# Long-Run Growth Dynamics of British Cities and their Role in the Economy

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# Declaration

This dissertation is the result of my own work and includes nothing which is the outcome of work done in collaboration, except as declared in the Introduction and specified in the text. It is not substantially the same as any that I have submitted, or, is being concurrently submitted for a degree or diploma or other qualification at the University of Cambridge or any other University or similar institution. I further state that no substantial part of my dissertation has already been submitted, or, is being concurrently submitted for any such degree, diploma or other qualification at the University of Cambridge or any other University or similar institution. It does not exceed the prescribed word limit of 80,000 words.


Ben Gardiner

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# Summary of the Dissertation: Long-Run Growth Dynamics of British Cities and their Role in the Economy

This thesis examines the economic development and evolution of British cities since the 1970s. Outside of the introduction and conclusion, it is comprised of six papers, most published jointly as journal articles through work on two ESRC-funded projects, *How Regions React to Recession: Resilience, Hysteresis and Long Run Impacts* (Grant ES/1035811/1) and *Structural Transformation, Adaptability and City Economic Evolutions* (Grant ES/N006135/1).

What binds the papers together, aside from their focus on different aspects of the development of British cities, is a database constructed to undertake the empirical analysis. The cities covered by the research are defined as a set of (high-population) Travel-To-Work-Areas, which are functional labour market areas defined on commuting boundaries and thresholds. What makes the database unique is both its extensive time dimension, and the range of economic indicators that have been developed to underpin the different dimensions of the research, each of which is addressed in the following chapters.

*Growing Apart - Structural Transformation and the Uneven Development of British Cities* summarises how cities have evolved since the 1970s, and the role that sectoral change has had in their growth and decline. *Reviving the 'Northern Powerhouse' and Spatially Rebalancing the British Economy* discusses the role of cities in the 'north-south divide' and the emerging policies to address the perceived under-performance of northern cities. *The City Dimension of the Productivity Growth Puzzle* looks at the national productivity slowdown through a city lens, in particular the role played by structural change. *In Search of the Skilled City* investigates the role of human capital in cities and how high-skilled labour is linked to different types and geographies of urban development. Finally, *The Resilience of Cities to Economic Shocks* examines how cities have responded in times of recession, and how this affects their long-run performance, before looking forward to the potential impact of Brexit as the next shock on the horizon.

# Acknowledgements

# Contents

# 1  Introduction

*'As is commonly the case with the geography of a complex economic unit, the present makes no sense until it is related to the evolutionary process which has produced it'* (Peter Hall, 1962).

'*Macroeconomics - large scale economics - is a shambles. Nations are not the basic, salient entities of economic life, nor are they particularly useful for probing the mysteries of economic structure, the reason for the rise and decline of wealth. Cities, not nations, are the true engines of economic progress'* (Jane Jacobs, 1984).

*'The economy as a whole is simply too big, too remote from ordinary experience, to grasp. Is there any piece of the economy that can truly help us understand the whole? I suggest a somewhat unusual answer, but one that is growing in popularity amongst economists: that a particularly good way to understand the economy is by studying cities'* (Paul Krugman, 1996).

## 1.1    Motivation and Context

### Academic perspective

It is difficult to underestimate the degree to which interest in city-level economic development and political devolution has increased over the past decade. Cities and urban areas are seen as the primary sources of wealth creation and the centres from which competitive advantage and productivity gains can accrue through agglomeration economies.

In academia, within the overlapping subfields of urban economics, regional science and the 'new economic geography', a vast body of literature now exists that explores the importance of the external economies and increasing returns effects that arise from the concentration of economic activity (firms, workers and consumers) in cities, and the positive impact of that concentration on productivity, innovation and wages. A substantial part of this work is theoretical and involves formal mathematical models; but it has also stimulated an expanding body of empirical enquiry, although this remains somewhat limited in many countries partly due to data limitations and definitional ambiguities.

Over the past few years, cities and city-regions have assumed growing prominence in discussions over economic growth, performance, and prosperity. Both geographers and economists point to the increasing concentration of economic activity and wealth creation in cities, and their crucial importance as the loci of national prosperity (Florida, 2008; Scott,

2001; Glaeser, 2009, 2012; Storper, 2013; Storper et al, 2015). National governments and international bodies have likewise recognized the key economic role that cities play, and have correspondingly directed attention to cities as the foci of policy intervention and governance reform (for example, OECD, 2015; European Commission, 2016; World Bank, 2008; Office of the Deputy Prime Minister, 2006). Cities have come to dominate how we think about economies.

But, as some studies demonstrate, not all cities have enjoyed economic success in recent years, (Dijkstra et al 2013; Parkinson, 2013), and some evidence points to an increasing divergence in economic growth between cities, especially in the United States (Hobor, 2013; Moretti, 2013; Kemeny and Storper, 2014). In fact, certain cities have actually experienced a dramatic decline in economic fortune, such as Detroit in (Binelli, 2013), or Liverpool in the UK (Couch and Cocks, 2012), and have been struggling to recover. More generally, there is growing concern about what has become known as the 'shrinking city' phenomenon, as certain cities across the US, Europe and elsewhere appear to be declining in population and in economic growth (see for example, Pallgast, 2010). Other cities appear to be able to 'reinvent' themselves and undergo economic resurgences, such as Boston in the US (Glaeser, 2005) and London in the UK (Martin, 2016). As the famous North American urbanist Jane Jacobs argued many years ago, cities rise and fall, in relative if not in absolute terms, depending on the competitiveness of their export activities. The decline of many cities particularly in the north of Britain in the post-war period has had dramatic consequences for the well-being and quality of life of their residents. The loss of jobs in the manufacturing sector led to many people living in cities becoming long-term unemployed or destined to take relatively low paid service sector jobs, or move to urban centres of growth and employment elsewhere. The structural transition from manufacturing to service economies has thus been one of the fundamental drivers of urban inequality.

**The UK context**

While much of the recent academic research referred to above has focussed on US cities (e.g. much of the work of Glaeser, Storper and Florida, op cit), and 'world cities' (e.g. ARUP's 100 Resilient Cities[1]), this thesis focusses on the economic performance of UK cities. There is a question on the extent to which findings from the academic research, and subsequent policy initiatives that emerge from this, are based on findings from US studies that may not be directly applicable in the UK.

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[1] See https://www.arup.com/projects/100-resilient-cities.

The UK is an interesting case because it is heavily urbanised and also operates on a largely mono-centric system due to the dominance of London (see Figures 1.1 - 1.2 below). London has benefited from two fundamental advantages not enjoyed by other UK cities.

First, it has long been the nation's financial capital, and was to some extent already a leading international financial centre when deindustrialisation set in, so that it was well placed to benefit from the deregulation and globalisation of finance and banking that the national Government began from the mid-1980s onwards (so-called 'Big Bang') – indeed, as Figure 1.1 shows, this is the period when London's productivity pulled away from the rest of the country, and other large cities in particular.

**Figure 1.1: Productivity in London versus British and Core City[2] Averages**
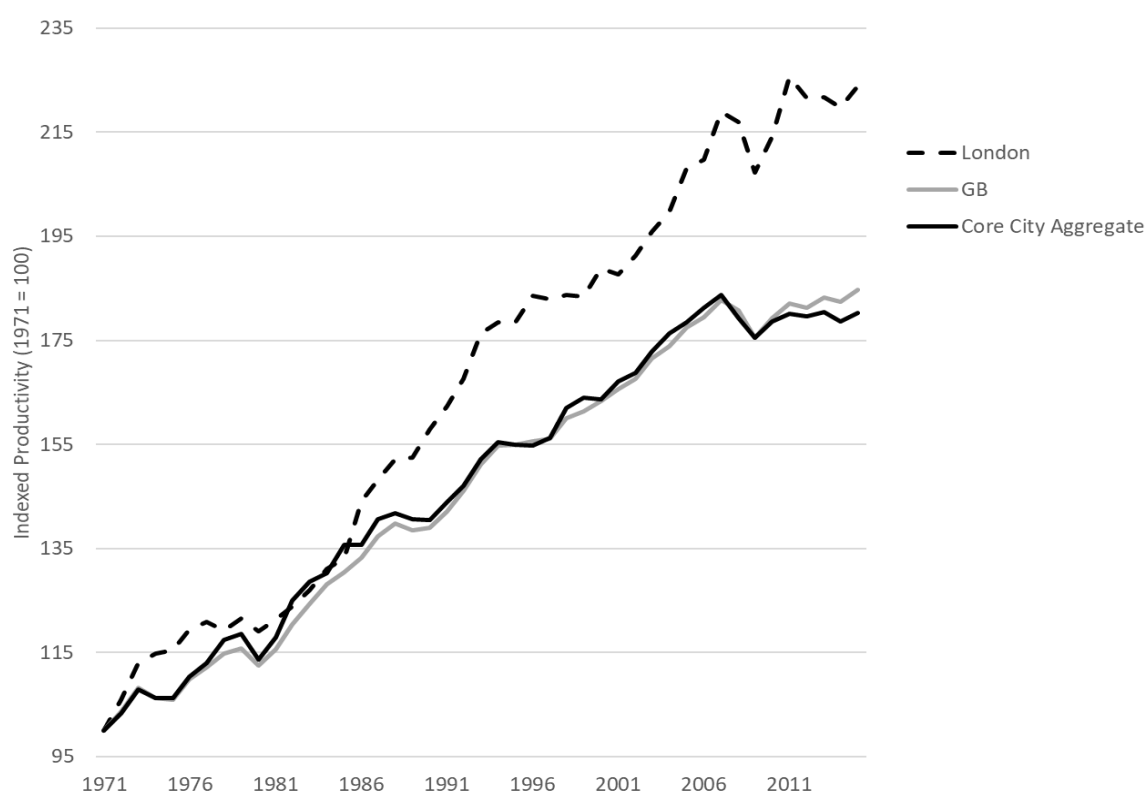


Source: Data constructed as part of PhD Thesis (see Chapter 2).

Much of London's economic turnaround since then can be attributed to the success of its financial nexus, and its leading role as a global financial centre. Second, and again of long-standing significance, London is the seat of not just financial power in the UK economy but also of political power, containing as it does all the major seats of what is one of the most centralised political and policy systems among OECD nations. This has put London in a

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[2] The Core Cities are a group of 11 large UK cities outside of London. They include Belfast, Birmingham, Bristol, Cardiff, Glasgow, Leeds, Liverpool, Manchester, Newcastle, Nottingham and Sheffield.

unique position to influence national policy-making, from fiscal and monetary policy to control over public finances and public spending across the regions and cities of the UK. It has also enjoyed a level of political and fiscal autonomy simply not available to other major cities across the nation. *In short, the UK's political economy is highly spatially biased in favour of the capital, a bias that has long been an institutionalised feature of the UK.* This raises important questions concerning the need to devolve and decentralise the national economy, so as to permit the UK's other cities to develop and compete on a 'level playing field'.

The growing interest of policy and academia in cities as economic hubs also reflects a basic economic and demographic phenomenon of the increasing proportion of populations that are living in urban areas. The UN report, World Urbanisation Prospects (2015 revision), reports that urbanisation of global population has increased from 43% in 1950, to 54% in 2014, and is expected to rise to 66% by 2050. In the UK the equivalent figures are 78, 82 and 89. Figure 1.2 shows these trends in more detail, and while the UK proportion did not change much up to 2000, there has clearly been a marked shift towards an upwards trend since then.

**Figure 1.2: Urban Population Shares**
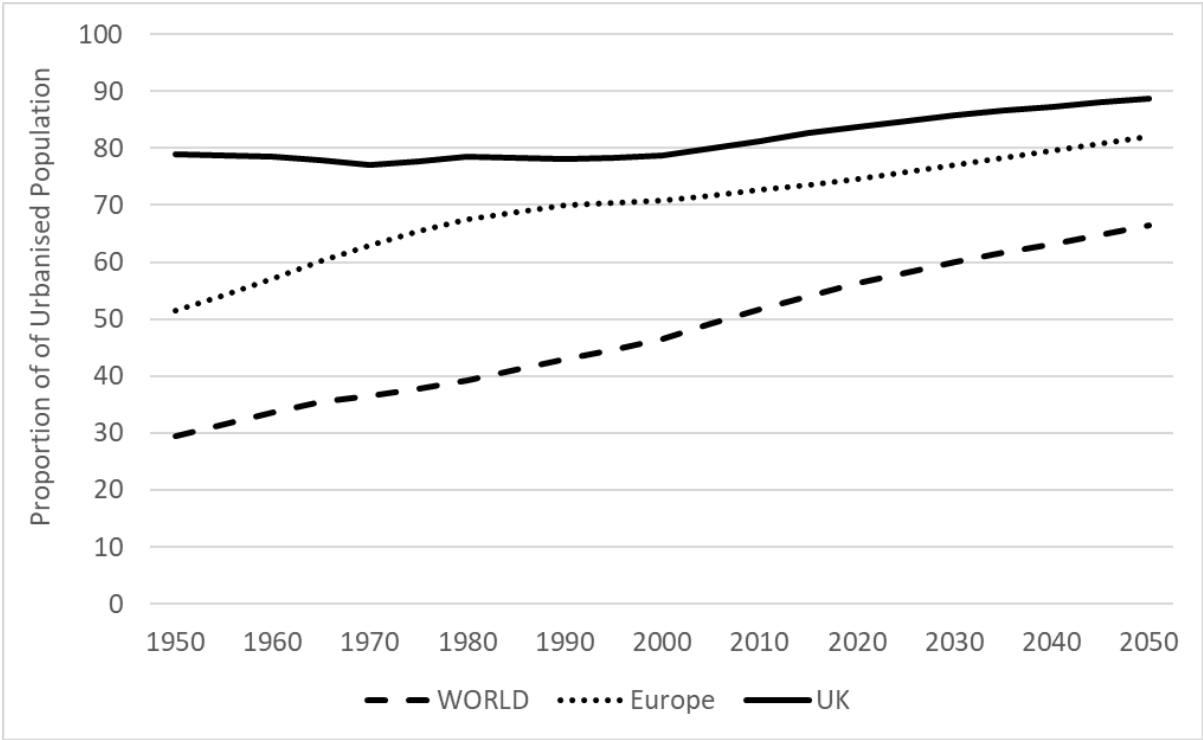


Source: UN World Urbanisation Prospects (2015 revision)[3]

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[3] Much of this type of analysis depends on how you define what is meant by the term 'urban'. For the UN, it is noted that no common (global) definition exists and so they rely on ensuring consistency of definition within countries across time, rather than across countries.

Having established that the UK spatial context is an interesting one to research, two further questions can be asked. Firstly, to what extent the UK's concentration of activity in London is unique, particularly among large European countries with which it has had closest links in recent times through EU membership. Secondly, whether the period of time being analysed (1970s -> 2015) is unique in terms of the spatial imbalance being experienced in the UK or whether it is more normal than might be realised.

Figure 1.3 provides the country-level comparison (at NUTS2 regional level, as equivalent city definitions were not readily available) by looking at the ratio of the top and bottom region's productivity.

**Figure 1.3: Country comparison of regional (NUTS2) productivity spreads**
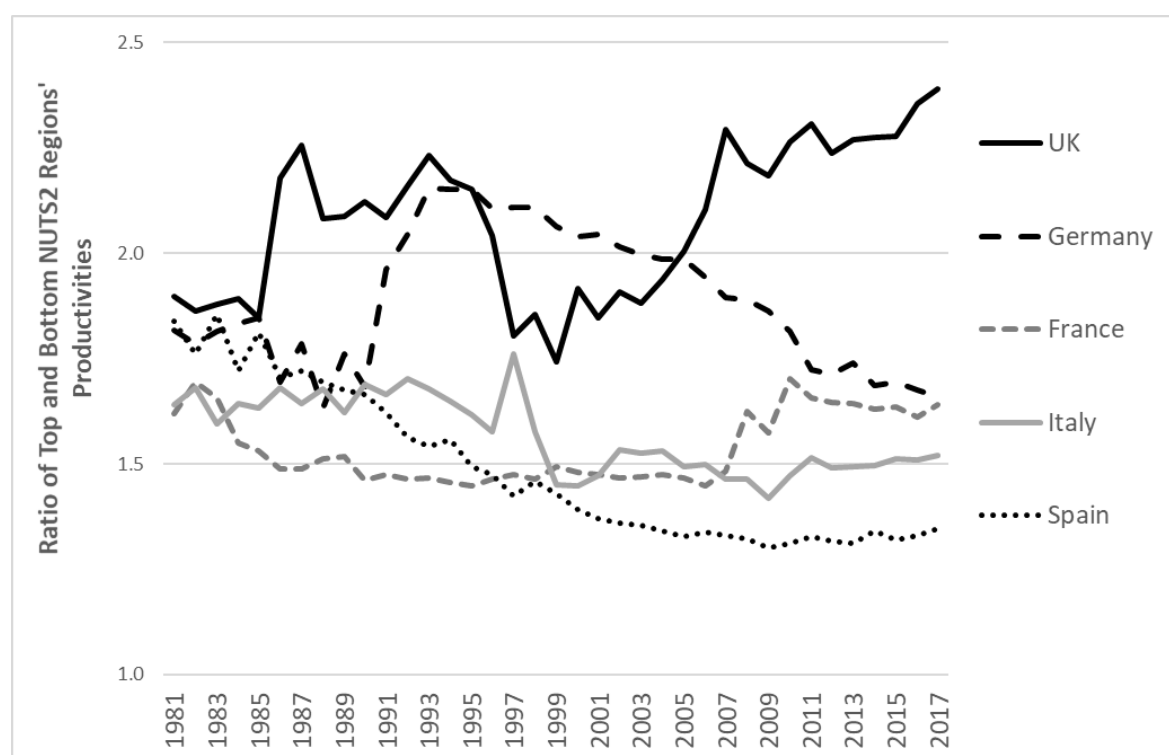


Source: Eurostat ARDECO database[4].

