form of many European countries and regions – around a quarter of the population of the continent lives in a polycentric region (Derudder et al., 2021[xvi]).

In the 2010s, there was optimism among European researchers that polycentricity could be a positive force for regional economic performance[xvii]. Indeed, one analysis found that "a doubling of the degree of polycentricity increases metropolitan labor (sic) productivity by 5.5%"[xviii]. However, the majority of quantitative studies evidence the contrary.

- Studying all OECD member country regions, Brezzi and Verni (2014[xix]) evidence that "regions characterised by a lower degree of polycentricity—those with a more hierarchical system—are associated with higher levels of gross domestic product per capita".

- Studying all urban regions across 34 European countries, Caset et al (2023[xx]) evidence that "more polycentric regions and more dispersed regions are associated with lower [total factor] productivity levels … hint[ing] at the continuing importance of single-centre agglomeration benefits".

- Also studying Europe's urban regions, Ouwehand (2022[xxi]) evidence that "polycentric regions are unable to substitute for the economic urbanisation externalities associated with a single large city", measured using total factor productivity.

- Volgmann and Munter (2019[xxii]) looked at the rate of growth of metropolitical functions in German regions between 1995 and 2017 and evidenced higher growth in monocentric regions (+10.27% over this time period) than in polycentric regions (+1.61%).

- Several studies of China, which is embracing 'planned polycentricity' in its approach to urban development, also find that more polycentric regions generally perform worse economically than monocentric regions[xxiii].

Each of the studies above contains much more nuance than is summarised here, but the central and recurring theme is this: morphologically monocentric regions generally perform better on number of core economic development metrics than polycentric regions.

This narrative and the evidence that substantiates it are based on important but conventional definitions of 'economic performance' – namely, productivity and economic output – which are not favourable to polycentricity. Other studies have used other measures and arrived at different but still compatible conclusions.

For example, Li et al.'s analysis (2024[xxiv]) evidences that more polycentric German regions have lower economic inequality, which Sun et al (2019[xxv]) also evidence in China. Polycentric regions also tend to be

associated with lower housing costs and better quality of housing (Decamps et al., 2019[xxvi]), less congested traffic (Lee and Gordon, 2007[xxvii]) and better access to essential services (Hoogerbrugge et al., 2021[xxviii]). These positive upsides are consistent with the evidence of lower productivity and economic output. This is because in polycentric regions the forces of agglomeration are more diffused and weaker[xxix], which drives their relative productivity underperformance. By the same token, this also means the negative externalities of agglomeration – inequality, pressures on housing and congestion – are not as pronounced. In monocentric regions, the inverse is the case – economic performance is greater, but so are the negative externalities.

As with all large-scale samples, there are anomalies that buck the trend. There are monocentric regions that are underperforming and polycentric regions – not least the Randstad region of the Netherlands – that perform very well. One hypothesis is that monocentricity and polycentricity are essentially spatial frameworks that make it easier or harder, respectively, to organise the factors that affect economic performance. On this basis, it is possible to bring together the factors that contribute to economic growth and productivity in polycentric regions, but the evidence bears out that it is more difficult to do so than in monocentric regions. To further develop this claim, the next section will set out new evidence on what polycentric regions can do to offset the productivity penalty they face and realise their latent economic advantages.

Integrating polycentric regions

It is clearly not an option, economically or politically, to write off polycentric regions – they are home to a quarter of the population of Europe – so what strategy should they pursue? How can they increase productivity and harness the advantages that come from having more space? Several researchers[xxx] have made the case that the answer to this question lies in integrating – physically, economically, institutionally and politically – the cities and boroughs they comprise. This is sometimes referred to, as introduced above, as functional integration. The logic behind it is intuitive: to emulate the proximity, connectedness and spillovers of monocentric regions as far as possible, short of lifting and moving cities and boroughs closer to each other.

The evidence available on the economic impacts of functional integration is not extensive, but it does suggest it is indeed a positive contributor to economic performance.

- Analysing the 117 polycentric regions in Europe, Meijers et al. (2017[xxxi]), evidence that "[t]he stronger the cities in [polycentric urban regions] are functionally integrated, the better their performance in the sense of organising urbanisation economies. Institutional integration, or metropolitan governance, has a positive effect on the performance of [polycentric urban regions], although the effect is smaller than for functional integration."

- Analysing a larger pool of Europe's 609 polycentric regions, Meijers and Burger (2017[xxxii]) show that "[c]ities that are strongly integrated with other cities perform better than cities that have neighbouring cities with which they are only moderately or weakly integrated. This suggests that a higher degree of functional integration between neighbouring cities may override [the] negative effects of competition, diminishing agglomeration shadows … Smaller cities surrounding larger metropolitan areas are more attractive to industries than equally sized cities without a large neighbour." In their paper, performance means the extent of growth of metropolitan functions across the sample of countries between 2004 – 2009.

- Kauffman and Wittwer (2019[xxxiii]) assessed employment growth across all of Switzerland's 152 small and medium-sized towns. They find "evidence for employment growth if [a small and medium-sized town] is embedded in a dynamic network, meaning that employment growth in neighbouring cities and towns creates spillover effects for [small and medium-sized towns]. Thus, if local administrations want to influence their employment structure, they are well advised to engage in regional economic policymaking."

- Two studies have indirectly shed light on the impact of regional integration in England. Most recently, the Centre for Cities (2023[xxxiv]) evidence that places (in England) that are closest to the lead city of their region have higher (nominal) wages. Looking at a selection of England's northern city regions, Jones et al. (2009[xxxv]) evidence that "places with strong labour market links to the economic centre had seen an increase in gross value added, resident or workplace earnings"; and argue that "strengthening economic links between places [has] the potential to contribute to sustainable economic growth, higher individual prosperity, the attraction and retention of higher skilled workers and the reduction of deprivation". Neither of these studies specifically looked at polycentric regions, but their findings on inter-area connectivity are transferrable and relevant.

- However, not all places within polycentric regions benefit equally from integration. Meijers et al. (2016[xxxvi]) evidence that, while "network connectivity positively enhances the presence of metropolitan functions … [l]arger cities profit more from regional and (inter)national connectivity. The average marginal effect of regional network connectivity on the presence of metropolitan functions is positive for cities with over 500,000 inhabitants and for cities with less than 250,000 inhabitants it is generally negative".

The integration of England's regional labour markets

If integration is positive for polycentric regions' economic performance, as the evidence suggests, how integrated are England's strategic authority regions?

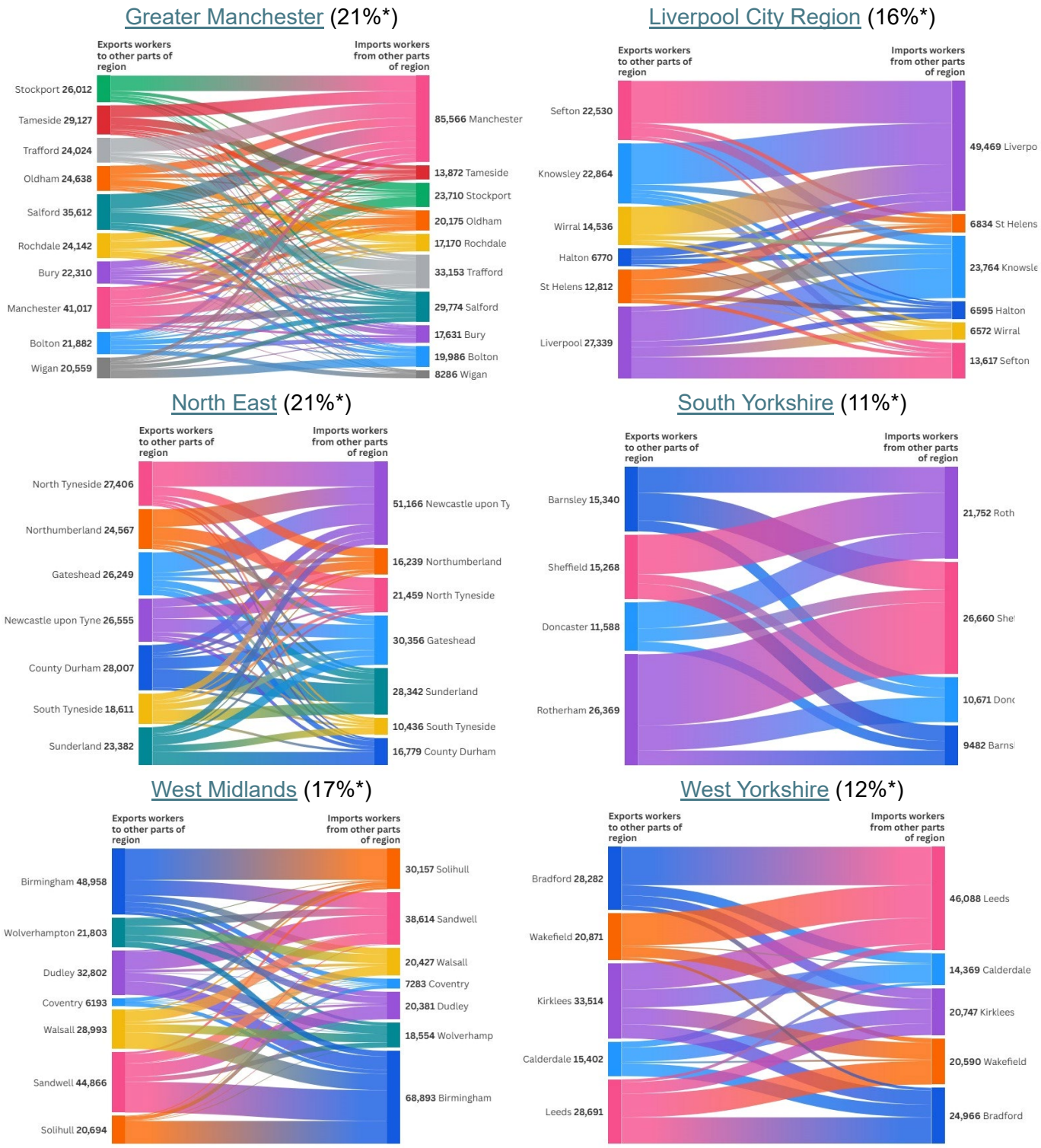
This paper presents, in Figure 4, new evidence on how functionally integrated strategic authority regions' labour markets are, based data from the 2021 Census on where people live and where they work. The Census is a comprehensive, country-wide demographic survey carried out every 10 years by the Office for National Statistics. The most recent Census was undertaken during the coronavirus pandemic – specifically, on 21 March 2021 when a nationwide lockdown was still in place[xxxvii]. While this would suggest that the data is unrepresentative of working-from-home/office patterns today, the most recent data suggests that, actually, around 40% of working adults in the UK worked from home at some point in the past seven days (ONS, 2023[xxxviii]). This is a similar scale of working from home as was captured in the 2021 Census. Even so, the data, while it is most recent and comprehensive source available, should be read with a high level of caution.

For each strategic authority region, Figure 4 shows the proportions of the workforce that: works from home (orange bar); lives and works in the same local authority area (blue bar); lives in one local authority area but travels to work in another within the same strategic authority region (green bar); and lives in one local authority area but travels to work in another outside of the strategic authority area they live in (brown bar). It is the green bar, showing the percentage of intra-regional commuting between localities, that is the best available proxy for regional labour market integration[xxxix].