It can be seen how Germany shifts upwards suddenly in the early 1990s due to reunification, when east German regions are added to the mix, but since that initial rise the trend has been generally one of convergence. Also Italy, a country which conjures up stereotypical north-south divides with the Mezzogiorno, has generally seen a decline in the spread of its regional productivity, although this is partly due to slow growth in general. Meanwhile France, a country which is also has a largely monocentric governance structure similar to the UK, has a much lower productivity spread, and aside from a divergence around the time of the financial crisis and subsequent great recession, has been fairly

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[4] See https://ec.europa.eu/knowledge4policy/territorial/ardeco-database_en.

stable. Finally the UK, where the sharp rise in the mid-1980s is caused by a mix of rising productivity in inner London, the top productivity region for the whole period  (due to the combined effects of continuing de-industrialisation and financial liberalisation but also the declining productivity of Southern Scotland (the lowest ranking region around that time). The reversal of this divergence occurs as low-performing regions start to catch up in the boom period of the mid-1990s, but this is a short-lived phenomenon. From the late-1990s onwards the trend has mostly been one of further separation of London's productivity from the rest of the country.

The historical perspective on UK imbalance and is outlined as part of Chapter 4, in particular Section 4.2 which uses data from Geary and Stark (2015, 2016) and Stark (2005) to show how London was, even in the late 1800s and certainly into the early 1900s, the dominant region in the UK in terms of GDP and GDP per capita shares, and was also growing in importance (in both manufacturing and finance). Possibly a more telling visualisation can be found in Figure 1 of the Industrial Strategy Council's review of UK productivity disparities[5], which shows how relative regional (NUTS1) productivity levels have moved since 1900 to recent times. While it is true that London is the only NUTS1 region that is close to representing a city, the wax and wane of its fortunes can be clearly seen over the longer run of data, with a gradual decline during the first half of the 20th century reversing around the early-1970s (at the start of this study's data period) and increasing thereafter. However, having said this, although the early period can be seen as part of a 'long wave' of development, the current levels of London's relative performance do seem historically high even by these longer-term standards.

**UK policy perspective**

From a policy perspective, the contributions that cities make to the national economy and how some cities are part of a global network that transcends national systems are of increasing interest. The world is also becoming increasingly urbanised and so it makes sense to look below the regional level and investigate how cities and regions interact with one another and how this affects the ability of different spatial areas to resist and recover economic shocks such as recessions.

In recent years, the UK Government has acknowledged that the national growth model has become too centralised[6] and too dependent on just a narrow range of economic activity – especially finance and associated sectors – in just one corner of the country (London and the

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[5] See https://industrialstrategycouncil.org/uk-regional-productivity-differences-evidence-review.

[6] See for example, analysis from the OECD (2014) which showed the UK was one of the most centralised economies in Europe.

surrounding South East), and has recognised the need to 'rebalance' the economy spatially, to 'power up' the nation's other major cities (see Martin and Gardiner, 2018).

Increasing calls for a loosening of tax-raising powers from Whitehall have, in turn, given rise to more localised policy initiatives, including devolution of power to cities and local areas. In 2011 the Government published Unlocking Growth in Cities[7], which set the scene for giving greater financial powers to cities through a number of initiatives, in parallel to operation of the Local Enterprise Partnerships (LEPs), which were designed to provide business-driven decisions at local level. More recently, cities have been at the heart of the so-called "powerhouses" of the North, Midlands, and elsewhere, and are thus now at the very heart of boosting economic growth.

In this context, recent national-level policy developments would appear to be useful steps in the right direction. These include: the declaration of a commitment to boost the major cities making up what George Osborne, when Chancellor of the Exchequer, called the 'Northern Powerhouse' (Manchester, Liverpool, Leeds, Sheffield, Newcastle); similar commitments to other pan-city initiatives e.g. Midlands Engine; the decision to construct a new High Speed Two rail link (HS2) from London to Birmingham, Manchester and Leeds; the granting of certain devolved fiscal and other powers to a limited number of major cities and combined authorities, with their own new 'metro-mayors'; a number of City Deals intended to support economic growth and job creation; a National Infrastructure Commission to advise central Government to undertake a nation-wide infrastructure assessment; and the introduction of a new, 'place-based' National Industrial Strategy. These are all welcome and could potentially provide some of the building blocks for a much-needed policy programme to stimulate growth in the cities outside of London and ultimately help to spatially rebalance the national economy.

However, these various initiatives are not well coordinated, operationally or spatially, nor based on any coherent strategy specifically focused on how the cities operate as a system. The Government's commitment to promoting a 'Northern Powerhouse' to "rival that of London" seems to have lost momentum, and arguably has fallen victim to the demand of securing a satisfactory Brexit outcome. The HS2 project is also under review. Further, while devolution is certainly necessary for 'powering up' city economies and other areas outside London, of itself it is not likely to be sufficient. Much will depend on the scale of financial resources and powers actually devolved (an issue that had been raised by Lord Heseltine in

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[7] See https://www.gov.uk/government/publications/unlocking-growth-in-cities--5.

his report *No Stone Unturned*, 2012), and how far devolution goes beyond what appears to be the existing priority of 'contract over real governance' (Sandford, 2016).

Finally, despite its claim to be 'place-based', the Industrial Strategy which now underpins the subsequently-devolved Local Industrial Strategies merely regards place as one (and the last) of 10 key pillars of a national policy.  As the leading North American urbanist, Jane Jacobs (1984), famously argued, it is impossible to understand the 'national' economy without explicit reference to the performance and developmental needs of the cities and city regions of which it is composed.  It is in cities that the bulk of a nation's wealth is created, its exports are produced, its jobs are located, and its incomes are spent. 'Place' is not some separate 'pillar' of industrial policy, a simple 'add-on' dimension, but should be the central foundation on which to base and spatially configure key national policies on innovation, technology, skills, infrastructure, and so on.

That said, recent initiatives are of help and make the UK an interesting geography from which to analyse and learn from city evolutions, but there is still much to do.

## 1.2   Objectives of the Research

My research is underpinned by several aims and themes, that are best articulated in the questions below:

**How have structural transformations observed at national level been distributed across British cities?**

This analysis focuses primarily on the changing employment, output, and productivity of individual sectors, so as to identify declining industries, new and growing industries and those that have experienced successful upgrading or 'turnaround'.

The analysis then investigates how these individual industry patterns have played out across the national urban system and how the position in cities compares with that in their hinterlands.   A priori, one would not expect national patterns of industry change to occur uniformly across cities and their regions, not only because the latter will differ in their industrial (structural) ensembles, but also because the growth performance of a given industry may itself vary from area to area, reflecting, for example, local conditions and national and international factors (Storper, 2013; Cheshire et al. 2014).

To establish the first objective, I have constructed and applied a new database for describing the economic evolutions of cities in Great Britain. This is significant because the availability and awareness of a new database allows for improved analysis of city-level economic evolutions across space and time in a manner which, up until now, was not possible.

**How have the economic structures of British cities changed over time?**

A second aim has been to reveal and analyse how the economic structures (industrial ensembles) of individual cities have evolved over time. Thus, while the first aim is to determine the urban geographies of national industry-by-industry growth patterns, the aim here is to analyse the evolutionary dynamics of each city's complete industrial ensemble (including public sector activities). Several inter-related questions have been investigated here:

- How should city economic structures (industrial ensembles) be measured and compared?

- How should specialization, diversity and other structural concepts such as diversified specialization (Farhauer and Kroll, 2012) and related variety, (Frenken et al, 2007) be measured?

- Which measures provide better insight into a city's economic structure and its transformation over time?

- How far, and in what ways, have cities varied in the pace and direction of structural change?

- Have cities become less specialized and more diversified, and thereby increasingly similar in their economic structures over time?

- Do city economic structures change incrementally, or more discontinuously, for example in response to major shocks? The ideas of urban regional economic resilience are of direct relevance here (e.g. Martin, 2012; Martin and Sunley, 2015).

**How and why have cities varied in economic adaptability and to what degree has this been shaped by their industrial structure?**

The issue of structural change relates directly to the question of adaptability, or the speed with which city economies either shift from declining sectors into newer growth sectors, or are able to revivify slow-growing activities, for example by innovation and/or productivity-raising strategies. The notion of adaptability is central to an evolutionary perspective on economic growth (Metcalfe, 2003; Metcalfe et al, 2006), and to the new evolutionary economic geography (Martin, 2010; Pike et al, 2010). This is where the concepts of path dependence and new path creation come to the fore, both of which play a key role in how local economies evolve (Martin and Sunley, 2006; Martin, 2010). Key inter-related questions to be investigated here thus include:

- How far and in what ways do pre-existing city economic structures condition (positively or negatively) the emergence of new activities and industries?

- Do relationships between industries within an urban ensemble play a significant role in shaping urban economic adaptability?

- Are structurally diverse cities more likely to develop or attract new sectors of activities than more specialised cities?

- How path dependent are city economic structures? What is the evidence of lock-in? Are economically specialized cities more prone to lock-in?

- How does a city's inherited skills profile (its human capital base) shape the pace and direction of structural change?

- What has been the role of economic structure and structural transformation in explaining city growth paths?

**What sort of economic structure - diversified or specialized - is most conducive to regional and city growth?**

The question of diversity versions specialisation has been a recurring topic of debate in economic geography, regional science and urban studies/economics.  Despite the fact that some observers argue that specialization is the motor of city growth (Storper, 2013, Chapter 2; Storper et al, 2013, Chapter 2; Kemeny and Storper, 2014), the jury is still out on how structure influences growth.  Some studies find that employment growth rates are higher in cities with diversified economic structures (eg. Glaeser et al, 1992; Combes, 2000; Frenken et al, 2007), whereas others find that productivity growth rates are higher in specialised cities (Henderson, 2004; Mukkala, 2004). In fact, the evidence is equivocal (see Beaudry and Schiffauerova, 2009), and much of it, furthermore, pertains to short time periods. A medium to long-run perspective of the sort adopted in my research helps illuminate the question of which types of structure and ensemble are more or less conducive to growth.

**How have urban and related policies impacted on the structures and growth paths of British cities?**

There is increasing interest in the ways in which institutions and governance structures shape local, urban and regional economic growth (Rodríguez-Pose, 2013), in as much they may determine the operation of land and housing markets, physical infrastructures, and the supply of business finance and human capital. It is thus important to establish how far and in what ways both city-specific and national urban and industrial policies and governance arrangements have had any significant consequences for the process of industrial change and economic growth in cities. This issue is of particular relevance given current political concern to boost the economic growth of Britain's northern cities (Osborne, 2014; RSA City

Growth Commission, 2014[8]). Some have argued that any urban and industrial policy intervention should be 'horizontal', and that policies that support all entrepreneurial start-ups, encourage knowledge exchange and raise human capital levels across the board are most conducive to growth (Nathan and Overman, 2013). An alternative view is that more tailored local policies targeted at specific sectors or clusters are a more effective use of resources (Bailey et al, 2014), and policy and institutional interventions should therefore be directed at the supply of specific research institutions, technologies or skills that are related to the emergence of 'new economy' industries and clusters. This is the idea behind so-called 'smart specialization' in which policies are focused building on the potential of the existing industrial base and pursuing those key directions recognized by local entrepreneurs (McCann et al 2017).

## 1.3    Overview of the Research

The thesis consists of six discrete pieces of research, all focussed around the topic of cities and their evolution over time, space and the type of activity. Although the research topics are different, the flow chart in Figure 1.4 below and overview text shows how they are, nonetheless, part of an inter-related system of ideas that fit together as a whole.

**Figure 1.4: Connections of the research topics and themes**



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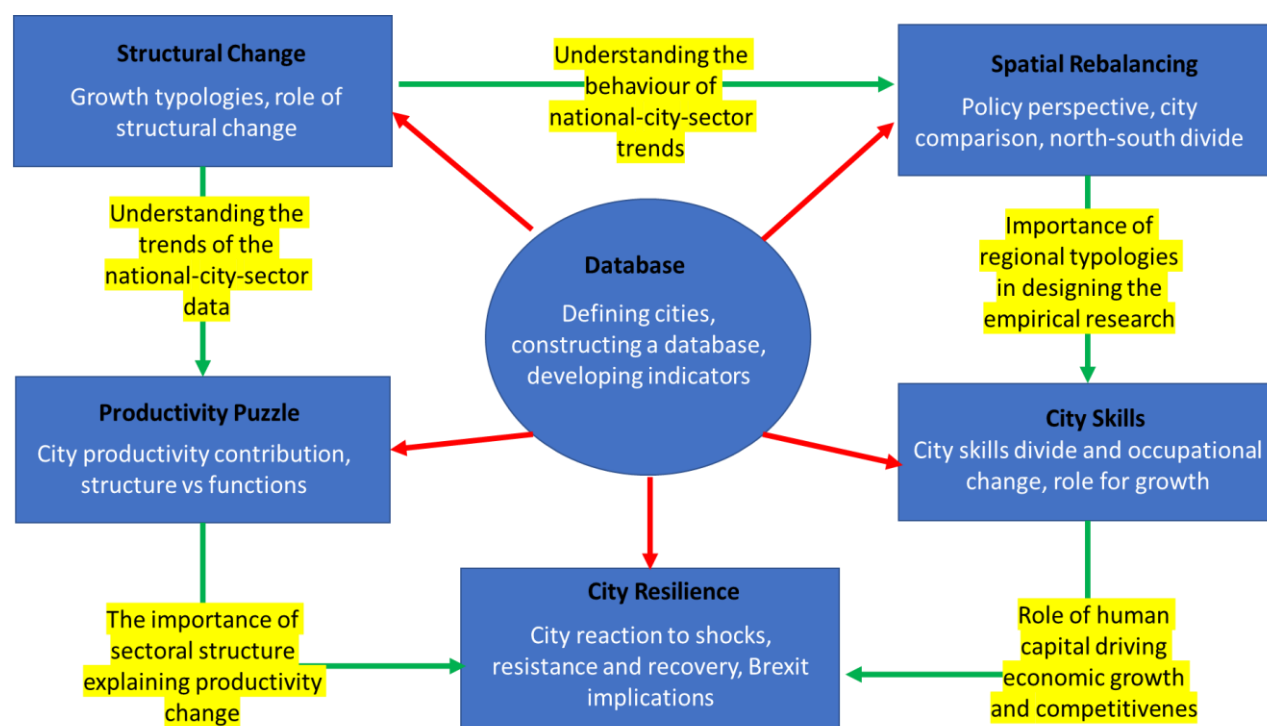
*Underlying narratives of the research*

- Places versus people

An underlying narrative that binds all the papers together is that place matters. In the UK and elsewhere there has been, and largely there still is, an ongoing policy debate which is stylised as *people vs place*. The people side of the debate argues that policies should be place neutral and only focus on actions which focus on benefits to the individual (e.g. education, mobility) rather than those which try to improve the inherent features of a place (unless this is a result of people want to live and work there). Studies such as Gibbons et al (2011) typify this view and claim that, once the individual (people) effects are removed, spatial disparities disappear and place is no longer important. To quote:

> "our general finding is that most of the observed regional inequality in average wage in Britain is explained by 'sorting' or 'people' rather than 'places'. Our preferred estimates, which include the individual fixed effects, suggest that the contribution of individual characteristics to variation in wages is between 100 to 850 times larger than the contribution of area effects (Gibbons et al. op cit; 760).

- Equity versus efficiency

Linked to this debate is that of equity versus efficiency, on which one side argues that imbalance is a natural outcome of the agglomeration forces which accrue due to increasing returns to scale an increasing densification in already prosperous areas (such as London and the Greater South East). Thus, these forces should be left to run their course, or even encouraged if the objective is stronger national growth. This is a view which in the past was largely be adopted by the British Government, in particular HM Treasury:

> "Theory and evidence suggests that allowing regional concentration of economic activity will increase national growth. As long as economies of scale, knowledge spillovers and a local pool of skilled labour result in productivity gains that outweigh congestion costs, the economy will benefit from agglomeration… policies that aim to spread growth amongst regions are running counter to the natural growth process and are difficult to justify on efficiency grounds, unless significant congestion costs exist (HM Treasury 2007: 20)."

On the other side of this debate is the view that regional imbalances do matter. This is discussed in more detail in Chapter Four, but the arguments are that a more unequal regional distribution of prosperity and performance is bad for the country as it makes macroeconomic policy less efficient as regions become less representative of the UK average which fiscal and monetary policy are aimed at. In addition, there are negative aspects of ever further

concentration such as pollution, congestion, social unrest, and other health-related issues which are often under-played. The OECD, in a recent study, (Royuela et al, 2018) find a negative association between regional income inequality and national growth, i.e. more unequal countries have growth more slowly since the start of the economic crisis.

The debate has not been concluded, and probably will never be due to the complex dynamic inter-linkages between place and people that are difficult to disentangle within an economic model. This view harks back to the work of Lösch (1939), which points to the close interrelationships between people, production and place that give rise to intractable identification issues.

- No single theoretical underpinning model

Throughout the chapters it will be evident that there is no underlying theoretical model from which dependent and independent variables are derived, or from which particular hypotheses are tested. This reflects partly the exploratory and explanatory nature of the work, based as it is on a newly-created database, and also the wide-ranging nature of the research brief which covers a variety of dimensions of city performance and which it would be difficult to originate at a single theoretical starting point. This stands somewhat at odds with more focussed first-principals empirical work on, for example, agglomeration economies (see for example Chapter 6 in Brakman, Garretsen and van Marrewijk (2020)). In contrast, the work in the chapters is more eclectic. For example, the existing modelling structure of Simon and Nardinelli (2002) is adopted (and adapted) for analysing different hypotheses relating to skilled labour and city development in Chapter Six. Also, in Chapter Seven on city resilience a basic correlation and production function type approach is adopted, whereas an alternative might have been to consider firm-level resilience from first principles and then build up an aggregate model which was consistent with micro-economic foundations. These are potentially topics for future research and would certainly help to bring the work closer to the field of mainstream urban economics, and in the case of resilience also reflects the still early nature of the research on explaining the concept through empirical work.

*Chronology of research*

The chronology of the research is also relevant for understanding how the narrative of the work evolved, and the chapters of the thesis generally follow the timing of work. The database was the first of research that was developed, as it was needed for all the other empirical analysis to take place. However, initially the work focussed on four main variables: sector output, employment and labour productivity, and population. Then came the need to establish a basic understanding of the trends in the data, in particular the extent to which city trends replication national-sector trends. Also, there was a desire to establish typologies of

behaviour, initially from underlying characteristics, but ultimately this evolved into looking at growth clubs because sets of common factors were hard to identify. Around the time the sectoral trends paper was being completed, an offer came along to do a book chapter on the north-south divide and this was seen as another interesting way of exploring the dataset, and so the role of cities in this policy debate was examined. This also fitted well with external projects, as I had helped to complete and publish the Northern Powerhouse Independent Economic Review (IER)[9] for Transport for the North a few months previously. Also, around this time, I was working as a Co-Investigator for the Productivity Insights Network[10], which is looking to improve understanding of the UK productivity puzzle by using cross-thematic approaches to shed new light on the problem. Using the newly-constructed database to analyse city productivity trends and, in particular, analyse the importance of sector mix and the role of de-industrialisation and rise of services (especially Knowledge Intensive Business Services, KIBS), was a useful addition to this strand of work. The project team then felt something should be done on human capital, which is often cited as one of the most important drivers behind economic performance at all spatial levels. An additional data set, based on research being done for Working Futures[11] by my company, Cambridge Econometrics, was established in the form of sector-occupation matrices to be developed at TTWA level. This additional dimension (occupation by sector by city over time) enabled us to test certain hypotheses concerning human capital and skilled labour, which otherwise would not have been possible. Finally, a long-running theme of interest in the project team was the concept of resilience – indeed the previous ESRC project had been devoted to the topic of regional resilience, and so looking at city-level resilience seemed to be a natural extension. It also brought together understanding gained from all the previous work (the role of sectoral mix, human capital, north-south divide typology, and the evolution of productive performance) in seeking to explain the concept of resilience from a new spatial perspective (as the regional resilience research space has become rather crowded). It was thus a fitting way to end the project.

The following sub-sections describe the different chapters in more detail.

**Database**

From the start, the construction of a database has been a central, and an underpinning, factor to all the subsequent empirical work, for the simple reason that such a database (of sufficient spatial, temporal and sectoral coverage) did not previously exist through official data sources.

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[9] See https://www.transportforthenorth.com/wp-content/uploads/Northern-Powerhouse-Independent-Economic-Review-Executive-Summary.pdf.

[10] See https://productivityinsightsnetwork.co.uk/.

[11] See https://www.camecon.com/what/our-work/working-futures-2017-2027-long-run-labour-market-and-skills-projections/.

In addition, and despite the increasing interest in city-level economic development and its place at the centre of sub-national policy agenda, there is no single definition of what geography a city should represent. City level databases usually fall within two groups – those based on administrative boundaries which are generally easier to collect and maintain, and functional boundaries which rely on more detailed (often census-based) calculations. The work on the data has culminated in a new city-level database centred around the travel-to-work-area, which is a concept based around self-contained commuting areas. This is a functional definition, although the database is constructed from local authority level data. The resulting dataset covers the period 1971-2015, has detail up to 82 sectors, and includes indicators for population, employment and output. The analysis begins by firstly comparing it with data available from other urban representations (functional areas, metropolitan regions, and primary urban areas). The analysis then moves to provide two applications of the data that demonstrate its usefulness to city-level research.

The work described in the data construction thus provides the foundations of the chapters that follow.

**Structural change**

Following the establishment of the database, the next most obvious path to take was to describe and typologise what was observed in terms of city growth paths. Structural change is central to this – the period of analysis has seen periods of deindustrialisation, the rise of the services sector, and in particular the rise of knowledge-intensive business services (KIBS) as globalisation has radically changed trading patterns and specialisation behaviour. As noted earlier, eg Storper (2013), Frenken et al, (2007), debates continue about how structural change is important in driving performance at all spatial scales (national, regional, and city-level). Regardless of the position in the debate (specialisation, diversification, related variety) structural change is widely considered to be an important aspect of national economic growth. Yet the issue is not only of relevance at the macro-economic level; it also has a direct bearing on the growth of regions and cities. In this chapter the relationship between structural transformation and economic (output) growth across British cities over the last half century is examined. The work shows how the structural transformations in the national economy have played out quite differently across British cities, shaping to a considerable extent their divergent growth trajectories over the past five decades. At a broad level, it is possible to distinguish between a number of distinct growth types of cities, and these also display significant differences in the extent and direction of structural change and reorientation. However, while differences in structural change have certainly been important in influencing city growth paths, other, 'city-specific', factors appear also to have exerted an influence, and thus require investigation.

**Spatial rebalancing and the Northern Powerhouse**

The concept of Northern Powerhouse was born on a trade mission trip to China by the then Chancellor of the Exchequer, George Osborne, in 2013, where it was felt that the cities and regions of the north required an entity or voice to represent them, following the abolition of the Regional Development Agencies a few years previously. In a talk in Manchester the following year[12], George Osborne's Northern Powerhouse agenda was launched, based on the idea that Northern cities are "individually strong but collectively not strong enough. The whole is less than the sum of its parts." Few would probably disagree with the basic intent and aspiration behind this declaration, or that the UK economy has become too dominated by London, but this chapter argues that both the dominant diagnosis of the problem, and the main policies being advanced to solve it, are more debatable. In addition, this 'discovery' of spatial imbalance in the UK was nothing new and had already been documented in research such as Martin (1988) and Fothergill and Gudgin (1982), among many others. This work tended to be regional in nature, however, while the city-based dimension of the Northern Powerhouse concept developed more recently following the rise of London contrasted against the deindustrialising northern cities (rather than just the stereotype North-South divide), and increasing relevance of cities to the policy landscape through rising urbanisation. It is in fact questionable whether Northern cities are as economically strong 'individually' as Osborne's claim suggests. There is more to a city's economic success than just size and density, and the argument that greater connectivity to London promised by the High Speed 2 rail project will benefit Northern cities is highly contestable. Moreover, devolution could even intensify economic and social disparities both among Northern cities themselves and in relation to the more advantageous position of London with regard to fiscal devolution. The lagging performance of northern cities (and regions) and the challenge confronting their catch-up with London need to be understood in terms of the historical development of the national political economy, and how that development has favoured a certain disposition towards and role in the evolving process of globalisation.

**Cities and the productivity puzzle**

Across OECD countries productivity growth has slowed, not just in recent years but over the past four decades: the so-called productivity puzzle. The research in this chapter examines the differing productivity growth paths of 85 British cities since the beginning of the 1970s, and explores how far these paths reflect differences across cities in the pace and nature of structural change. We find that while northern cities led productivity growth over 1971–91 southern cities then led after 1991. However, at the same time, the rate of productivity growth

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slowed across almost all cities between these two periods. We find evidence of considerable structural convergence across cities and a general tendency for the degree of specialisation to fall. This then leads to a decomposition analysis which identifies the relative contribution of between-sector (structural change) and within-sector effects to city productivity growth. The analysis reveals that structural change – and especially the shift from manufacturing to services – has had a negative impact on productivity growth across all cities, but that within-sector productivity developments while positive and outweighing structural change effects, have also declined over the past 45 years, as well as varying across cities. These findings point to the need for further research on the causes of this slowdown in 'within-sector 'productivity growth and why those causes appear to differ from city to city. They also point to the need for a 'place-based' dimension to policies aimed at improving national productivity performance.

**Cities and skills**

Recent research has argued that human capital has become the key driver of city growth and that there is a widening divergence between high and low-skill cities, e.g. Glaser (2003), Moretti (2013), and Parkinson (2016). This skilled city view includes several stylised propositions. The first is that more skills and human capital generate stronger economic growth; the second is that already skilled cities are becoming ever more skilled; and, the third is that larger cities tend to have stronger concentrations of, and faster growth in, high-skilled, cognitive occupations. Additional data work was undertaken to extend the city database, whereby occupational change between 1981 and 2015 was linked to and calculated from the existing sectoral employment data, this research evaluates whether these propositions apply to British urban evolution, and how they relate to the 'hollowing-out' of medium-skilled jobs. The results confirm the close interactive relationship between growth and high-skilled occupations. However, some of the skilled city propositions, such as 'smart cities becoming smarter', and a positive relationship between agglomeration and high skilled employment growth, do not apply in Britain where other factors have been more important. The pattern of high-skill growth has shown a strong regional dimension, and the 'emergence' of newer smaller cities, particularly in southern England has been more evident than the 'resurgence' of large core and industrial cities.

**City-level resilience**

Research on resilience in the social sciences has grown rapidly over the past decade, linked mainly to the 2008 financial crisis and subsequent global recession which saw many countries in Europe plunged prolonged downturns. Much of this work that relates to economics and geography (and which itself has originated from analysis of shocks in other areas such as psychology and environmental science) has focussed on national and regional

resilience, generally defined in terms of macro-regions. While the research undertaken thus far has addressed the issue of resilience from a variety of different perspectives (e.g. ecological, social, cultural, and economic), much less work has been undertaken into the roles that cities play in regional resilience, and how they contribute to the longer-term consequences for economic growth and prosperity. This is an important omission, because from a policy perspective the contributions that cities make to the national economy and how some cities are part of a global network that transcends national systems are of increasing interest. The world is also becoming increasingly urbanised and so it makes sense to look below the regional level and investigate how cities and regions interact with one another and how this affects the ability of different spatial areas to resist and recover economic shocks such as recessions. The paper thus helps to fill a gap in the literature by examining the resilience of British cities to major economic shocks. Using the newly-created city database, it analyses their resistance to and recovery from the last four major recessions, over the period 1971 to 2015. It reveals a distinct shift in the relation between resistance and recovery between these shocks, as well as major differences between northern and southern cities. Some possible factors shaping these patterns are explored, and tentative estimates of the likely impact of the Brexit shock (Britain's withdrawal from the European Union) are also provided. A key implication is that differences in resilience to major shocks can contribute to the long-run growth paths of cities.

**My role and contribution to the research papers**

My contribution to each of these areas of research can be summarised as follows:

- Database: My role here was to be responsible for the construction of the entire database, with some guidance being given by the wider project team on the criteria for establishing a threshold for the definition of TTWAs that were acting as a proxy for a functional city area. The database was first constructed, and then subsequently updated with a further year of data when these became available. It was then tested with some basic economic applications prior to wider use for research papers.

- Structural change: Here, I was working to develop the growth typologies adopted by the paper by reviewing the growth paths of output, employment, and labour productivity. I was also responsible for the development and application of the dynamic shift-share approach, originally developed by Barff and Knight (1988) to analyse the evolution of structural versus local effects across the different city types – this involved comparing and contrasting different shift-share approaches (static vs dynamic, as well as consideration of the Multi-Factor Partitioning technique proposed by Ray et al (2012), amongst others). Finally, I assisted in the sectoral descriptions and analysis of each of the city club types.

24

- Spatial rebalancing: I was responsible for the analysis of cumulative growth paths of the various cities included in the research, as well as contributing to the northern powerhouse background description. Subsequently I led on the calculation and description of the export base analysis, also assisting in the concluding sections.

- Productivity puzzle: I was responsible for analysing and reporting the historic growth paths of British cities over the period of study, including the north-south typological distinction. I was also responsible for calculating and reporting on the structural changes across northern and southern cities, including the statistical analysis of measures such as the Krugman Specialisation Index, and subsequently the Kruger decomposition analysis which separates structural change into within and between-sector components. Finally, I undertook correlation analysis in helping to describe factors that were associated with changes in productivity growth being analysed.

- City skills: Firstly, I was responsible for constructing an additional (occupations-based) database consistent with the sectoral employment previous calculated, which allowed the empirical analysis of skills (for which occupations were a proxy) to take place. This also led to the section on describing and defining occupational categories. I also undertook an initial review of the (mostly US-based) occupations-related literature (in particular the work of Simon and Nardinelli (1996 and 2002)), summarising the areas which we could analyse with our own database and starting to develop the propositions on which the paper would eventually be based around. I was responsible for most of the empirical analysis in the paper, including the Krugman Specialisation Index and equation estimation. Finally, I also devised an additional dimension to the shift-share analysis (occupation by sector by city) which was used initially to decompose changes in employment over time, but which ultimately did not make it into the final version of the paper.

- City resilience: In the final set of analysis, I conducted the majority of the empirical work. This included recessionary analysis, calculation of resistance and recovery indices across the periods of recession and recovery, and the typological analysis looking at the shape of recovery paths across cities against the theoretical possibilities. I assisted in the regression analysis, formulating the data, regression and interpretation of results. Finally, I was mostly responsible for undertaking the Brexit-related analysis, applying previous empirical results across the selection TTWAs to provide an estimated city-level impact of alternative Brexit scenarios.

## 1.4    Remaining Chapters[13]

The remaining sections of this thesis contain publications produced during the course of my research on the aforementioned projects. These are as follows:

Chapter Two: Constructing a New City Database on Long Run Economic change in Great Britain, B. Gardiner.

Chapter Three: Growing apart? Structural transformation and the uneven development of British cities, Tyler, P., Evenhuis, E., Martin, R., Sunley, P., and B. Gardiner, *Cambridge Journal of Regions, Economy and Society*, Volume 10, Issue 3, 14 October 2017, Pages 425–454, https://doi.org/10.1093/cjres/rsx017

Chapter Four: Reviving the 'Northern Powerhouse' and Spatially Rebalancing the British Economy: The Scale of the Challenge, Martin, R. and B. Gardiner, Chapter 2 in Developing England's North (2018) Craig Berry and Arianna Giovannini (eds), SPERI.

Chapter Five: The city dimension of the productivity growth puzzle: the relative role of structural change and within-sector slowdown, Martin, R., Sunley, P., Gardiner, B., Evenhuis, E., and P. Tyler, *Journal of Economic Geography*, Volume 18, Issue 3, 1 May 2018, Pages 539–570, https://doi.org/10.1093/jeg/lby008.

Chapter Six: In Search of the Skilled City Sunley, P., Martin, R., Gardiner, B., and A. Pike, *Urban Studies*. https://doi.org/10.1177/0042098019834249.

Chapter Seven: The Resilience of Cities to Economic Shocks: A Tale of Four Recessions (and the Challenge of Brexit), Martin, R. and B. Gardiner, *Papers in Regional Science,* February 2019. https://doi.org/10.1111/pirs.12430.

Chapter Eight presents my conclusions from the work. Firstly, it draws out the main findings of the papers. Secondly, it identifies further lines for research, and any remaining unanswered questions. Finally, it reports on the implications for policy.

Chapter Nine is the bibliography, followed by Technical Appendices relating to different chapters.

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[13] It should be noted that I do not consider that any part of my research (method or data) has ethical or health and safety issues connected with it, and so do not intend to make any further comment on these topics.

# 2 A City-Level Database of Long Run Economic Change in Great Britain

## 2.1 Introduction

Despite the growing interest in seeing cities as a basic building block from which to conduct analysis within economic geography, there has been little agreement on how to define what is meant by the term 'city'. Partly this is because the term can serve different purposes, with some studies focussing on the tight built-up area of a city, while others need to take a broader view that includes commuter boundaries. The definition used is also affected by available data, as the typically the more functional boundaries have limited time series in comparison to the less accurate administrative constructs. This paper seeks to address these limitations of analysis by constructing a new database, based on functional definitions but which can also be used for long time series and sectoral analysis. In this way, a more detailed and longer-term perspective can be obtained on how the British urban landscape has evolved over time, and the extent to which changing economic structure has contributed to this can be better understood.