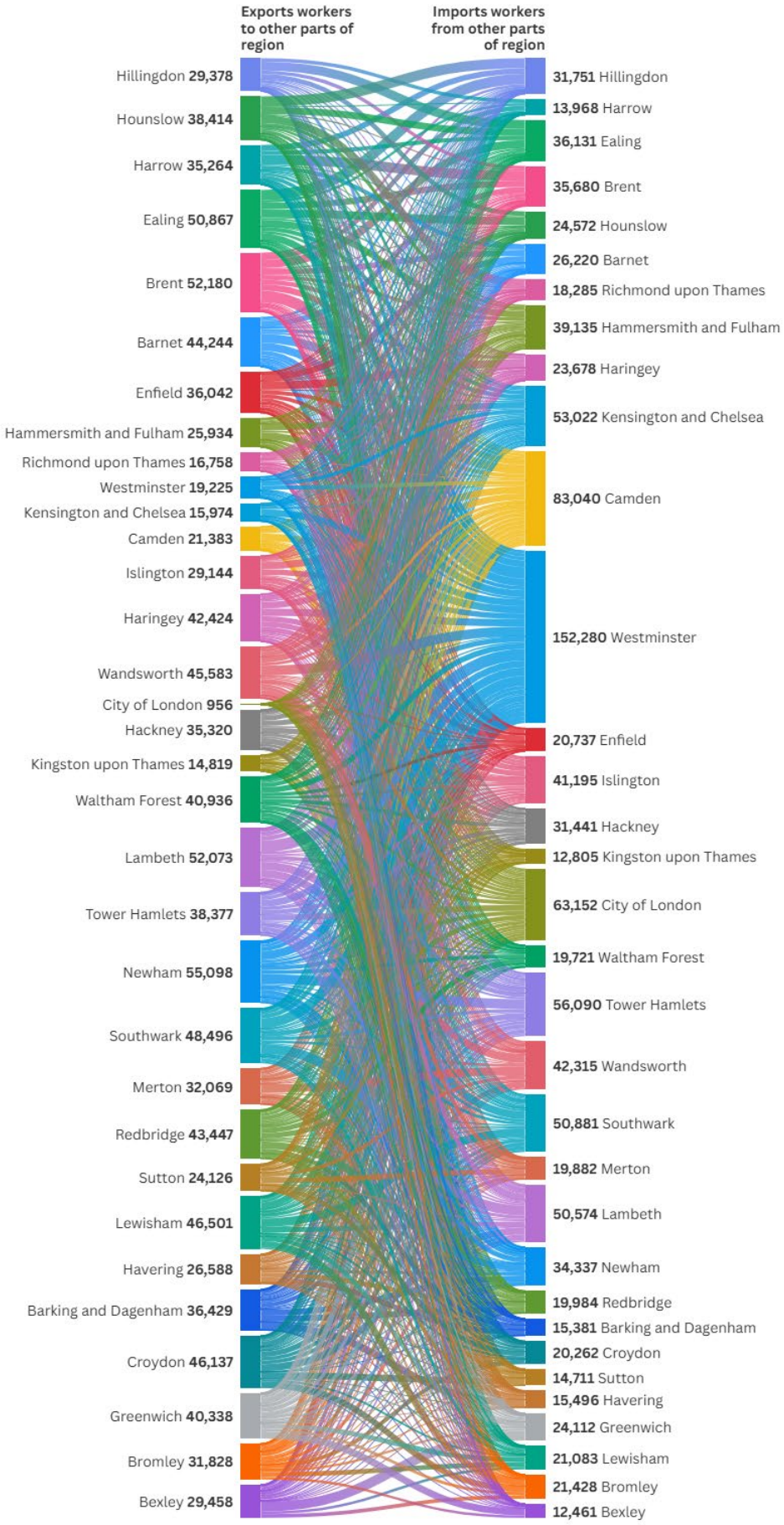
Figure 4 shows that Greater London is the most internally integrated labour market, with 26% of Londoners living and working in different localities. While the East Midlands ranks second, with 23% of people crossing administrative borders for work, this is partly due to the fact this region is comprised of a large number of small district councils – one of the drawbacks of using local authorities as the geographic unit of analysis, as mentioned earlier.

Figure 5: Integration of England's labour markets[xl]

Figure 6: Visualising inter-area commuting: where people live and where they work



Greater London (26%*)



*The percentage of the regional population that lives in one local authority but works in another.

The data begs the question: what is a good level of regional labour market integration? There is, of course, no causal link or even a correlation between the level of intra-regional commuting and economic performance. The regions that top the productivity charts are different to the regions that top the intra-regional commuting charts, as Figure 7 shows. Some studies have looked at the levels of inter- and intra-regional commuting in polycentric regions like the Randstad (van der Werff, 2005; Centre for Cities, 2016) and Ruhr (Centre for Cities, 2016), but the data is now close to ten years; and comparing percentages is arbitrary.

Figure 7: Regional productivity and inter-regional commuting[xli]

Region	GVA per hr worked (UK: 100)	Intra-regional commuting (%)
Greater London	128.5	26%
West of England	100.3	12%
Cambridgeshire and Peterborough	96.2	14%
Greater Manchester	95.0	21%
York and North Yorkshire	91.2	8%
West Yorkshire	89.2	12%
Liverpool City Region	89.2	16%
North East	85.9	21%
West Midlands	85.3	17%
East Midlands	85.1	23%
Tees Valley	84.5	20%
South Yorkshire	80.7	11%

One way to think about the link between economic performance, labour market integration and polycentricity is as follows. The starting point needs to be to understand the level of economic demand a regional economy is, or should be, capable of sustaining. In many English regions, this is lower than it should be – not just compared to London, but compared to counterparts in Europe (Stansbury et al., 2023[xlii]). In polycentric regions, this demand will come from different sectors or activities in different places. Then, it is possible to understand how this level of demand could be served by labour from different localities within the regional labour market, such as by pulling in people who are economically inactive or in lower value jobs. This scenario would require greater inter-area commuting to serve the greater demand for labour. Thought of in this way, polycentric regions have a potential advantage in being able to create a larger, more specialised labour market; and, as part of this, use land more strategically – between commercial and residential purposes – than monocentric regions. Several of these themes will be picked up in greater detail in the following chapters.

The evidence, summarised in the previous chapter, suggests that polycentric regions should pursue a strategy of functional integration. Intra-regional commuting data, showing where people live and where they work, is one measure of how integrated England's strategic authority regions are. As the next chapter will attest to, (deepening) regional integration does not happen by accident, but is the product of intentional investment and policy decisions sustained over a very long period of time. With this in mind, in the next chapter will set out new evidence on *how* integration can be deepened.

Strengthening regional integration

> "Without more bottom-up collaboration between cities, a deliberate polycentric population distribution may cause efficiency losses due to the lack of regional markets, cross-jurisdictional mobility, and other factors essential for regional economic development. This raises an important policy question: with diverse motivations from different stakeholders mixed in processes of region-building, regional economic growth may not be easily achieved by 'imaginary' spatial configurations" (Meijers, 2005[xliii]).

The evidence presented above suggests that integrating the cities and boroughs of polycentric regions is good for their collective economic health. This is harder to execute than it sounds. For example, Bailey and Turok's case study of attempts to integrate the economies of Edinburgh and Glasgow (2001[xliv]) outlines the political, identity-based and economic challenges to realising regional – or, in this case, pan-regional – integration.

In 2013, political scientist Richard Feiock coined the Institutional Collective Action Framework[xlv] to help actors in different settings navigate the pitfalls of institutional fragmentation. The crux of Feiock's argument is that for inter-area collaboration to work, the gains – and the division of gains – among localities need to be high and they need to outweigh the costs of securing them (Wittwer, 2020[xlvi]). In short, the upsides of collaboration need to outweigh the downsides.

There are several tangible examples of intra-regional collaboration that can be viewed through this lens. In England, the formation of strategic authorities is itself a statement of intent for intra-regional collaboration. Across the UK, the £210 million Industrial Decarbonisation Challenge[xlvii], a government programme to fund the regional infrastructures needed for the net zero transition, was built upon the premise that public and private organisations need to share the costs of the transition because no one organisation has an incentive to fund them on their own. Amsterdam, Rotterdam and Antwerp are part of a shared port infrastructure network, forged by industry and financial markets and institutionalised in the oil futures spot market[xlviii]. Other research has profiled collaborations between Oslo and the Akershus County in Norway on joint major infrastructure projects[xlix] and the economic integration of Switzerland's small and medium-sized towns[l]. In the United States, cities and districts are part of infrastructure alliances to make the supply chains they have shared interests in more competitive[li]. Across each of these examples, there are gains arising from economic collaboration that the actors involved calculated to be greater than the costs.