For some countries even the issue of definition is not straightforward, there being no agreement of what is meant by a 'city' in terms of geographical boundaries. Different authors and institutions, in different studies, use different definitions. In the UK there is no single consistent or official definition that is used as the basis for the collection of economic data series on cities, nor as the basis for public policy interventions. This makes analysis based on the basis of robust and reliable data, especially over time, far from straightforward. It also stands in contrast with the situation in the United States, where an official system of 384 Metropolitan Statistical Areas (MSAs), defined by the US Office of Management and Budget[14], can be used to study urban trends and developments. The MSAs are well-established (since the 1950s) and are typically defined by a commuter area surrounding and urban core which contains at least 50,000 inhabitants. The latest data definitions are available for 2010-2017.

## 2.2 Alternative Methods for Defining a City

Two main types of city area definition can be identified – either on *administrative* or *functional* lines.

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[14] See http://www.census.gov/population/metro/ and https://www.govinfo.gov/content/pkg/FR-2000-12-27/pdf/00-32997.pdf.

Administrative methods use officially available units of data such as the NUTS (Nomenclature des Unités Territoriales Statistiques) regions in Europe to define urban boundaries. The main advantages of this approach is that the data are readily available as they are collected regularly by the relevant statistical authorities, while also connecting needs with the scale of administrative delivery, while the main disadvantage is that the boundaries imposed by these data may not best reflect the actual functioning area of a city or urban area, i.e. they may over or under-bound the functioning city area[15]. Cities need more than their immediate built-up area to function properly – they need housing, transport infrastructure for commuters to travel to and from work, and recreational space for people to relax. All this points towards the space used to define a city being larger than the business district or even the immediate neighbourhoods. Indeed, this works on an administrative level as well, because if the primary city area and surrounding support areas are governed by different agencies with different strategies and goals, this may be to the detriment of an areas economic potential. Definitions of city boundaries are discussed by Parr (2007), who identifies four alternatives: the Built City (the immediate urban area with clear physical presence), the Consumption City (where most goods and services are supplied from), the Employment City (the wider employment catchment area[16]), and finally the Dependent City (the broader territory required to support employment and other city-based needs). All these perspectives on city space have their own role to play but can lead to quite different findings and conclusions when it comes to economic scale and performance. Parr (opt cit) summaries well by stating "Clearly, there is no "all-purpose city", and the type of city adopted will depend on the nature of the research question under consideration.".

Functional methods, on the other hand, rely on an understanding of the economic behaviour of an area, usually[17] using census-level information on employment, residence and resulting commuting flows to establish a more robust measure of the economic sphere of a city or region[18]. Compared to administrative definitions, the main advantage and disadvantage are reversed, i.e. functional areas are harder to obtain but correspond better with economic

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[15] The term under- or over-bounding refers to a situation where the spatial definition or an area is not consistent with its functioning boundary. So an area is under-bounded if economic activity greatly exceeds its spatial definition, and over-bounded in the reverse situation.

[16] The Workforce City is most closely aligned to the one used in this paper.

[17] Alternative functional definitions are discussed in Burchfield et al (2006) which uses satellite images to measure 'urban sprawl' and to investigate the causes behind the spread of urban development in the US, while Henderson et al (2018) use night-time light intensity to measure the spatial distribution of economic activity and relate this to the evolution of development in different countries across the world. Interesting as they are, however, neither of these approaches would be conducive to studying the evolution of economic development over time *and* space in the way that more standard economic data could do.

[18] Clearly different activities and indeed indicators have different spatial scales that are appropriate for them and their analysis. For functional areas built on commuting boundaries, this is most directly linked to the labour market and then to the output produced by the jobs within an area.

reality in what they seek to measure. The forerunner of functional area definition in Europe was the Functional Urban Region (FUR), originating with Hall and Hay (1980) and taken further by Cheshire and Magrini in various publications (e.g. Cheshire and Magrini, 2006) extolling the advantages of using FURs over NUTS regions for measuring economic development. For the majority of EU countries, the FUR core-city area was defined on the basis of the smallest local units available for each country (wards in the UK) that gave a population density of 1,235 per km2, with a hinterland defined on the basis of net commuting flows[19].

In an effort to re-establish internationally consistent city-level definitions along functional lines, similar to the MSAs in the United States, the European Commission[20] and OECD (2012) have worked together to define and create a database of functional urban areas (FUAs), which has a clear definition of what is meant by an "urban" area, using a 4-step process:

(i)     Identify "urban high-density areas" that have a population density criterion of at least 1,500 inhabitants per km2 defined across 1 km2 grids.

(ii)    Group contiguous areas together in high-density clusters, with urban centres defined as those with a population greater than 50,000.

(iii)   FUAs are then comprised of urban areas (contiguous or otherwise) which have commuting patterns that link residential populations based on a defined minimum threshold of 15%.

(iv)    A further distinction is then made between FUAs of different population sizes:

   (a) Small Urban Areas: 200,000 < population > 50,000

   (b) Medium-sized Urban Areas: 500,000 < population > 200,000

   (c) Metropolitan Areas: population > 500,000.

   (d) Large Metropolitan Areas: population > 1.5m.

   Such an approach is welcome and long overdue. For cross- or within-country research this initiative represents a way of looking at cities on a comparable basis that has not been possible before, and empirical research on these data are already yielding interesting results, e.g. Schmidheiny and Suedekum, (2015). However, for long historical analysis the database

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[19] Commuting flows were originally calculated for, and limited to, 1971 values but were subsequently updated to 1991 through the GEMACA II project (see http://ec.europa.eu/regional_policy/archive/urban2/urban/audit/parallel/comparitivecontent.htm), although this only focussed on the largest metropolitan areas with populations in excess of 1 million inhabitants.

[20] See http://ec.europa.eu/eurostat/statistics-explained/index.php/Archive:European_cities_%E2%80%93_the_EU-OECD_functional_urban_area_definition.

is of no use, because there are no consistent time series available with a mix of years across countries. For example, on the basis of 2001 Census data the UK is listed[21] as containing a total of 101 FUAs with the following distribution:

- 3 Large Metropolitan Areas (London, Birmingham and Manchester),
- 12 Metropolitan Areas,
- 44 Medium-sized Urban Areas,
- 42 Small Urban Areas

On the surface this seems promising, yet closer inspection reveals only two data points for population (2000 and 2014), and little else available from either OECD or Eurostat database sources. What remains therefore is a well-worked functional definition which can identify the demographic boundaries of urban areas, but which is currently devoid of any useful economic data on which to undertake research or policy analysis. Indeed, in their most recent State of the Cities report (European Commission, 2016) in order to look at urban economic development over time the additional concept of Metropolitan Regions is used. Metropolitan Regions are a broader definition of the Metropolitan Areas mentioned above, namely they are urban agglomerations with more than 250,000 inhabitants and are constructed from NUTS3 regions[22]. As they are built from administrative building blocks, more economic data are available covering output (GVA), employment, population and other indicators[23].

Within the UK, one of the most popular methods to define cities is the Primary Urban Area (PUA)[24], which has been used in a number of studies which look at city performance (e.g. Martin, Gardiner and Tyler (2014), Swinney and Thomas (2013)), Future of Cities Foresight project (HM Gov, 2015). Following a data construction process for the Future of Cities Foresight project, data on the 63[25] British PUAs are available from 1981 at 45 sector disaggregation. Essentially the PUA is a hybrid definition (i.e. combining both functional and administrative features) for while the definition of the PUA is grounded in Census data which establishes the geography of the Built-Up Area[26] (see ONS) as the starting point, they are limited to the use of whole Local Authority Districts (LADs) as their building blocks, which can

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[21] See https://www.oecd.org/cfe/regional-policy/functional-urban-areas-all-united-kingdom.pdf.

[22] Adjacent regions are added to the agglomeration if more than 50% of the population are included within its area.

[23] See http://ec.europa.eu/eurostat/web/metropolitan-regions for more detail.

[24] See http://www.centreforcities.org/puas/.

[25] The PUA definition was revised in Coombes and Wymer (2015).

[26] BUAs are defined as defined as land with a minimum area of 20 hectares (200,000 square metres), while settlements within 200 metres of each other are linked.

lead to questions as to whether the defined area is economically dense enough to really be defined as a functioning city[27].

The UK government also has its own method for calculating functional areas, called the Travel-to-Work Area (TTWA). The TTWA concept dates back to the 1950s, although it was not until the 1980s that a more formal definition was adopted, following the work of Coombes et al (1986), which in turn built on the work of Smart (1974). The work has subsequently developed and been modified to allow different TTWAs for different sub-groups of the labour market (who may have different commuting patterns and thus create different boundary conditions) as well as for different industries (e.g. agriculture may have a larger number of TTWAs compared to manufacturing and service sectors). See Green (1997) and Casado-Diaz (2000) for more discussion.

Subject to a minimum size of 3,500 people, TTWAs are also defined on census commuting patterns, and represent labour market areas where the majority[28] of the resident population also work in the same area. As with other functionally-defined areas, the TTWA can be claimed to better define areas in economic terms and relevance, although the principal disadvantage is limited data availability (the ONS typically release only one year of population data consistent with the areas, although they do revise the TTWAs after each census year, as far back as 1971). TTWAs were used by the Department for Communities and Local Government (DCLG, 2006) to support the State of the Cities report, which focussed on the 56 largest towns and cities in England.

The TTWA concept is not unique to the UK, indeed as Coombes (2002) notes, '…the fact that TTWAs meet a clear need in Britain is not surprising when it is realised that this need is also recognised in almost all similar countries.' When Cattan (2002, in particular Table 1) undertook a survey of OECD countries it was found that of the 22 countries responding, only five did not define regional labour market areas. Among those that did, there were differences in the precise conditions, e.g. commuting boundaries and thresholds, on how labour market areas were defined, and so direct comparison may be limited even though the core principal exists. More recently, Coombes et al (2012) examined the potential for a common functional labour market classification for the entire EU, highlighting the different methods used to define areas across Member States.

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[27] It should be noted that the Centre for Cities undertook a review of its PUA definitions in light of changing geographies and city growth. This is reported in Centre for Cities (2015).

[28] The threshold is usually 75%, although it can go as low as 66.7% for areas where the working population exceeds 25,000 (see http://webarchive.nationalarchives.gov.uk/20160105160709/http://www.ons.gov.uk/ons/guide-method/geography/beginner-s-guide/other/travel-to-work-areas/index.html).

The TTWA concept is not without its criticisms, although some of these, e.g. Webster and Turok (1997) mostly focus on their usefulness for representing unemployment statistics. Feng (2009) highlights three main areas of debate: firstly the fact that economically functional areas naturally inter-connect and thus overlap, while the TTWA are mutually exclusive; secondly that although the TTWAs are named around the principal urban area in their catchment, there is no guarantee that there is not more than one sub-commuting area within them and so they may not be as cohesively strong as the definition suggests; finally, the TTWA definition changes over time (every 10 years) as commuting boundaries vary according to the wax and wane of urban centres, alongside the changing nature of society and people's willingness to commute over longer distances. It is true that the TTWAs will still interact and the commuting thresholds imply that there will still be some cross-commuting occurring, but it would be extremely difficult to arrive at an economically defined area that was completely self-contained. It is also true that some TTWAs, e.g. Cambridge (which now extends down towards London)[29], are much larger than the natural city boundaries would suggest and thus they are likely to be diluted in some cases. The majority of TTWAs, however, are centred around a large urban area that acts as the commuting hub. The final criticism of changing TTWA boundaries (every 10 years) is valid, and evidence tends to show a gradual reduction in the number of areas each year[30], from 334 in 1981 to 228 in the latest 2011 set of definitions. However, if both the economic activity and spatial definition of areas was changing over time then it would be impossible to make comparisons of the type which are the objective of the dataset. This is why the boundaries used were fixed at the 2011 definitions. Table 2.1 summarises the functional area definitions currently available for the UK.

**Table 2.1: Functional Area Definitions for the UK**

| Name | Institution | Definition | Number in UK |
|---|---|---|---|
| Primary Urban Area (PUAs) | Centre for Cities | Best match for Built Up Areas by using whole LADs, with a minimum size of 135,000 people | 63 |
| Functional Urban Areas (FUAs) | OECD | Urban cores defined as 1km grids with minimum 1,500 people per km². Linked together through | 101 urban areas, of which 15 |

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[29] The 2011 revision to the Cambridge TTWA has been questioned – see
https://www.scambs.gov.uk/media/3153/matter_pm1_statement_-_supplement_1.pdf.
[30] See https://www.citymetric.com/business/economically-speaking-britain-losing-three-or-four-cities-year-blame-longer-commutes-1366.

| Name | Institution | Definition | Number in UK |
|------|-------------|------------|--------------|
| | | commuting flows (minimum 15%) to form high density areas with a minimum population of 50,000. Hinterland areas linked again with minimum 15% commuting threshold. | Metropolitan Areas (> 500,000 inhabitants). |
| Travel to Work Areas (TTWAs) | ONS / UK Government | Areas bigger than 3,500 people where 75% of resident workforce work in the area, and at least 75% of people who work in the area also live there | 228 |

There is then, a trade-off to be had between defining an economically meaningful area and having sufficient data available in order to undertake long-term analysis of how these areas develop over time.

The remaining parts of this chapter describe the method of and results from trying to improve on this trade-off by constructing a Travel-to-Work Area database for Great Britain over the period 1971-2015 and across 82 sectors. In summary, the method by which this can happen is to use LADs as the building blocks (as with the PUAs) but to use proportions of LADs rather than just whole areas which helps counter the over-under bounding issue. Constructing these data provides the most detailed sectoral database for British cities over this period, a span during which considerable structural change and three major recessionary shocks and recoveries have occurred.

## 2.3    Constructing a Travel-To-Work-Area Dataset for Great Britain

**Main objective**

The main aim of the work has been to construct a dataset comprising population, employment and output (constant price GVA) for a set of Travel-to-Work Areas with sufficient time dimension to allow for analysis of long-term economic development. This is an important development because the ability to analyse city and regional development over long periods of time is greatly hampered by the lack of availability of a consistent and detailed dataset, and while more recent data are available they do not allow the evolution of economic-geography patterns to be observed. In addition, a fine level of sectoral disaggregation was desired in order to investigate the role played by economic structure of the TTWAs in shaping

their development – 45 sectors[31] was the starting point, although this was extended to 82 sectors for some variables.

The overall aim of the work is based within a clear hierarchy of data. All data manipulation was carried out at district level – only when these data were fully checked was the final step taken, whereby each variable was aggregated from districts to TTWAs. The following stages describe the process which arrives at the most disaggregated data possible, while retaining quality and robustness suitable for the subsequent analysis.

*Stage 1: Construction of UK sectoral data (86 sectors, 1981 -)*

The production of the employment data starts with the construction of UK series at an 86-sector level of disaggregation. Data are estimated for male and female, full-time and part-time and for self-employment; i.e. six types of employment. Raw data are taken from the ONS but at this level of disaggregation some numbers are Cambridge Econometrics (CE)'s own estimates.

*Stage 2: Regionalisation (NUTS1, 45 sectors, 1971 -)*

Following the completion of the UK sectoral data, regional (NUTS1) data are constructed. Data are constructed at a 45-sector level of disaggregation (see Table 2) by the six employment types discussed above, scaled and made consistent with the UK sectoral data. The NUTS1 data are then pushed back to 1971 as to provide an intermediate level for checking the local area data against.

The combination of different datasets is not straightforward, as the data are of different aggregations and time periods. The following points are elaborated to make the process clearer:

- CE's regional (NUTS1) data (back to 1992 for employees and 1996 for self-employed) are based on the quarterly workforce jobs data from the ONS as the main dataset which provides the 19-industry data by region, type (full-time, part-time and self-employed) and gender.

- To move from the 19 industries to 46 sectors, data from the Business Registry and Employment Survey (BRES) and Annual Business Inquiry (ABI) gives 46 industry data (based on SIC07) that can be used to generate 19 to 46 industry shares for each region and type.

- To extrapolate the dataset back to 1971, the growth rates of CE's existing historical dataset are used, which are themselves based on older ONS data from the Census of Employment

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[31] A detailed table with sector definitions is provided in the Appendix.

and ABI. These older datasets were converted to the latest standard industrial classification (SIC07) to maintain consistency with the more recent data. Historical boundary changes for regions and local authorities are adjusted for, as part of this process to ensure consistency.

It should also be noted that the UK and regional data are based on second quarter figures, e.g. employment for 2011 is based on data published for 2011Q2 (equivalent to a mid-year estimate).

*Stage 3: Localisation (LAD level, 45 sectors, 1971-)*

At local area level, employment data are the most readily available from the ONS (through NOMIS[32]), and these data were first collected and processed. The latest available data (BRES data based on SIC 2007) were obtained, with older vintages of data (from BRES[33], ABI, etc.) being used to construct consistent historical growth rates which were then applied to the latest levels to give a consistent back series for each sector and local authority district.

The GVA data were then constructed by applying NUTS2-level productivity data (as provided by the ONS) to the employment data[34]. This required the mapping of NUTS2 regions to districts and the mapping of the detailed sectors to the fewer sectors for which sub-national productivity data is available from the ONS[35].

Finally, LAD-level population data were collected from the ONS mid-year population estimates and presented alongside the employment and GVA data.

*Stage 4: Further disaggregation (LAD level, 82 sectors, 1971-)*

As with the 45-sector data, detailed local area employment data are the most readily available from the ONS (through NOMIS[36]), and these data were collected and processed accordingly. The latest available data (BRES data based on SIC 2007) were obtained, with older vintages of data (from BRES[37], ABI and the Census of Employment[38]) being used to construct consistent historical growth rates which were then applied to the latest levels to give a

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[32] https://www.nomisweb.co.uk/

[33] BRES is an ONS business survey which (from 2010 onwards) replaced the Annual Business Inquiry (ABI).

[34] We are aware of the recent availability of local area GVA data (see

https://www.ons.gov.uk/economy/grossvalueaddedgva/datasets/regionalgvaibylocalauthorityintheuk) but unfortunately this came too late for the current version of the database. In later editions we would fully expect to make use of these data.

[35] The regional data are deflated using national-sector price deflators, because sub-national price deflators are not available from the ONS.

[36] https://www.nomisweb.co.uk/

[37] BRES is an ONS business survey which (from 2010 onwards) replaced the Annual Business Inquiry (ABI).

[38] Also obtained from NOMIS.

consistent back series for each sector and local authority district. Table 2.2 below provides a summary of sources.

**Table 2.2: Datasets used for detailed sector disaggregation**

| Dataset | Period | Sectors |
|---|---|---|
| BRES | 2009-2015 | 86 (effectively 82*)[39] |
| BRES | 2008-2009 | 86 (effectively 82*) |
| ABI - Employee Analysis | 1998-2008 | 60 (split to 82) |
| ABI -Survey Employee Analysis | 1991-1998 | 60 (split to 82) |
| ABI – Employee Analysis | 1975-1981 | 183 (aggregated to 82) |
| Census of Employment – Employee Analysis | 1971-1974 | 183 (aggregated to 82) |

*Stage 5: Matching to TTWAs*

With the LAD database complete, the final process was to match the local areas to the TTWA definitions. The process of moving from LAD-level data to TTWA definitions is not straightforward, as the two area types of are not designed to be consistent, one being an administrative definition, the other being functional, their geographies are non-overlapping and yet all allocations from LAD to TTWA must add up.

The process involved matching the TTWA boundaries as closely as possible, using map imagery and the large urban agglomerations within each TTWA in order to judge the proportions of LADs that should go in each TTWA. Some were straightforward, others less so. An error margin of +/-5% was used to judge whether the combined proportions of LAD populations were sufficiently close to the TTWA population and density in 2011 (the census and base year for the TTWA definition being used). As the focus of the work was on larger urban areas, the matching process was concentrated mostly on those areas that would subsequently be used for more detailed analysis – the logic behind this selection is described below.

***Choosing which TTWAs to analyse (i.e. proxy for city areas)***

The full set of 228 TTWAs was considered too many for city-based analysis, particularly as many of them are quite small and/or do not contain urban centres of any significance. Analysis took place to determine a suitable cut-off point based on population size of the

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[39] The 86 sectors mentioned in the table did not map well to the 45 sectors. As a result, the number of sectors were aggregated to map 82 sectors to the 45.

TTWAs in 2014[40], and on the basis of a 200,000 threshold the top 85 TTWAs[41] were selected[42]. Combined, the selected TTWAs used in the paper account for 82% of GB population, 83% of employment and 86% of output in 2014. Table 2.3 provides a list of the selected TTWAs in alphabetical order along with population size and density for 2015, while a map showing the geography of the selected TTWAs from among the full set is shown in the Appendix.

**Table 2.3: TTWAs and key characteristics for 2015**

| TTWA | Population (000s) | Area (sq km) | Population Density (per sq km) |
|---|---|---|---|
| Aberdeen | 416 | 4706 | 88 |
| Barnsley | 261 | 350 | 747 |
| Basingstoke | 258 | 828 | 312 |
| Bedford | 218 | 612 | 357 |
| Birkenhead | 354 | 351 | 1011 |
| Birmingham | 1738 | 1058 | 1643 |
| Blackburn | 337 | 757 | 446 |
| Blackpool | 272 | 390 | 696 |
| Blyth & Ashington | 236 | 3809 | 62 |
| Bournemouth | 368 | 609 | 605 |
| Bradford | 531 | 366 | 1450 |
| Brighton | 351 | 243 | 1444 |
| Bristol | 805 | 924 | 871 |
| Cambridge | 691 | 2578 | 268 |
| Cardiff | 812 | 1052 | 772 |
| Chelmsford | 496 | 1791 | 277 |
| Chester | 315 | 918 | 343 |
| Chesterfield | 273 | 818 | 333 |
| Chichester | 277 | 1146 | 242 |
| Colchester | 215 | 427 | 503 |
| Coventry | 575 | 531 | 1083 |
| Crawley | 645 | 1345 | 479 |
| Crewe | 292 | 888 | 329 |
| Derby | 433 | 786 | 551 |
| Doncaster | 305 | 569 | 536 |
| Dudley | 540 | 158 | 3422 |
| Dundee | 248 | 1936 | 128 |
| Dunfermline and Kirkcaldy | 306 | 1140 | 268 |
| Durham & Bishop Auckland | 260 | 1116 | 233 |
| Eastbourne | 247 | 694 | 355 |

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[40] 2014 was chosen because the data construction started at an early stage in the project when 2015 data were not available.

[41] TTWAs in Northern Ireland were not considered because the CE LAD database does not cover this region, and so the process of data extension and matching was not possible.

[42] Selecting the top-85 TTWAs on population size led to a minimum size of 207,000 (for Halifax)

| TTWA | Population (000s) | Area (sq km) | Population Density (per sq km) |
|---|---|---|---|
| Edinburgh | 689 | 1329 | 519 |
| Exeter | 438 | 2335 | 187 |
| Falkirk and Stirling | 303 | 2734 | 111 |
| Glasgow | 1286 | 1545 | 833 |
| Gloucester | 278 | 742 | 374 |
| Guilford | 652 | 1170 | 557 |
| Halifax | 208 | 364 | 573 |
| High Wycombe & Aylesbury | 421 | 1243 | 339 |
| Huddersfield | 369 | 347 | 1063 |
| Hull | 508 | 1928 | 264 |
| Ipswich | 384 | 1938 | 198 |
| Kettering & Wellingborough | 229 | 702 | 326 |
| Leamington Spa | 261 | 1261 | 207 |
| Leeds | 818 | 593 | 1380 |
| Leicester | 998 | 2101 | 475 |
| Lincoln | 346 | 2521 | 137 |
| Liverpool | 1012 | 806 | 1256 |
| London | 8529 | 2345 | 3638 |
| Luton | 736 | 686 | 1072 |
| Manchester | 2644 | 1906 | 1387 |
| Mansfield | 303 | 461 | 657 |
| Medway | 623 | 1123 | 555 |
| Merthyr Tidfil | 218 | 630 | 346 |
| Middlesbrough | 470 | 518 | 906 |
| Milton Keynes | 398 | 747 | 533 |
| Motherwell & Airdrie | 423 | 1590 | 266 |
| Newcastle | 1001 | 1081 | 926 |
| Newport | 307 | 709 | 433 |
| Northampton | 356 | 1127 | 316 |
| Norwich | 444 | 1960 | 227 |
| Nottingham | 824 | 1109 | 743 |
| Oxford | 542 | 2021 | 268 |
| Peterborough | 329 | 1356 | 243 |
| Plymouth | 356 | 1603 | 222 |
| Portsmouth | 570 | 399 | 1428 |
| Preston | 436 | 800 | 545 |
| Reading | 529 | 744 | 712 |
| Sheffield | 880 | 792 | 1111 |
| Shrewsbury | 213 | 2184 | 97 |
| Slough & Heathrow | 1614 | 866 | 1864 |
| Southampton | 677 | 1606 | 422 |
| Southend | 584 | 561 | 1042 |
| Stevenage | 388 | 601 | 645 |
| Stoke-on-trent | 523 | 1036 | 505 |
| Sunderland | 381 | 586 | 650 |
| Swansea | 383 | 873 | 439 |
| Swindon | 401 | 2007 | 200 |

| TTWA | Population (000s) | Area (sq km) | Population Density (per sq km) |
|---|---|---|---|
| Telford | 210 | 614 | 342 |
| Trowbridge | 267 | 1790 | 149 |
| Tunbridge Wells | 312 | 1021 | 305 |
| Wakefield | 334 | 339 | 986 |
| Warrington & Wigan | 834 | 597 | 1396 |
| Wolverhampton | 773 | 753 | 1027 |
| Worcester & Kidderminster | 313 | 1005 | 311 |
| York | 360 | 1373 | 262 |

The dataset can therefore offer a picture of economic development across the main urban areas of Great Britain, covering population, employment, and output, (the latter two indicators with detailed sector disaggregation) over the period 1971-2015. This period is of great interest because it includes five recessionary periods (the two 1970s crises in 1973 and 1975, the early 80s and 90s recessions, and the Great Recession of 2008-2009) as well as covering a period of deindustrialisation and the financial liberalisation from the mid-1980s as well as more latterly the period of increasing globalisation. Related to these latter developments, the dataset can also track the growing dominance of London for the national economy and the growing imbalance between the northern and southern regions of the country.

## 2.4   Comparisons with Other (city) Datasets

Having established the TTWA-city dataset, it is instructive to compare characteristics with some of the other main city-area definitions described in Table 2.1, to get an idea of the scale of differences both in terms of levels and growth rates.

**TTWAs versus Functional Urban Areas (FUAs) and Metropolitan Regions**

Both FUAs and Metropolitan Regions are constructs of the European Commission-OECD, so it makes sense to group them together. As mentioned above, data on FUAs are somewhat limited. At best what can be compared is population size for those cities which are common to both definitions. Figure 2.1 provides such a comparison.

**Figure 2.1: TTWA vs FUA Population for 2014**
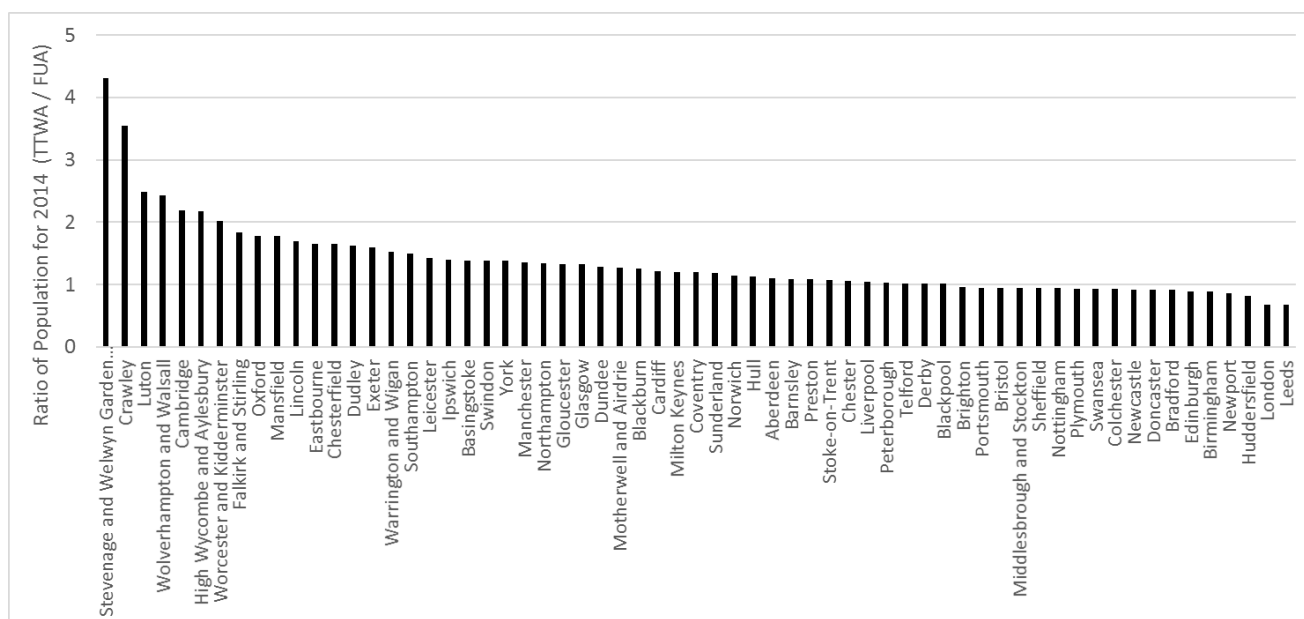


Clearly there is a wide range of differences among the 63 areas which coincide[43], with (in all but 18 cases) a tendency for the TTWA to contain a larger population than the FUA. This is not too surprising, as the TTWA will typically encompass a wider area due to its commuting definition. The more tightly bounded a TTWA is around an urban centre (or centres), through its inability to attract commuters from further distances (this could be due to lack of economic weight, lack of transport infrastructure, and/or limitations due to geographical location) the more likely it is to resemble the functional urban area.

Metropolitan Regions are a broader definition of the Metropolitan Areas mentioned previously, namely they are urban agglomerations with more than 250,000 inhabitants and are constructed from NUTS3 regions[44]. As they are built from administrative building blocks, more economic data are available covering output (GVA), employment, population and other indicators[45]. Using this definition, there are 37 metropolitan regions for the UK, 35 of which correspond to the selected TTWA areas[46]. Figures 2.2 - 2.4 show some comparison across a range of different indicators.

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[43] For the purpose of comparison, the Warrington and Wigan FUAs have been added together to better match the corresponding TTWA.

[44] Adjacent regions are added to the agglomeration if more than 50% of the population are included within its area.

[45] See http://ec.europa.eu/eurostat/web/metropolitan-regions for more detail.

[46] The TTWAs of Blackburn, Blackpool and Preston are combined to equate to the equivalent metro region. In addition, the West Midlands metro region is equated to the Birmingham TTWA. Depending on the indicator of comparison, not all the metropolitan regions are available from Eurostat.

**Figure 2.2: TTWA vs Metro Region Population for 2011[47]**
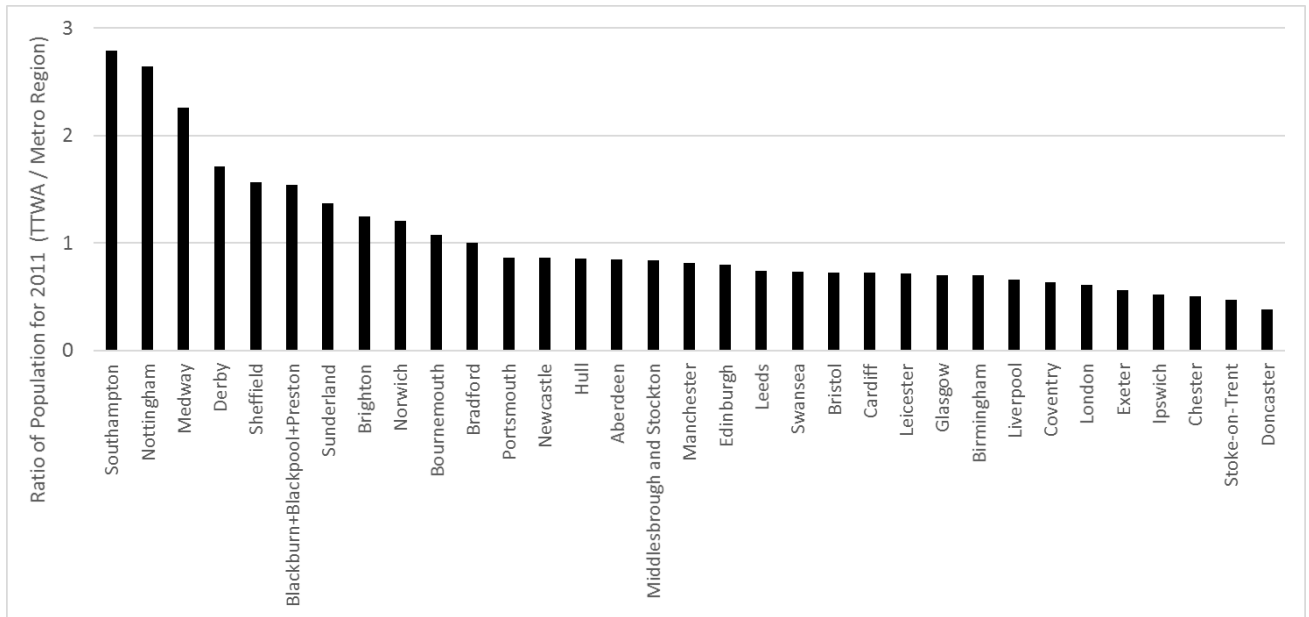


Similar boundary issues are likely to be present for metro regions, although given the less-well defined spatial building block of NUTS3 regions it would be expected that this is less marked than for the FUAs. This seems to be broadly the case, and there are a greater proportion of areas where the TTWA has a lower population than the metro region.