This chapter will present new qualitative evidence on why, how and when places – mainly city or municipal governments, but also business leaders, universities and other civic institutions – collaborate with each other to deepen their economic integration. This is particularly important for polycentric regions; it is critical to their ability to overcome the productivity penalty they face relative to monocentric regions.

The findings presented in this chapter are based on interviews with:

- Six senior economic development practitioners in Switzerland. Switzerland was chosen because it is among the most decentralised countries in Europe and has highly empowered cantons – the geographic and administrative units that make-up the Swiss system of governance. In total, there are 26 cantons of varying population sizes ranging from 16,000 (the smallest) to 1.6 million (the largest, Zurich). There is no formal tier of regional government 'above' the cantons. This makes Switzerland an interesting case study for understanding inter-area integration, because collaboration only happens where it is intentionally pursued; and because there is some existing evidence on economic collaboration between Swiss towns and cities[lii].

- Four senior economic development practitioners in the Ruhr region of Germany. The Ruhr is recognised as one of Europe's archetypal polycentric regions. It comprises 53 cities and boroughs, including the cities of Dortmund, Duisburg, Essen and Bochum, and is home to over 5 million people[liii]. The Ruhr is part of the state of North Rhine-Westphalia, which has a population of 18 million. The Regionalverband Ruhr (the Ruhr Regional Association) exercises a limited number of statutory functions on behalf of the region, including planning, business development and tourism, which are limited in comparison to the statutory functions of the state and municipal authorities.

- Three academics familiar with the evidence base on regional governance, economic development and polycentricity and the policy and political contexts in the Netherlands, Germany and UK.

Five themes emerged over the course of the interviews that shed light on why, how and when inter-area collaboration happens. Taken together, they offer a set of principles that polycentric regions should work towards to deepen their internal functional integration. Each of the themes will be unpacked in the remainder of this chapter, using a series of quotes to capture recurring sentiments reflected across the interviews as directly as possible.

1. There needs to be a clear purpose for regional collaboration that delivers tangible benefits to the cities and boroughs that are party to it.

There was no indication across any of the interviews that regional collaboration was something to be done for intrinsic reasons, or that it was the natural thing to do. Competition between areas is the default setting.

> “There is a high degree of competition between the cities within the Randstad. If Amsterdam secures investment, Rotterdam wants it too. You can’t give to one city without giving to another.” (Academic roundtable.)
>
> “Why do we have to collaborate? Competition is good and cities compete with one another. Each city needs its own branding and offer.” (Ruhr roundtable)
>
> “All of the cities in the Ruhr have set up their own football stadiums, conference halls, theatres and infrastructures. That creates a heavy burden on public purse and is not efficient. (Academic roundtable.)
>
> “Lots of people work in the major cities. Of course there’s competitive on specific subjects. We try to provide better conditions here than in other places. But its friendly competition.” (Switzerland)

The quotes offer a grounded, realistic starting point for understanding the dynamics of regional collaboration. By the same token, interview participants did see a role for inter-area collaboration where it has a specific purpose that adds value and delivers benefits to the places that are party to it.

> “Collaboration doesn't just happen by itself. In each case, there is a clear purpose, objective and interest. Functional economic areas are defined bottom up. Places define themselves who they want to collaborate with and collaborate when they see a joint interest.” (Switzerland)
>
> “You need to share the same problem and have the same question to resolve as others to want to work with them.” (Ruhr roundtable)

Interviewees gave three practical examples of where inter-area collaboration is beneficial: internationalisation and inward investment, collective lobbying, and land use.

Firstly, in relation to internationalisation and inward investment. In a competitive global economy in which all places are vying to secure investment and competing against others, participants recognised that it is their interests to club together. This allows them to rally behind place names and brands that are known internationally and offer investors the scale and diversity of a larger region that is bigger than what they can offer on their own.

Figure 8: The 'city of cities' location marketing campaign, promoted by the Ruhr Regional Association

"Cities in the United States don't know our individual cities. 'Each city for itself' is a problem from a branding perspective. We need to promote the common interests of the region and try to get businesses to locate here." (Ruhr roundtable)

> "Internationally, we promote our diversity. On the one hand, we promote the traditional parts of our places – our food, landscape and mountains. On the other, we talk about the fact we are high-tech, our well-connected cities and towns and our innovation strengths. We sell this as a treasure. If you do business here, you can access both within short proximity. We don't look at rural and urban areas in competition, but at how they create a functional economic area that is better than what individual places could offer. This is our USP." (Switzerland)

> "Being visible and being on the map: this is what you need each other for." (Academic roundtable)

Second, participants saw the merit in working together as regions to lobby for resources.

> "Our mayors go on joint delegations to secure funding from the European Commission. And, if a major regional company were to announce it was closing down, they would work together to try to stop it from happening. [In these situations] they have a motive for collaboration, which is forced from the outside. (Ruhr roundtable)

> "Housing is a significant pressure across the Randstad region. The major cities are working and lobbying together to pressure the federal government to give them the funding they need to address it. If you organise a big lobby towards the national government, you are much stronger together. (Academic roundtable)

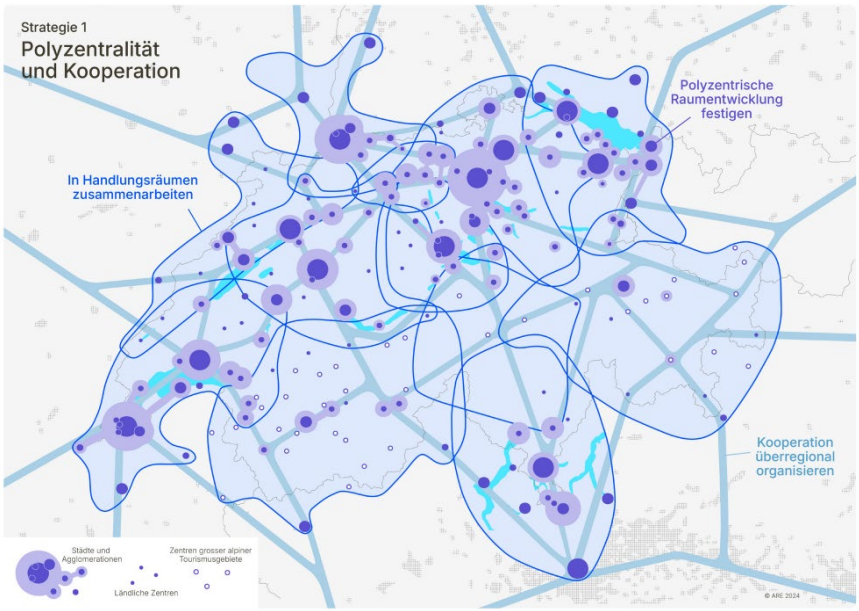
Third, participants spoke of the pressures on land for development and housing, particularly in larger regional cities. Through collaboration, cities and boroughs can unlock additional land across a larger geographic area so long as they are well-connected by transport and can reap the mutual benefits of out-of-area development. This is not only about alleviating pressures on housing. It also enables places to combine the advantages of urban and rural settings to offer residents and investors the benefits of both – one of the upsides of having more space, and a feature of Flanders' (a polycentric region of Belgium) approach to spatial planning[liv].

> "Our city is very densely built. There are no more areas where we can develop. But there is cheaper land in other areas that are well-connected and accessible by transport. So, we created a project to unlock land and create 1,000 jobs outside of the city. (Switzerland)

> "Where can we build housing across the [Randstad] region that is close to transport? We are looking away from building in the major cities and towards peripheral places, to help benefit the region and alleviate the pressures the cities are facing. Here, you can work in Utrecht, go to a concert in Amsterdam, cycle and see the harbour in Rotterdam and enjoy the areas in between. You can enjoy all parts of the region, living rurally but enjoying our urban centres at the same time." (Academic roundtable)

> "Our cities are expected to see large population growth, in some instances by 30%, by 2050. There is going to need to be collaboration between neighbouring places in order to deal with this growth and manage its impacts on our infrastructures." (Switzerland)

Figure 9: Raumkonzept (draft)



In Switzerland, the federal government, cantons, municipalities and numerous interest groups are working together on a common, non-binding, spatial vision of the country, which will guide the development of plans and strategies at various spatial levels, with the aim of achieving coherent territorial development.

The process of developing the raumkonzept has involved defining 12 handlungsräume (functional economic areas), showing how cantons are spatially connected to one another. Raumkonzept is a plan for a polycentric future for Switzerland at national-level.

These are just three specific forms of regional collaboration. They are not exhaustive of all possible forms of collaboration, but they illuminate a central point: collaboration between areas is most attractive when it has a clear purpose and delivers tangible benefits and added value to the parties to it. In each of the instances above, it is a shared material interest that drives inter-area collaboration.

By extension, this does not mean places should collaborate on everything or that full-scale integration should be the goal.

> "At certain scales it's easier to get agreement to promote integration on some subjects, but on others it's not. Labour markets, yes. High speed rail and mega infrastructure, yes. Housing is more difficult as progress is assessed is more locally. You need to work out what you can collaborate on at which scales. When you bring stakeholders together, what are the topics that you could get people around the table to discuss and agree on without the discussion falling apart? You need to develop the strategy based on what it is possible to collaborate on. You can't have a strategy that relates to issues people cannot agree on." (Academic roundtable)

2. Governance structures should exist to execute whatever the purpose of regional collaboration is.

> "You have the large individual cities [of Germany] that are well-resourced. We need a strong body to coordinate between them and work out the priorities to be pursued together, to harness the benefits of the Ruhr as a whole. To the federal and state governments, the Ruhr is too small for them. Since the 1980s the largest firms in the region have been delivering projects of joint interest to our municipalities, but on a topic-by-topic basis and without supporting or permanent structures. We need to strengthen our own capabilities to promote the region. (Academic roundtable.)

Regional institutions act as the 'glue' that connects cities and boroughs, helps to build trust between civic leaders, facilitates joint working and provides a front door for business, civil society and other actors to engage in the policymaking process. When designed and managed well, they can have a positive impact on regional economic outcomes. For example, Klok et al. (2018[lv]) evidence that regional networks reduce the cost of collaboration, delivering the greatest benefits where multiple networks are organised under one legal structure. Drawing on a survey of 206 local governments in the early 2000s, Hawkins (2016[lvi]) evidences that "[r]epeated interactions and a history of informal relationships [between governments] reduce barriers to cooperation"; and that "[w]hen local government officials trust other governments in the

region and conform to informal expectations of reciprocity, forming a joint venture for economic development purposes is more likely to happen". Recent research indicates that, in England, the presence of devolved institutions may be reducing the 'risk premium' that investors price into their investments (Daams et al., 2025[lvii]). This latter study forms part of a large body of research on the impact devolved governance is having on economic outcomes (summarised in Institute for Government, 2023[lviii]), and on the impact if could have (Amery, 2025[lix]).

Swiss interviewees nuanced the narrative that, to crudely summarise, regional institutions are a good thing in their own right. In Switzerland's highly decentralised context, inter-area partnership structures only exist to fulfil a specific purpose. These partnership structures take different forms, including case-by-case performance contracts that specify what each area (canton) will contribute to and get from a joint project; and standing conferences to coordinate activities in specific areas, including education and training.

> "Regions are not institutionalised, but we [cities and towns] do lots of small-scale projects together. Everything we do together is agreed as part of a performance contract. Who pays what and who gets what is negotiated contract by contract. Every time, you can see what value is being added and make sure you are collaborating with the best partners. Our programmes usually come to an end after four years (for innovation programmes). Then, you evaluate what has been achieved and decide what to do afterwards. We started with small projects, proved the model, and then moved onto larger ones." (Switzerland)

While this perspective on the role of institutions reflects the particulars of the Swiss context, it embodies a simple principle that extends more widely. The function of inter-area governance institutions should be to serve cities and boroughs' shared interests and deliver what they want to collaborate on. Simply put, the form (of governance) follows the function (or purpose for collaboration). Governance is a means to an end rather than an end in and of itself.

3. Incentives can help to foster regional collaboration.

Across all interviews, participants highlighted instances where cross-regional collaboration had been or is being incentivised, usually by the federal government through the provision of funding.

> "In the past, we have received funding to promote joint trade trips with other areas, which has enabled us to save money through doing things together. (Ruhr roundtable)

> "In the UK, we see universities collaborating more and more with each other. It has been engineered to some degree, where the government says it requires funding bids by consortia of a certain scale. I don't think this model will work long-term, as it is forced, but it has created an incentive for places to work together. (Academic roundtable)

> "Back in 2016, the three cantons started an innovation programme because there was funding available for it [from the federal government]. The subsidy was helpful in facilitating collaboration up front, but if the federal government withdrew its funding, the cantons would probably still see the value in collaborating together. (Switzerland)

> "In decentralised and devolved countries with lots of local stakeholders, you get congestion between actors who block each other. We are missing incentives for collaboration" (Academic roundtable).