**Figure 2.3: TTWA vs Metro Region Population Density for 2011**



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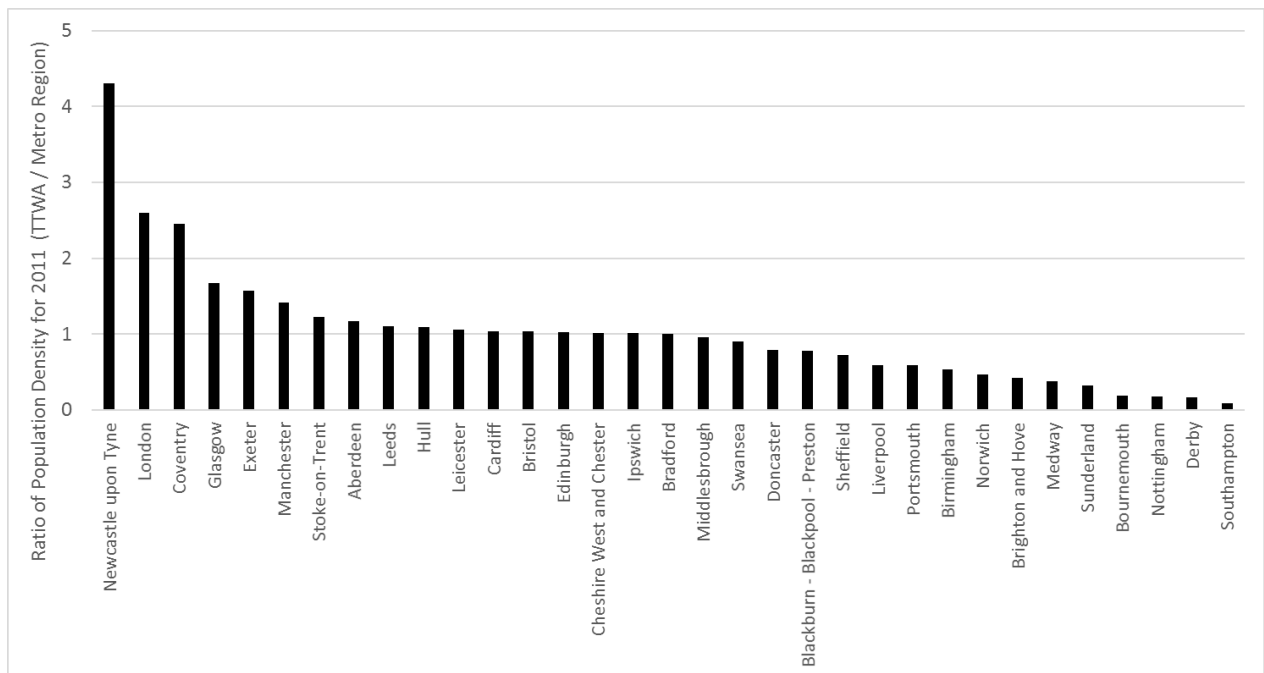
[47] 2011 is chosen as the period of comparison for cross-sections because this is the base year of the TTWA construction and is therefore the most accurate year available.

**Figure 2.4: TTWA vs Metro Region Employment Growth 2000-15**
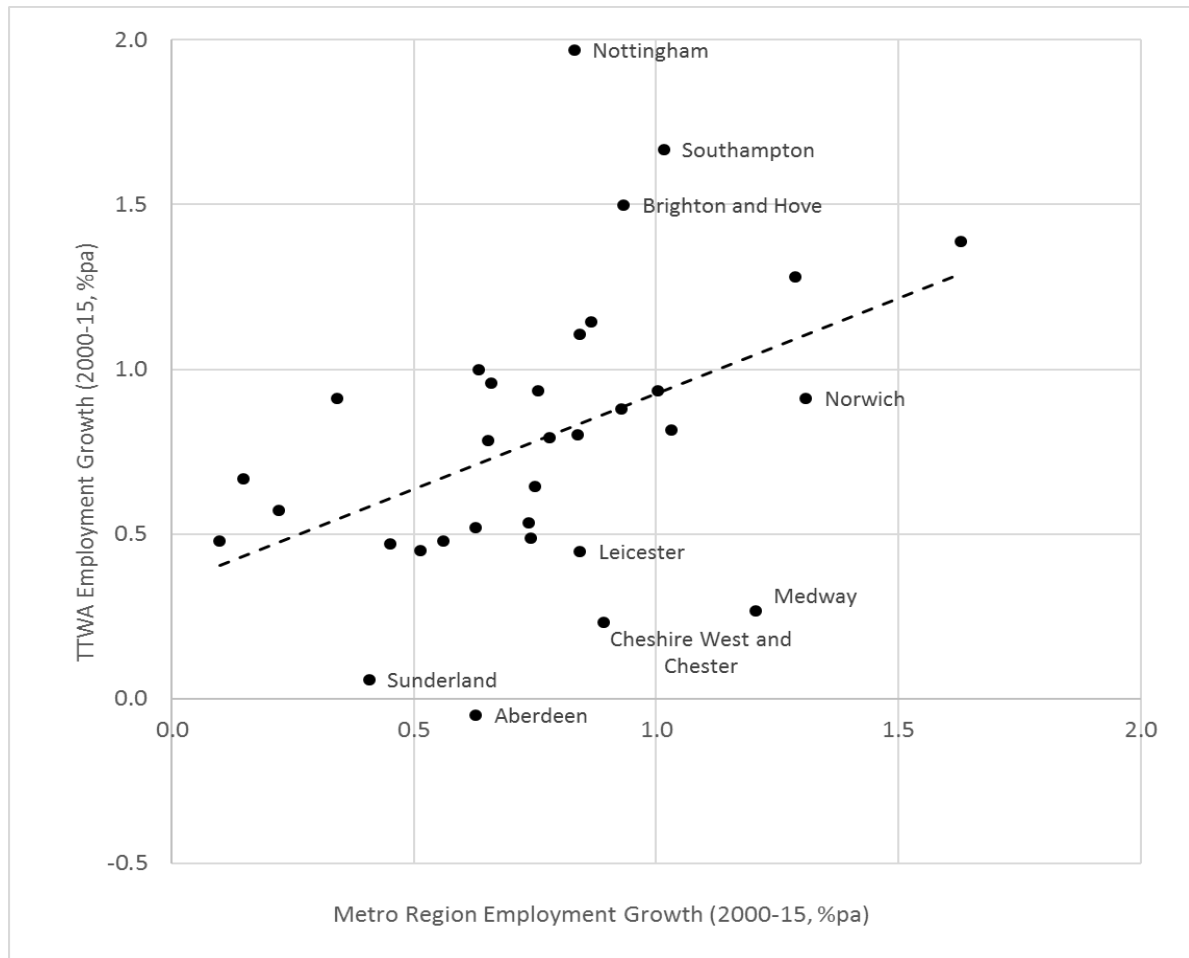


When a similar comparison is made for population density around half of the areas are within +/-30%, as shown in Figure 2.3. However, there are some notable outliers, particularly Newcastle and Doncaster. A marked deviation would be a sign that, in the case of Newcastle, a more rural hinterland is included in the definition of the metro region – which would seem to be the case as the total population ratio is not that large. For employment growth, there is a reasonable correspondence (a correlation of 0.43) although there are some outliers, as shown in Figure 2.4.

**TTWAs versus Primary Urban Areas (PUAs)**

Another useful comparison can be made between the TTWA city data and those for PUAs, particularly as the latter are often seen as the de-facto definition of cities in the UK and popularised by the Centre for Cities in their series of Cities Outlook reports[48]. As mentioned

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[48] See, for example, https://www.centreforcities.org/publication/cities-outlook-2019/.

previously, the PUA definition starts from the basis of the built-up area of a city, which is then approximated by the closest fit of LAD boundaries. There are 63 PUAs, representing the UK's largest cities and towns. Of the 63 PUAs, 57 correspond to TTWA area names, allowing a reasonable sample for comparative purposes[49].

Figure 2.5 shows the extent of difference between the two spatial definitions by ranking the ratios for population and population density[50]. Clearly there are a few areas (Slough and Heathrow being the extreme case) where the TTWA population vastly exceeds that of the PUA. In general, TTWA population is greater than that of the corresponding PUA – in only four cases (London, Huddersfield, Bournemouth and Birmingham) is the ratio below unity. In contrast, the population density of a TTWA is in general lower than that for the same PUA – in only three cases is it higher (Warrington and Wigan, Southend, and Barnsley). The findings confirm what would be expected – the TTWA is a broader area allowing for commuter zones, whereas the PUA focuses on approximating the urban zone as much as possible.

**Figure 2.5: TTWA vs PUA Population Total and Density**
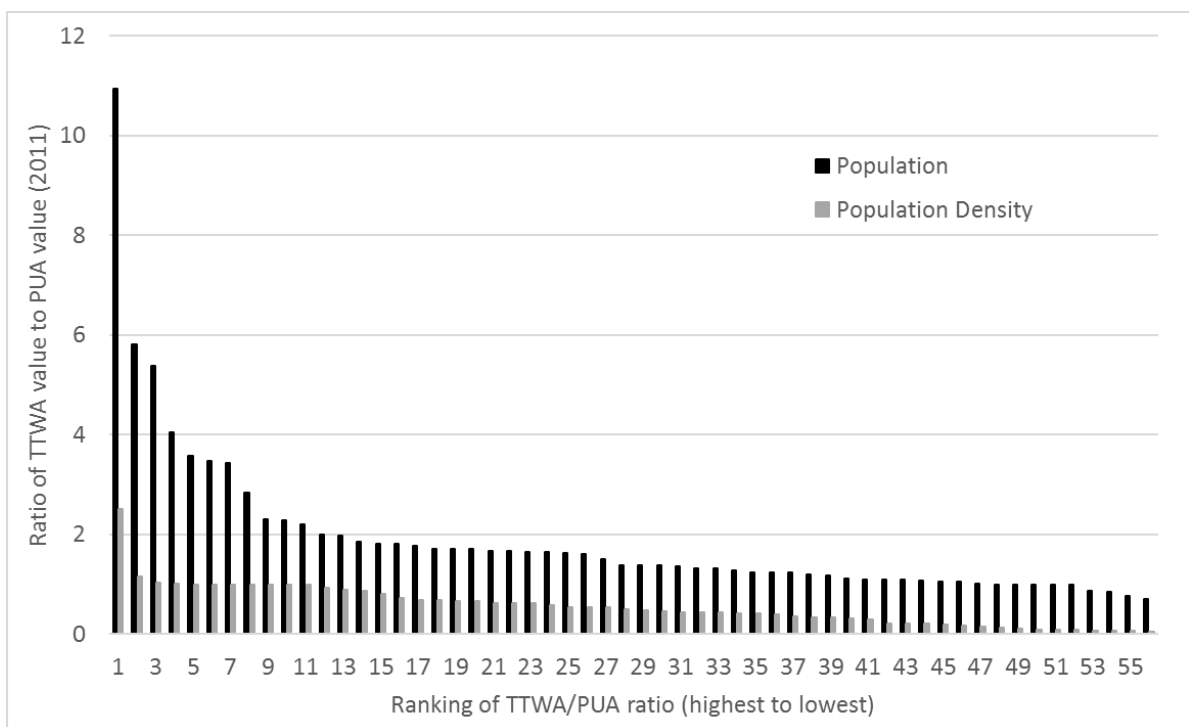


In addition to looking at population, productivity differences between the TTWAs and PUA were also examined. These were based on my own calculations (i.e. using GVA and employment data and appropriate LAD combinations) because the data in the Cities Outlook

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[49] The Wigan and Warrington PUAs are combined together to allow comparison to the Wigan and Warrington TTWA.

[50] The rankings do not necessarily represent the same area.

website is only in current prices, whereas the TTWA data are calculated in constant prices. As the TTWA areas are typically larger and less dense, one might expect productivity levels to be lower in TTWAs when compared to PUAs. This is generally found to be the case, with approximately two thirds of PUAs having a productivity level higher than the equivalent TTWA. However, these productivity differences are not particularly large, with the range of the ratio from 1.06 to 0.81. In addition, there is a negative correspondence (correlation -0.48) between the ratios for productivity and for population, i.e. those TTWAs which are larger than the equivalent PUA also tend to have a lower productivity level (although the difference is not that great).

## 2.5    Applications of the TTWA Dataset

The new dataset is a key methodological advance as it allows us to address some key questions about longer-run urban economic change in Britain. Two examples are explored[51]: firstly, looking at how growth and structure of the economy have changed over the past 40 years, and secondly at the relationship between long-term productivity and employment growth across British cities,

### Long-term structural change

Figure 2.6 shows the sectoral contribution to long-term employment change over the entire sample period of the database[52]. The TTWAs are ranked according to the percentage change in total employment growth over the period, i.e. ranging from Milton Keynes being fastest growing area (at 2.9% pa), while Liverpool was the slowest (actually falling by 0.6% pa).

What can be clearly seen is that those areas which have enjoyed the fastest growth in employment were also those which were the strongest performers in the KIBS (Knowledge-Intensive Business Services[53]) – only Blackpool had a negative KIBS contribution over this period - and also, to a lesser extent, other private sector services such as wholesale and retail. Conversely, those areas that have suffered most from slow or falling employment are where the manufacturing sector (and to a lesser extent mining and quarrying) has contributed most to the lost jobs – Aberdeen stands out as an outlier in the mining and quarrying sector, with jobs growth benefiting from the historical strength of the oil industry.

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[51] Further examples of work and empirical findings from using the dataset can be found in Tyler et al (2017) and Martin et al (2018).

[52] The contribution from each sector represents its proportion of the gross change in absolute employment over the entire period.

[53] KIBS are defined by aggregating specific sectors (Computing services, R&D, Other business activities) and follow standard definitions.

**Figure 2.6: Sectoral employment change 1971-2015**



*Contribution to gross change in employment (1971-2015)*

Legend:
- Agriculture
- Mining and Quarrying
- Manufacturing and utilities
- Construction
- Wholesale and retail
- Transport and logistics
- KIBS
- Public services
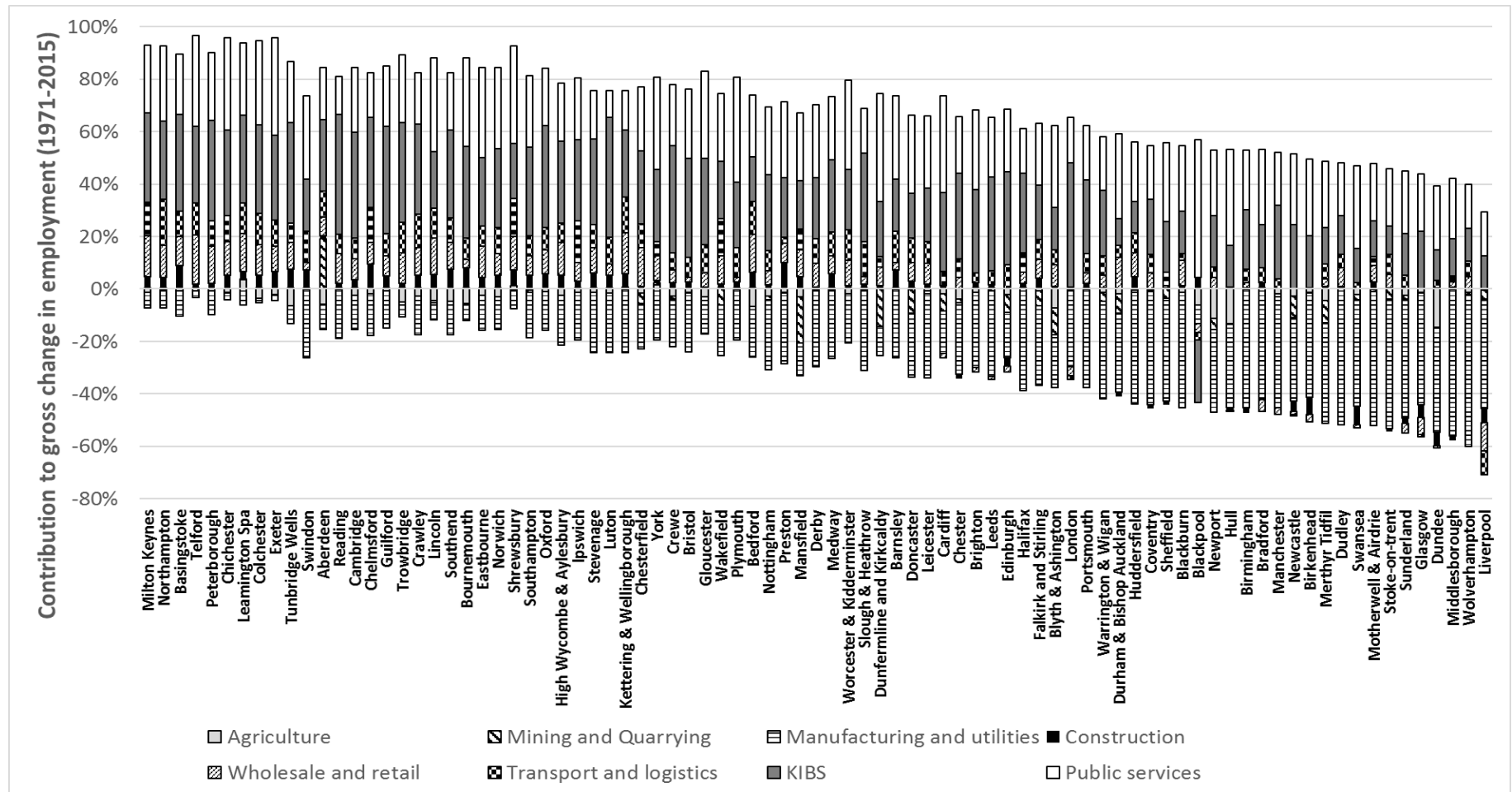
**Productivity-employment relationship**

Part of the loss of manufacturing (and extractive industry) employment losses over the past few decades can be attributed to improvements in productivity through labour-saving technological progress. At the same time, growth in service-sector employment, which has replaced manufacturing jobs, is often in lower-productivity activities (the majority of service-sector jobs are not in KIBS).