The role of incentives in facilitating joint working between different places is not new. The European Union's Interreg programme is currently investing 7.4 billion EUR (2021 – 2027) in joint projects between neighbouring places on different sides of national borders[lx]. In the UK, the whole project of creating strategic authorities is premised on the idea that, to access funding, places need to collaborate with one another.

What are the barriers to inter-area collaboration that funding and incentives help to overcome? The premise of this paper is that collaboration between the cities and boroughs that make up polycentric regions is a worthwhile policy goal, because more integrated polycentric regions perform better economically. While one interviewee mentioned the fact incentives have a role in ensuring "regional economic development happens

in a coherent way" (Switzerland), the barriers cited to collaboration that incentives help to address were often more specific.

First, incentives can create a competitive imperative to come up with good ideas. "Name a challenge and give out money where a region can organise a good response to it" (Academic roundtable). This is the logic behind Switzerland's Regional Innovation System initiative, which brings together small- and medium-sized enterprises, universities and other innovation service providers, including technology centres, innovation hubs and public authorities, and provides funding for consortia of companies located across urban and rural, mountainous areas.

Second, funding can offset the costs of collaboration and make it more attractive. As one participant to the Ruhr roundtable highlighted, there are "lots of small- and medium-sized enterprises that tend to stay and trade within their home city, because they lack the resources to be able to connect with others or access markets from elsewhere" – an example of cross-regional collaboration that could happen, but is not happening due to a reported lack of resources. This is one of the premises of Feiock's Institutional Action Framework.

4. The specialist, complementary roles of individual cities and boroughs within a regional economy should be cultivated.

Interviewees recognised that different places have different strengths and roles in their regional economies, whether as hubs for a certain sector or metropolitan function, residential living, leisure, tourism or nature. Specialisation allows places to hone different functions, so that, overall, regions can meet their economic, social and cultural needs in the most effective and efficient way (Jones et al., 2009[lxi]). In turn, this creates a degree of mutual interdependence between regional cities and boroughs, where the prosperity of the region rests on nurturing the distinctive roles of the places it comprises.

Places' roles and strengths are the result of decades of economic change, historical accident and/or natural factors. They cannot be decreed by policy, but evolve as part of an historical continuum in response to economic and technological changes[lxii].

> "Specialisms are important. Cities need them as their trademark. Business needs to know which cities do what." (Ruhr roundtable)
>
> "There are unofficial roles for different places. Different places need each other's supply chain specialisms, such as in metal production. Other places have universities. These roles have been determined by history. (Ruhr roundtable)
>
> "The Randstad cities have complementary profiles, with each focusing on different groups of businesses and sectors. The Hague has strengths in legal, political and international activities. Rotterdam in logistics, distribution and manufacturing. Amsterdam is the cosmopolitan centre where many global companies are headquartered. Each has their own charm. Sometimes specialisation can be helpful. Don't try to do lower-order functions that others would do better or that it would be inefficient to replicate. What are the strengths of my place in a region? What is my role in the bigger picture? What can I add to the region that adds to it? You need to make sure the region caters for the full range of functions, irrespective of where or in which cities they are. (Academic roundtable)
>
> "Every city and centre needs to play its role. The [regional] network functions well if the cities have their own roles, USPs and identities. If you think of Zurich, you think of financial services. Geneva is the headquarters for many global companies. Bern is the seat of the federal government. Basel is industrialised and where our pharmaceutical strengths are." (Switzerland)

While places may have specialist roles and strengths, 'who does what' is a politically charged matter. The competitive impulse that exists between places can point investment away from where it should go, on the basis of where it would be best served, to where politics wants it to go.

"It's one thing to recognise market forces that indicate which places have which natural roles. But then it's a different thing to get the representatives of those places to go along with that. If you see money going into one area, the others will ask where their slice of the cake is." (Academic roundtable)

"You could say companies should locate to those places that have the strengths they need. But it doesn't work like that. There's just too much competition. Cities are competing against each other. (Academic roundtable)

"We have indexes showing which places have which comparative advantages and strengths. There is a good understanding of what they are. But the strengths you focus on and where you spend your money are political decisions. The political agenda always changes and there's a very big mix of opinions that drives decisions about what we spend money on." (Switzerland)

5. Transport infrastructure helps to practically enable regional integration.

Transport has an important place in the discussion about monocentricity, polycentricity and economic performance (Glaeser and Kohlhase, 2003[lxiii]). As discussed earlier in the paper, one of the main reasons why monocentric regions perform better economically than polycentric regions is because the former are more able to harness the forces of agglomeration, which proximity, distance and density are the underlying mechanisms of. Obviously, we cannot harness agglomeration in polycentric regions by lifting and shifting cities and boroughs closer together. However, policy can have this effect by improving the transport links between them (Jones et al., 2009) and building homes more densely around transport hubs[lxiv]. It is no coincidence that Figure 4 (above) shows that Greater London, which has a multi-modal transport system covering most of the region, has the most spatially integrated labour market and highest level of intra-regional commuting in England.

Across the interviews, participants gave a range of practical examples to illustrate how transport connectivity helps regional economies to function as a coherent whole, through linking the cities and boroughs and the people and businesses they comprise.

"The Ruhr is very well connected. You can live in one place and work in another. Most university students live in a different city to the one they study in." (Ruhr roundtable)

"Dortmund's IT industry has grown over the past 20 years. It has created benefits for Dortmund, but also for the wider region too. Over 1,000 people who work here commute in from other places every day. Looking to the future, our tech companies are growing and will need more workers who will come from the wider region." (Ruhr roundtable)

"We are the world champion at taking the train. You can come by plane into Geneva and arrive in Zurich for the afternoon. People come to Switzerland because they know they can work in Basel and live in the mountains, connected by public transport. Our transport system enables interactions between places and makes them attractive. It enables to investors to invest. For example, in Solothurn [a small town] there is a huge brownfield land reserve, the largest in Switzerland. An investor from the US backed the project because it was within an hour of Zurich airport by public transport, which is far from a Swiss perspective but close from a US perspective. (Switzerland)

"In Eastern Switzerland, we are very polycentric with no single metropolitan area. Industry – and several large companies with billions in sales and five-digit employee numbers – is located between rather than in the cities. Mobility is excellent. It's 30 minutes to get from St. Gallen [one of the cities in Eastern Switzerland] to Zurich. (Switzerland)

"A lot of investment went into regional transport to make the Randstad region work as a polycentric region. The Metro systems of the Hague and Rotterdam are connected. There were plans to connect the other cities of the Randstad, but the collaboration fell down." (Academic roundtable).