**Figure 2.7: TTWA productivity vs employment growth (1971-2015)**
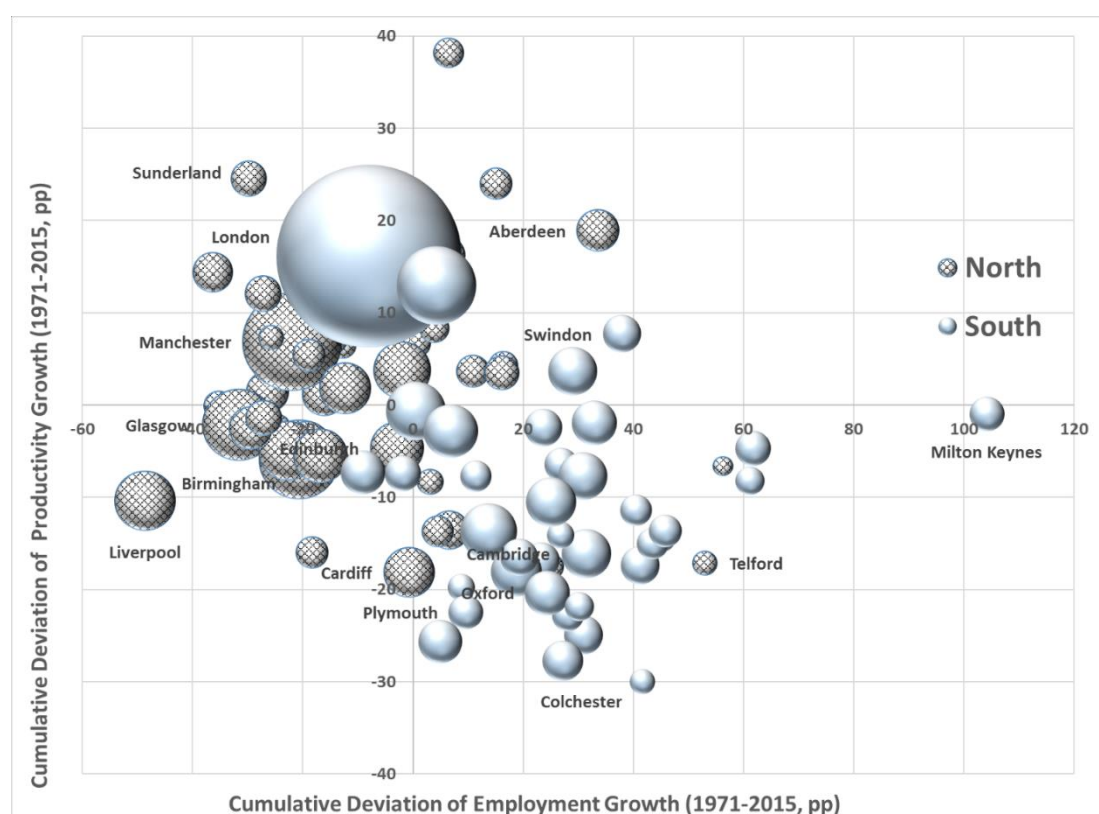


Figure 2.7 shows how, for all TTWAs, employment and productivity growth are associated through measuring their cumulative deviation[54] from the national (GB) average – the size of

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[54] Cumulative deviation was highlighted by Blanchard and Katz (1992) to analyse the evolutions of long-term regional divergence. The annual growth rate of the indicator in question has the national growth rate subtracted and is then cumulated over time. The result is the cumulative deviation of a city's growth from that of the national economy, up to that year, from a selected start year (here 1971). It thus shows a city's 'growth gap', in percentage points, as the difference between its actual growth and where it would have been had it grown at the national rate. A positive cumulative growth differential indicates that a city has grown faster than the national economy, and a negative cumulative differential that it has lagged the national

the bubble for each TTWA is proportional to its average share of total employment for the 1971-2015 period. Furthermore, the cities are allocated to Northern and Southern typologies, along the same lines that were used in Martin et al (2015).

Of the four quadrants created by the axes, top-left and bottom-right represent what might be expected, i.e. northern (more heavily industrialised) areas have shed (manufacturing) jobs at the expense of increasing productivity, while southern areas (which had less industrial heritage) are more typified by high-employment low-productivity performance. The top-right quadrant, where employment *and* productivity growth are both above the national average, is the preferred outcome, while the opposite situation occurs in the bottom-left quadrant.

Southern areas dominate the bottom-right (high-employment, low-productivity) quadrant, and aside from two sizeable exceptions (London, and Slough and Heathrow) they are mostly on the smaller side. Meanwhile, the northern cities predominate the upper-left quadrant (as expected) with more examples of larger cities evident also in the bottom-left quadrant – a performance which has given rise to the widening of the north-south divide in recent decades.

## 2.6   Conclusions and Directions for Future Research

This paper has presented a new database for analysing the evolution of spatial development in Great Britain over the past four and a half decades, focussing on Travel to Work Areas as a proxy for cities and urban areas. The TTWA is a functional area, designed to capture a largely self-contained commuting area around a urban centre of cluster of centres. A central problem with many functional definitions is having enough data available to undertake detailed analysis, particulary over time but also across a range of economic indicators. A construction process based upon local area data as building blocks is similar to that of the Primary Urban Area, but by using proportions of (rather than whole) LADs to allocate and refine boundaries it is hoped that a more accurate representation can be established and issues of over or under-bounding can mostly be avoided.

The result is a database which covers the period 1971-2015, over which several business cycles took place including the Great Recession of 2007-12, and also during which large structural shifts were occurring (deindustrialisation and the rise of services and in particular KIBS). It is sufficiently disaggregated (45 and 82 sector splits) to allow for structural shifts to be focussed on particular sectors of interest, and allows for a relatively large number of areas (85) to be identified, which is useful for typological analysis and potentially panel data analysis

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economy. The procedure helps to smooth out the noise from individual growth periods and shows how growth cumulates over time to create divergence from national performance.

(particularly dynamic spatial models of the type explored in Elhorst (2014). It also includes a sufficient mix of indicators (primarily output, employment and population) to undertake decomposition analysis and also explore contemporary issues such as the productivity slowdown. As the TTWAs are defined as largely self-contained labour market areas, and it has been shown how these areas are typically larger (in terms of population size) than more built-up / urban definitions such as PUAs and FUAs. It remains a question as to whether this eliminates the need for spatial spillovers if this unit of area were used in regression analysis – in all likelihood there would still be a need, both potentially within (the urban core and surrounding hinterlands) and between due to inter-linked business supply and demand chains which go beyond pure labour market connections. However, as not all the TTWAs are included in the coverage, it would be difficult to include a spatial modelling component in the analysis, as the full set of contiguous spatial areas is not being covered in the dataset.

When compared to other databases (functional urban areas, metropolitan regions, and PUAs) which cover similar areas of interest, some interesting findings emerge. Firstly, the TTWAs are typically larger (in terms of population size) than other urban areas, but not in every case. Similarly, the TTWAs are typically less densely populated than their counterparts, but again there are exceptions to this rule. Finally, when scale is removed, indicators such as productivity show similar results to those for PUAs (their closest spatial relation). These differences in results will depend mostly upon how tight the commuting area is around the urban centre they service. This in turn will depend upon factors such as economic weight, availability of transport infrastructure, and geographical location and any limitations this may convey.

Is the TTWA definition the 'correct one' or is it 'better' than what currently exists? As noted by Parr (op cit), there is no singular correct definition of a city boundary – the appropriate definition depends on the issue being examined. Thus, for general labour market-related investigations and those involving research on the skills base that supports city activities, the TTWA would seem to be the most relevant as its boundary is defined with these concepts in mind. On the other hand, for studies focussing on agglomeration benefits, which typically accrue in the densified area of a city, a tighter definition based on the built-up boundary of a city, based on population size and density, would be best. Combes and Gobillon (2015) also address this issue within the context of measuring agglomeration economies. Again, they conclude (even within the narrower confines of their own analysis) that 'Knowledge spillovers, human capital externalities, and matching effects should be the most prevalent agglomeration forces at short distances - say, within cities or even neighborhoods...' while '…the effects of market access for both final and intermediate goods emphasized by economic geography models should be the main agglomeration forces driving differences in

local outcomes at a larger scale, such as the region.'. So clearly then, spatial scale should, wherever possible, closely match the economic theory or factor being analysed. And for built-up area and close focus interactions, firm-level analysis based on post-code location would seem most appropriate.

The usefulness of the database has also been demonstrated through two applied examples – revealing the structural changes which have underpinned employment performance, and also the spatial nature of the productivity-employment trade-off which is apparent across British cities, and which is another reflection of the North-South divide. Further applications of, and extensions to, the database will be reported in due course, but for now we hope that this paper will generate sufficient interest among academics and policy makers who will ultimately have access to the data to undertake their own investigations.

Functional area databases already exist elsewhere, such as with the Metropolitan Areas in the US and Functional Urban Area concept developed by the OECD-EC. Closer matches to TTWAs also exist in many countries around the OECD and EC, and there is currently a European taskforce[55] attempting to establish a harmonised system of labour market areas, as also described in Coombes et al (2012). The Eurostat taskforce is likely to face difficult challenges in trying to establish a consistent set of labour market areas across the whole of the EU, and it is unlikely that these data will have much historical context, instead presenting more of a snapshot of activity much like their Functional Urban Area counterparts. In order for the methods described in this paper to be applied in other countries it is clear that an equivalent (lower level of spatial aggregation) dataset would need to be available so that geo-spatial matching could take place to match the different area definitions. An alternative approach would be to use firm-level databases which have geo-coded entries, such as those maintained for business registration purposes. However, the scale of the task involve would be large, and so the availability of an intermediate, lower-level, dataset remains a short-cut to allowing analysis of the evolution of labour market areas over longer periods of time.

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[55] See https://ec.europa.eu/eurostat/cros/content/2018-task-force-european-set-lmas_en.

# 3 Structural Transformation and the Uneven Development of British Cities

## 3.1 Introduction

The period since the Oil Crisis of the early 1970s has been one of great structural change in the British economy. Britain has lost much of its industrial base and experienced rapid growth in the service sector. Whilst structural change has affected virtually every aspect of the British economy, perhaps one of the most significant impacts has been on the economic growth of its cities, particularly its large conurbations that owed much of their rapid expansion throughout the eighteenth and nineteenth centuries to Britain's industrialisation. Many of Britain's largest cities have struggled to adjust to a post-industrial economy. As cities have lost manufacturing jobs they have experienced periods of high, often long-term unemployment, and in more recent years whilst there have been more job opportunities these have often been relatively poorly paid, and thus contributed to increased levels of income inequality across British society (Fenton, et al 2008).

Despite the importance of structural change on the growth trajectories of cities, it is perhaps somewhat surprising that there is relatively little in-depth analysis of the phenomenon. In the British case, the most comprehensive analysis to-date appears to have been undertaken some thirty years ago (see Hausner, 1987). At that time, an extensive (ESRC funded) research project considered how British cities, and their hinterlands, had adapted to economic change over the period 1951-1981. More recently, a UK Government Office for Science's Foresight Project on The Future of Cities showed that the growth paths of British cities in recent years has been quite diverse (Martin, Tyler and Gardiner, 2015), a finding reinforced by other recent work (Martin et al., 2016a).

How cities deal with structural transformation over time, and the concomitant changes in conditions and opportunities for their economic growth, are clearly major issues for society and the formulation of policy. Indeed, as the British Government devolves economic powers from central to local government it is important that those tasked with managing city economies understand the basic mechanisms that lie behind change, and what may be the scope for intervention to assist the process in a way that enhances local economic growth. Policy makers need to know the sectors that are declining, those that may be experiencing successful upgrading or 'turning around', and those that are new and growing. They need to know how to

assist city economies to adapt and adjust their structures in response to both the challenges and opportunities of a rapidly changing globalised marketplace.

In this paper we examine how differences among cities in medium to long run growth, and shifts in the growth paths of cities relative to one another, are in part due to differences in the process, nature and extent of structural transformation.[56] We have taken industrial sectors as the unit of our analysis (rather than, say, types of firms) and have considered structural transformation in Britain as it relates to a process in which some sectors expand relatively quickly and thus increase their relative share of national output, whilst others do the opposite.

We begin by reviewing perspectives on the perceived role of economic structure on the growth of cities in Section 2. We briefly discuss several theoretical perspectives from both economics and economic geography. Structural transformation has so far however received relatively little consideration as a factor in explaining economic growth in cities. Notwithstanding this lack of attention in theories of growth, structural transformation and its uneven geographical effects, has been well documented as an empirical phenomenon. In the 1970s and 1980s many cities in Europe and North America were hard hit by deindustrialisation. And in more recent years, a structural transformation appears to be taking place within the service sector, with some parts of the service sector growing rapidly and showing considerable dynamism, while other parts seem to be more stagnant and lagging in productivity.

Section 3 examines what has happened to the economic growth of Britain's major cities over the last forty-five years using a novel dataset, covering some 85 cities, specifically constructed to reflect functional economically meaningful travel-to-work areas. The cities range in employment size (in 2014) from 5.35 million (London) to 83,400 (Merthyr Tydfil) with employment and output data for 81 sectors of activity for each city. We focus on city growth in output, and show that there have been considerable differences in the growth paths observed. We distinguish three distinct types of performance: those cities that have grown considerably faster than the nation, those that have grown at the national rate and those that have exhibited relative decline in their output growth. We also distinguish the two special cases of London and Aberdeen. London is the United Kingdom's largest city and its capital. Aberdeen has been the centre of the North Sea oil industry over the period. We use this analysis to understand more about how structural change has influenced the patterns of growth observed later in the article.

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Section 4 considers structural change in Britain over the period 1971 to 2014. It examines structural change according to whether a sector has increased or decreased its relative share of national output. This enables us to focus on distinct types of transformative change at the sectoral level.

The article then moves in sections 5 and 6 to examine to what extent and in what manner differences in the growth of British cities can be 'explained' by changes in the national structure of the British economy. The article adopts a modified version of the conventional shift share approach to assess the contribution of economic structure to the growth trajectories of each of the categories of cities distinguished in Section 3.

Section 7 outlines the impact on employment of structural transformation in the period from 1971-2014. Deindustrialisation has had very marked effects on most cities in Britain, but especially the slowest growing cities have seen very significant losses of employment. This group of cities has never fully recovered from the structural transformation in the 1970s and 1980s, and also the quality and robustness of the employment growth that has been taken place since is very much in question.

We finish with some conclusions and questions for further research in Section 8.

## 3.2    Structural transformation and city growth

Cities grow for a variety of reasons (see Storper, 2013). Indeed, a large body of economic theory now exists concerned with why economic activity agglomerates in cities, how agglomeration influences productivity, human capital formation, wages and innovation, and the role played by planning systems (the literature is extensive, but see, for example, Fujita and Thisse, 2002; Henderson, 2003; Glaeser, 2008; Glaeser and Gottlieb, 2009; Cheshire et al. 2014). These key insights are most certainly relevant for understanding city growth. However, these literatures have much less to say about the medium to long-term *evolution* of city economies, about structural transformation and its relationship to diverse city growth paths.

Structural transformation refers to the changing sectoral composition of output and employment over time, a stylised fact for which there is copious evidence (Kuznets, 1957, 1971; Pasinetti, 1993; Freeman and Louca, 2001; Cornwall and Cornwall, 1994; Metcalfe, Foster and Ramlogan, 2006; Kruger, 2008). Traditional growth theory always had difficulty incorporating structural change, although the notion has found extensive use within the study of economic development. But for those economists who reject the distinction between development and growth (see Kuznets, 1971; Pasinetti, 1981; Baranzi and Scazzieri, 1990; Rodrik, 2006), and for present-day evolutionary economists (such as Metcalfe, 2003; Metcalfe

et al, 2006), structural change or structural transformation is an integral feature of a dynamic modern economy, and the study of 'structural dynamics' necessary for understanding the growth process. As Roncolato and Kucera (2014, p. 399) put it, "sustainable economic growth requires structural transformation". Similarly, in the new evolutionary economic geography, particular attention is focused on the path dependence of local economic structures, on the process of new path creation - that is the emergence of new industries and technologies – and on the adaptability and resilience of local economies (see Martin and Sunley, 2006; Boschma and Martin, 2010; Pike et al, 2010; Bailey and Berkeley, 2014; Martin and Sunley, 2015).