Reflections on the findings

If inter-area integration should be a guiding principle for polycentric regions, this paper has sought to address the next question: how do you achieve it? The existing evidence base offers some useful case studies of joint regional projects, but, beyond Feiock's Institutional Collective Action Framework, little on how they were brokered and delivered. The findings above start to address this gap in the research. The relatively small, geographically specific sample means the findings cannot be generalised too far. But nonetheless, the findings offer a useful, practical set of principles for policymakers in most countries seeking to make polycentricity work.

There are some distinctions between the findings of this research and the existing evidence base.

In particular, much research to-date has emphasised the importance role of governance structures in facilitating inter-area working. This paper has offered a different perspective. Governance is not an end in and of itself, but a means to an end - delivering what regional actors can politically buy in to collaborating on.

Furthermore, several existing studies highlight the role of culture and identity in forging regional ties and inter-area working (van Houtum, 1998; Dunin-Wasowicz, 2018; Meijers et al., 2017[lxv]). It is notable that neither were explicitly raised in any of the interviews.

Two further themes were mentioned by participants that warrant further consideration.

The first is the potential role of the tax system (dis)incentivising regional collaboration. In the case of the Netherlands, very little tax revenues are collected regionally or locally; most are collected by the national government. This removes a potential source of divisiveness from discussions about where inbound companies should locate, because the direct fiscal benefits are captured nationally and, therefore, are not on the table for local areas to argue over. These benefits are on the table in Switzerland, where taxation is a canton competency and local areas can undercut one another by offering lower tax levels to inward investors.

The second is the role that individuals can play in brokering inter-area collaboration as civic entrepreneurs (Berridge, 2019[lxvi]). As one participant in the academic roundtable said: "Integration comes down to individuals and people. You need champions who can get things done, who trust each other, and who are willing to work together to push things through. Because there will be barriers at every single step."

Conclusion

The central, but not necessarily original, message of this research is that where economic activities happen and how they are connected matter. Cross-country evidence suggests that monocentric regions, where economic activities centre around the orbit of a single large city, have a productivity advantage over polycentric regions, where economic activities are more balanced across a network of regional cities and boroughs. Theory suggests that this is because the forces of agglomeration are stronger in monocentric regions than in polycentricity regions.

Polycentric regions are home to almost a quarter of the population of Europe, so it is important for policymakers to understand which economic and governance strategies they should pursue to overcome the productivity penalty they face, and to realise the upsides that come from having more space. Cross-country studies also suggest that integrating the cities and boroughs that make up polycentric regions can generate positive economic outcomes. This paper has sought to take the evidence base one step further, to shed light on *how* to strengthen integration.

Based on interviews with practitioners and academics, this research suggests five principles that local, regional and national policymakers should pursue to make polycentricity work.

1. There needs to be a clear purpose for regional collaboration that delivers tangible benefits to the cities and boroughs that are party to it.

2. Governance structures should exist to execute whatever the purpose of regional collaboration is.

3. Incentives can help to foster regional collaboration.

4. The specialist, complementary roles of individual places within a regional economy should be cultivated.

5. Transport infrastructure helps to practically enable regional integration.

Although these findings are drawn from a small, geographically specific sample, they offer a useful framework to guide action. Where do they fit within the broader debate and literature on regional economic development – now, and looking to the decades ahead?

First, now is an apt time for local, regional and national policymakers in England to think about how best to organise their regional economies.

As cited above, over 61% of the population of England is now covered by a strategic authority. Completing the devolution map and reaching 100% coverage, as is the government's ambition, will involve creating strategic authorities in non-urban, more rural areas. Several of these areas lack a clear economic centre (Re:State, 2025[lxvii]) and may benefit from the principles offered by this research on how to make polycentricity work.

For areas where a strategic authority is already in place, the recent confirmation of nearly £16 billion for regional mayors to spend on transport projects (HM Government, 2025[lxviii]); the statutory requirement being placed upon strategic authorities to produce local growth and investment plans (HM Government, 2024[lxix]); and the requirement for strategic authorities to also produce spatial development strategies (ibid), are all policy opportunities to put the evidence surfaced by this report into practice.

Second, while urban form matters, it is not destiny.

Beugelsdijk et al. (2018[lxx]) ambitiously sought to assess how significant a factor urban form is relative to other factors in explaining regional economic outcomes. Their analysis suggests that historical urban density – as of 1800 – has the second highest correlation with total factor productivity. The top factor is whether the country in question used to be communist.

Without doubt, urban form – and its children, monocentricity and polycentricity – matters quite a lot to economic development. But it is not everything. Monocentricity and polycentricity are not standalone factors that determine whether a region is likely to be productive or not. There are productive and less productive variations of both urban forms. During the academic roundtable, a participant said that "it just happens to be the case that the core region of the Netherlands [the Randstad] is polycentric".

Monocentricity and polycentricity should instead be thought of as spatial frameworks that make it easier or harder, respectively, to organise the total range of factors that affect economic performance: human capital; business development, investment, innovation and internationalisation; placemaking and physical infrastructure development; and institutional maturity and place storytelling, for example. Polycentricity mediates how each of these growth factors should be organised and delivered. While it may be harder to do so in polycentric regions than in monocentric regions, it is not beyond the capability of the civic entrepreneurs who wish to make it so.

Third and finally, technological change and post-pandemic changes to working patterns may lessen the economic advantage of the monocentric model.

While there are many demographic and geographic nuances to this pattern, the Covid-19 pandemic roughly doubled the number of people in the UK who say they work from home (ONS, 2022[lxxi]). According to the latest data, around 40% of working adults in the UK worked from home at some point in the past seven days (ONS, 2023[lxxii]), down from some of the mid-lockdown peaks shown in Figure 4.

This shift raises a number of questions about the future of cites, the forces of agglomeration and the productivity edge that monocentric regions have over polycentric regions. Does the rise in the number of people working from home mean urban megalopolises are likely to become a thing of the past?

At the extreme end of the debate, some think this might be the case. Gupta et al., 2025[lxxiii] forecast "apocalyptic" declines in the value of New York real estate values by 46% over the long run, or close to $560 billion across all US cities if the rate of change (decline) in property valuations we are seeing holds steady over time. Others (Rosenthal et al., 2022[lxxiv]; Ghosh et al., 2025[lxxv]) find similar, but not as extreme declines in the valuation of city centre commercial real estate post-pandemic. In terms of broader residential markets, Ayman Ilham et al. (2024[lxxvi]) evidence a "shift in residential location preferences away from dense urban areas, driven by reduced commuting due to sustained teleworking or a hybrid work model". These market movements suggest that the draw to and appeal of urban centres is declining, at least in the West.

Medium-range transport connectivity, improvements to digital infrastructure and the continued growth of service sector (vis-à-vis manufacturing jobs) in market economies are opening up the possibility of more remote living and working. This provides economic opportunities for polycentric regions that can offer access to high skill, high wage jobs and more liveable places, utilising their advantage of having more space. Although we are not witnessing the end of the office and workers still overwhelmingly see the benefits that office-working brings (Centre for Cities, 2024[lxxvii]), "distance is not the barrier it once was" (Rosenthal and Strange (2020[lxxviii]).

It is far too early to say whether these post-pandemic societal and market trends will hold up, accelerate or roll back. But for civic leaders, city planners and local, regional and national policymakers, these trends create an imperative to stand back and assess whether the way we have been organising our economies to-date is right for the decades ahead. Urban hubs will remain the economic centres of market economies, but technological, behavioural and economic change is creating a window of opportunity for different spatial configurations of regional economies. This research puts forward ideas and evidence that could help to make these different configurations work in practice.

References

[i] O'Connor, 2009
[ii] Gabiax, 1999
[iii] Arshad, Hu and Ashraf, 2018
[iv] Recreated from Seymour, 2017
[v] The spatial distribution of activity through the lenses of monocentricity and polycentricity has been investigated most notably by Sir Peter Hall and Kathy Pain through the POLYNET project (2006). More recently, multiple facets of the concept of polycentricity were interrogated in *Territory, Politics, Governance* (2023), edited by John Harrison, Michael Hoyler, Ben Derudder, Xingjian Liu and Evert Meijers.
[vi] HM Government, 2025
[vii] HM Government, 2025
[viii] As shown in the charts, these are: Cambridge and Peterborough, the East Midlands, Greater Manchester, Greater London, the Liverpool city region, the North East, South Yorkshire, the Tees Valley, the West of England, the West Midlands, West Yorkshire and York and North Yorkshire.
[ix] About Figure 2 and the data used to produce it:

- Population data (ONS Population estimates - local authority based by five year age band [2021]) was extracted from NOMIS in 2024 and reflects 2021. Link to access: https://www.nomisweb.co.uk/reports/lmp/la/1946157260/subreports/pop_compared/report.aspx.
- Jobs data measures the number of employees (from the Business Register and Employment Survey), self-employment jobs (from the Annual Population Survey), government-supported trainees (from DfES and DWP) and HM Forces (from MoD). The data was extracted from NOMIS in 2025 and reflects 2023. Link to access: https://www.nomisweb.co.uk/query/construct/summary.asp?menuopt=200&subcomp=
- Gross value added data was extracted from the ONS in 2025 and reflects 2023. Link to access: https://www.ons.gov.uk/economy/grossdomesticproductgdp/datasets/regionalgrossdomesticproductlocalauthorities. Gross value added data for East Cambridgeshire is not available and therefore missing from the Cambridge and Peterborough total. Gross value added data for the Yorks and North Yorkshire Combined Authority is not presented, because it is only available for York and not the other former districts of North Yorkshire.
- Data for only the first 18 local authorities (including the City of Lonon) in London is shown for presentational reasons. Across all three measures, the numbers incrementally tail off as would be expected and do not change the distributional pattern.

[xi] Hall and Pain's landmark study of monocentric regions (2006) labelled not only the Greater London area, but the South East as one of the world's most distinctive monocentric megalopolises. More recently, a growing number of – largely campaigning – voices have started to promote the adoption of a more polycentric economic model for the capital (e.g., Centre for London, 2025).
[xii] Manchester Independent Economic Review, 2009
[xiii] West Midlands Combined Authority, 2024
[xiv] Zhang et al., 2021
[xv] Jacobs, 1961
[xvi] Derudder et al., 2021
[xvii] ESPON, 2020
[xviii] Meijers and Burger, 2010
[xix] Brezzi and Veneri, 2014
[xx] Caset et al., 2023
[xxi] Ouwehand, 2022
[xxii] Volgmann and Münter, 2019
[xxiii] Li et al., 2022; Li and Liu, 2018; Wang et al., 2019; Li and Du, 2020
[xxiv] Li et al., 2023
[xxv] Sun et al,, 2019
[xxvi] Decamps et al., 2019
[xxvii] Lee et al., 2007
[xxviii] Hoogerbrugge et al., 2021
[xxix] Meijers et al., 2017; Brezzi and Veneri, 2014; Seymour, 2017; see also Caset et al., 2023, Rosenthal and Strange, 2020
[xxx] Caset et al., 2023; ESPON, 2016; Seymour, 2017
[xxxi] Meijers et al., 2017
[xxxii] Meijers and Burger, 2017
[xxxiii] Kauffman and Wittwer, 2019

[xxxiv] Centre for Cities, 2023
[xxxv] Jones et al., 2009
[xxxvi] Meijers et al., 2016
[xxxvii] ONS, 2022
[xxxviii] ONS, 2023
[xxxix] Travel to work flows are just one measure of a region's economic integration. The Economic Geographies of the West Midlands report (2024[xxxix]) employed a more sophisticated range of data and methods – evidencing where people live and where they travel to for purposes other than work, such as leisure; where people live and where they move house to; and where people live and spend money as consumers – but which are not available for other areas of England.
[xl] Origin-destination data explorer (ONS, 2023)
[xli] ONS, 2025. Greater London's index ranking is taken from a separate ONS data set (2025), but is also indexed against the UK average.
[xlii] Stansbury et al., 2023
[xliii] Meijers, 2005
[xliv] Bailey and Turok, 2001
[xlv] Feiock, 2013
[xlvi] Wittwer, 2020
[xlvii] UKRI, 2024
[xlviii] Van den Berghe et al., 2022
[xlix] ESPON, 2020
[l] Wittwer, 2020
[li] Wachsmuth, 2016
[lii] Wittwer, 2020
[liii] Kermoyan, 2023
[liv] Boussauw et al., 2018
[lv] Klock et al., 2018
[lvi] Hawkins, 2016
[lvii] Daams et al., 2025
[lviii] Institute for Government, 2023
[lix] Amery, 2025
[lx] European Commission, 2025
[lxi] Jones et al., 2009
[lxii] Boschma and Frenken, 2009
[lxiii] Glaeser and Kohlhase, 2003
[lxiv] Hrelja et al., 2020
[lxv] van Houtum, 1998; Dunin-Wasowicz, 2018; Meijers et al., 2017
[lxvi] Berridge, 2019
[lxvii] Re:State, 2025
[lxviii] HM Government, 2025
[lxix] HM Government, 2024
[lxx] Beugelsdijk et al., 2018
[lxxi] ONS, 2022
[lxxii] ONS, 2023
[lxxiii] Gupta et al., 2022
[lxxiv] Rosenthal et al., 2022
[lxxv] Ghosh et al., 2025
[lxxvi] Ilham et al., 2024
[lxxvii] Centre for Cities, 2024
[lxxviii] Rosenthal and Strange, 2020