It took the path-breaking work of authors such as Kaldor (1966, 1967, 1968), Kuznets (1973) and Pasinetti (1981, 1993) to move structural change to centre stage in growth theory. Thus, according to Kuznets:

rapid changes in production structure are inevitable – given the differential impact of technological innovations on the several production sectors, the differing income elasticity of domestic demand for various consumer goods, and the changing comparative advantage in foreign trade (1973, p. 250).

Likewise, in Pasinetti's scheme, structural change is conceived as a multi-sectoral economy evolving through time under the influence of technical progress and changes in final demand consumption. Technical change occurs unevenly among sectors, so that the rate of change of productivity differs from sector to sector (and by implication from region to region).[57] Correspondingly, demand changes at different rates among different products. Moreover, technical change may take the form of the introduction of new products, and hence the emergence of new activities and new sectors. In short, structural dynamics are inherent to the growth process. In Kaldor's seminal works on economic growth theory, manufacturing was assigned particular importance as the driver of economic growth primarily because it has greatest potential for dynamic returns to scale (Kaldor, op cit; see also Thirlwall, 1983), the implication being that a shift to services could well slow down productivity growth. In a later contribution, Baumol et al (1989) discuss the considerable diversity of productivity developments that can be observed across industries and sectors, and emphasise not only the fact that structural change is an ongoing long-run phenomenon, but also that productivity growth is particularly relevant in the long run.

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[57] Interestingly, in explaining the stimulus for his new theory, Pasinetti attributed it in part to "the extremely uneven development – from sector to sector, from region to region – of the environment in which I lived (post-war Europe) at the time I began my training in economics" (Pasinetti, 1981; p. xi).

Empirically, structural transformation has in recent decades been particularly apparent and disruptive through the process of deindustrialisation. Deindustrialisation refers to the contraction and decline of the weight of manufacturing industry within an economy (Martin and Rowthorn, 1986; Pike, 2009). This may only be a relative decline (loss of importance of manufacturing as a proportion to other sectors), but there may also be an absolute decline (decline in output and employment). In many of the most advanced economies in Western Europe and North America a relative decline of manufacturing began in the 1960s, with the service sector growing at a faster rate than manufacturing. But especially after the first oil crisis of 1973, the pace of change accelerated, and in many traditional segments of manufacturing (such as steel, shipbuilding, heavy engineering, car manufacturing, chemicals, etc.) an absolute decline in employment (and in some sectors, also output) set in. This coincided with large-scale rationalisation- and modernisation-operations with concomitant downsizing and plant-closings (Bluestone and Harrison, 1982).

The 'maturity thesis' regarding deindustrialisation postulates that the relative decline of manufacturing is a 'natural' consequence of rising incomes and living standards, as consumer demand shifts from manufactured goods to services of various kinds (Rowthorn, 1986; Hudson, 2011). This parallels some of the theoretical insights of Kuznets, Pasinetti, and Kaldor cited earlier. In addition, as economies develop, their comparative advantages vis-à-vis other economies will change; so there will be increasing pressures to shift into in more high-value economic activities which correspond with higher wages and higher skill-levels (Pike, 2009; Hudson, 2011). Forms of manufacturing which mainly rely on cheap and semi-skilled labour will then move to other places where wages, living standards and overall levels of education are lower. These factors have meant that – in economically advanced nations – the scope for output growth in manufacturing has been smaller than in other sections of their economies. Moreover, technological change and productivity improvements have meant that employment in industry has fallen drastically, as a consequence of on-going automation and the increasing importance of economies of scale.

Some of these patterns of deindustrialisation seem to be mirrored by recent trends of structural transformation within the service sector. Some tradeable parts of the service sector – in particular those providing 'innovation jobs' (Moretti, 2013), such as IT, life sciences, finance, advertising, design, entertainment, etc. – exhibit considerable dynamism and show continuing growth in employment and output. Other segments of the service sector, such as personal services, leisure activities health care, and education, have been more stagnant in terms of the application of new technologies; and while experiencing substantial employment growth they have shown much slower productivity advance (Berger and Frey, 2016; LSE Growth Commission, 2017). How far new advances in digitalisation, robotics and machine learning,

will threaten jobs in these activities is an increasingly pertinent issue (Berger and Frey, 2016; Baldwin, 2016). But some recent accounts have argued that mature economies such as the UK are experiencing a dominant shift of employment to low-productivity, non-tradable services, and that this can be described as 'growth-reducing structural change' as it will weaken future innovation and productivity growth (Rodrik, 2016). The balance between different types of service industry growth is clearly crucial.

These structural transformations have affected different cities and regions differently across Europe and North America. Certain places in which manufacturing formed the backbone of their economy were especially badly affected by deindustrialisation, undergoing serious falls in industrial employment. After the initial shock in the 1970s and 1980s, some of these places managed to find renewed growth in advanced manufacturing and service industries; but recovery has been very uneven (Birch et al., 2010; Power et al., 2010; Hobor, 2013; Cowell, 2015). In part, the success with which cities have reorientated their economies has depended on policies adopted during and after deindustrialisation, and the institutional structures within which cities and regions operate (especially with regard to the powers and resources available at the subnational level). Indeed, particular macro-economic policies – such as measures to protect the value of the currency and a lack of an industrial strategy – together with weak regional policies and an economic governance structure which is exceptionally centralised, have undoubtedly contributed to the particular intensity and high degree of disruption of deindustrialisation in the United Kingdom (Martin, 1986; Pike 2009; Birch et al., 2010; McCann, 2016). But many other factors also appear important in coping effectively with structural transformations, such as location, human capital formation, the knowledge and innovation base, agglomeration effects, infrastructure connections, entrepreneurial culture, etc. These determine whether an urban economy manages to develop new activities that incorporate important and dynamic functions (i.e. especially 'innovation jobs') in national and international value chains, reducing its dependence on 'branch plants', public sector expenditure, and low-productivity services (Massey, 1995; Moretti, 2013; Baldwin, 2016; Storper et al., 2015). Such activities will then also contribute to its tradeable base and generate additional income within the economy of the city, driving employment and output in other activities through multiplier effects (Rowthorn, 2010; Moretti, 2013; Martin et al., 2016a). A growing body of work in economic geography has examined how industries emerge from related and antecedent sectors. It has been argued that those cities that possess a platform of technologically related industries are better able to diversify and adapt their economies by spawning more new sectors and industries (Frenken and Boschma, 2007; Neffke et al, 2011). However, many of the claims about the ways in which the diversification and branching of industrial structures shape long-term urban growth have not been tested empirically.

What is clear, then, is that the growth path of a given city will be the outcome of a complex and evolving interaction of 'external' (national and indeed global) factors and city-specific factors and conditions. Following Metcalfe et al (2006), we can think of a city's economy as being an ensemble' of activities – a structural ensemble – that is constantly changing as a result of this interaction. Such a structural ensemble can be examined and decomposed in different ways, of course. Our analysis has taken industrial sectors as the primary units of a city's structural ensemble. However, it is entirely plausible to distinguish other constituent elements, like types (or sizes) of firms or occupational composition. Ultimately, structural change will involve several such dimensions: for example, the decline of manufacturing jobs is almost certain to lead to the decline or even disappearance of certain types of occupation. Nevertheless, given our interest is in the 'great transformation' from an industrial to a post-industrial economy, we focus attention here on sectors.[58] The differential growth of a city's firms and industrial sectors imparts structural transformation, while the aggregate pattern of that transformation will shape a city's growth path, relative to other cities. An ensemble approach suggests that the development of industries in a particular city may be strongly or weakly inter-related (e.g. through demand linkages, skills and knowledge spillovers) so that the performance of an industry in a particular urban area may depend on how it is set within and interacts with a wider group of local industries.

What is to be analysed and explained are the differential growth rates of output, employment and productivity across an industrial ensemble – here the sectoral ensemble of a city. Without differential growth there is no structural change, no evolution of the sectoral shares of city output, employment or productivity. If the growth rate of output in sector $i$ in city $j$ is denoted by $g_{ij}$, the growth rate of aggregate output in the city by $g_j$, and the growth rate of the share of sector $i$ in the total output of the city by $s_{ij}^g$, then by definition

$$s_{ij}^g = g_{ij} - g_j$$

and similarly for employment

$$s_{ij}^e = e_{ij} - e_j$$

Obviously, if all growth rates, $g_{ij}$ (or $e_{ij}$), are equal, the case of proportional growth, the output (employment) structure of a city is frozen, and there is no structural change or transformation. Further,

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[58] We also have constructed time series on the occupational structures of our 85 cities, from 1971 to 2014. The analysis of this aspect of city growth and change will form the basis of another paper.

$$s_{ij}^e + q_{ij} = s_{ij}^g + q_j$$

where $q_{ij}$ and $q_j$ are the growth rates of productivity in sector *i* in city *j* and total city productivity respectively. Consequently, in an industry in which productivity increases at the city average rate, the output share of that sector will change at the same rate as its employment share. Hence proportionate growth implies that all sectors in a city have a common rate of productivity growth, which is unlikely to be the case. The key point is that the differential growth rates of the sectors making up a city's industrial ensemble, and what makes those growth rates differ, are of central importance in shaping that city's aggregate growth path over time and in relation to that of other cities.

## 3.3    City Growth Evolutions

In order to examine the patterns of change across British cities we focus on cumulative differential growth, whereby, starting in our base year 1971, we subtract from each city's growth rate in each year the corresponding national (Great Britain) rate, and cumulate these differences over time (see Blanchard and Katz, 1992, for the development of this approach). The overall performance of the 85 cities, measured in terms of their cumulative differential growth in output and employment over 1971-2014, is shown in Figure 3.1.

A number of features emerge. It is clear that the differential growth of both output and employment across cities has been substantial. Further, the patterns for output and employment are closely correlated: those cities that have experienced the fastest rates of growth of employment also tend to be those that have recorded the fastest rate of growth of employment, and vice versa. Some cities, such as Milton Keynes, Northampton, Telford, Crawley and Swindon have experienced average growth rates in their GVA and employment far exceeding the national average (and totalling to a cumulative differential of over 30-40 percent over the period). Other cities, such as Liverpool, Glasgow, Newcastle, Birmingham, and Sheffield have grown well below the national rate in both output and employment. Still other cities have tracked national growth. Notwithstanding the high correlation between output and employment growth, however, some cities show a much slower performance in employment than in output, such as Sunderland, Middlesbrough, Manchester and Huddersfield. Still other cities seem to experience much stronger employment growth compared to GVA growth, such as Colchester, Chelmsford, Plymouth and Southend.

*Figure 3.1: Output growth and Employment growth over 1971-2014 in terms of cumulative percentage point deviation from national growth, for 85 British cities (including line of best fit and R²)*
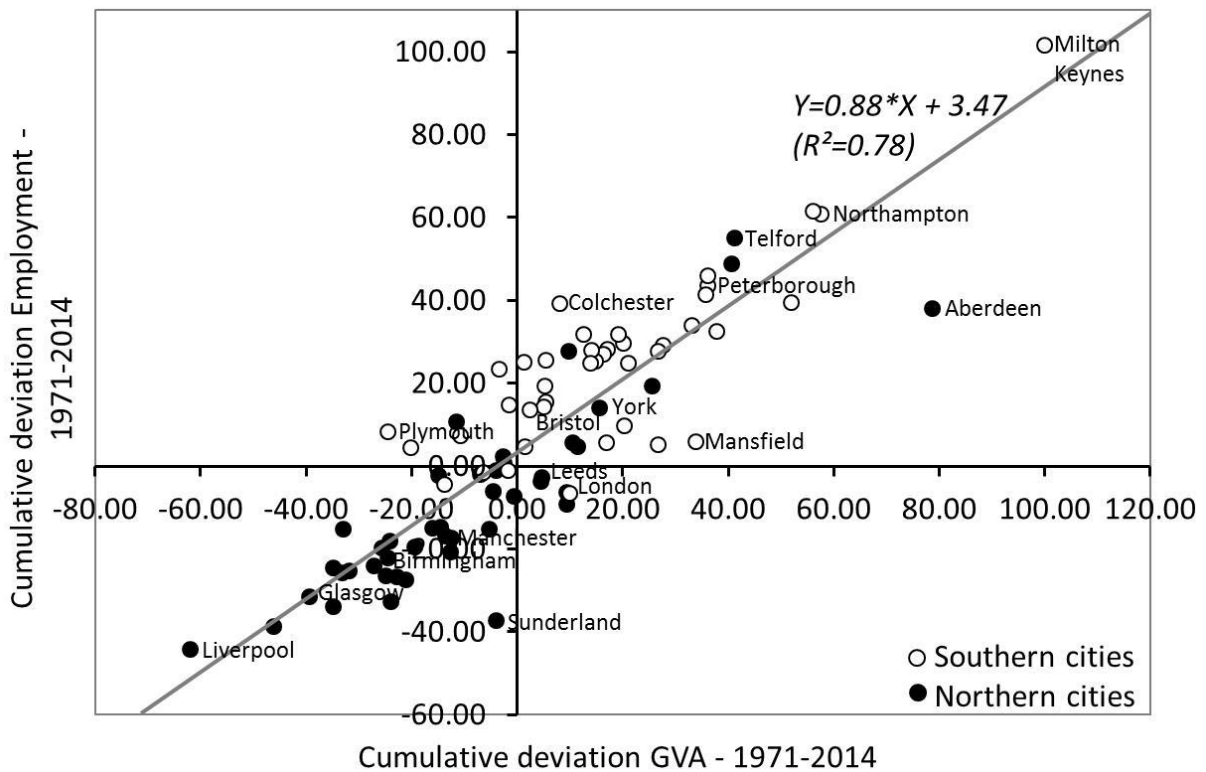
Note: Southern cities defined as those in the following regions: London, South East, East of England, South West and East Midlands. Northern cities defined as those in the West Midlands, Yorkshire-Humberside, North West, North East, Scotland and Wales.

Another feature is that many of the fastest growing cities have been in the southern half of Britain (roughly south of a line between the Severn and Humber), and most of the slowest growing have been in the north. Notable exceptions to the latter group are Aberdeen (which has benefited from the North Sea oil industry), Telford (a New Town in Shropshire), Leamington Spa and Crewe. It is perhaps not inappropriate to refer to the pattern evident in Figure 3.1 as closely corresponding to the conventional depiction of Britain's economic geography as mapping out a broad North-South' divide (Martin 1988; Lewis and Townsend, 1989; Rowthorn, 2010; Martin et al., 2016b).

To assist analysis, the cities were grouped in terms of their output growth trajectory experience relative to the average national growth rate: namely, according to whether they had a cumulative differential growth significantly above, similar to, or significantly below, the national level over the period. A bandwidth of half a standard deviation below and half a standard deviation above the national rate was used to make this classification. We have separated out

the experience of London due to its relative size, and of Aberdeen because of its relatively unique experience propelled by the exploitation of North Sea oil. We thus identify five groups – or Clubs – and a residual group of non-urban TTWAs. Table 3.1 shows which cities are in which Club.

*Table 3.1:* *Clubs of British cities defined according to their relative GVA growth trajectory using half a standard deviation (unweighted) to distinguish above average and below average.*

| Club I (27 cities) | GVA + | Milton Keynes, Northampton, Basingstoke, Swindon, Telford, Leamington Spa, Crawley, Peterborough, Chichester, Tunbridge Wells, Mansfield, Reading, Guildford, High Wycombe & Aylesbury, Derby, Crewe, Norwich, Chesterfield, Bournemouth, Exeter, Cambridge, Slough & Heathrow, Lincoln, York, Southampton, Eastbourne, Ipswich |
|---|---|---|
| Club II (33 cities) | GVA 0 | Trowbridge, Dunfermline & Kirkcaldy, Wakefield, Shrewsbury, Halifax, Blyth & Ashington, Colchester, Kettering & Wellingborough, Oxford, Stevenage, Gloucester, Doncaster, Leeds, Bristol, Nottingham, Chelmsford, Falkirk & Stirling, Luton, Leicester, Worcester & Kidderminster, Chester, Southend, Sunderland, Barnsley, Warrington & Wigan, Huddersfield, Brighton, Edinburgh, Bedford, Preston, Durham & Bishop Auckland, Bradford, Manchester |
| Club III (23 cities) | GVA - | Portsmouth, Coventry, Cardiff, Hull, Newport, Medway, Merthyr Tydfil, Motherwell & Airdrie, Middlesbrough & Stockton, Sheffield, Blackburn, Plymouth, Newcastle, Birmingham, Dudley, Birkenhead, Blackpool, Stoke-on-Trent, Dundee, Swansea, Glasgow, Wolverhampton, Liverpool |
| London | | London |
| Aberdeen | | Aberdeen |
| Non-urban TTWAs | | TTWAs which are not classified as cities |

Figure 3.2 shows the evolution of the growth of GVA relative to the nation for the Clubs from 1971 until 2014. We have excluded Aberdeen as an outlier. Figure 3.3 then displays what this has implied for the average annual growth rates over the period; with also an indication of the dispersion between maximum and minimum for the growth rates within each club.

Figure 3.2:    GVA: Cumulative differential percentage growth relative to GB: London, Club I
(GVA +), Club II (GVA 0), and Club III (GVA -), and Non-urban TTWAs.
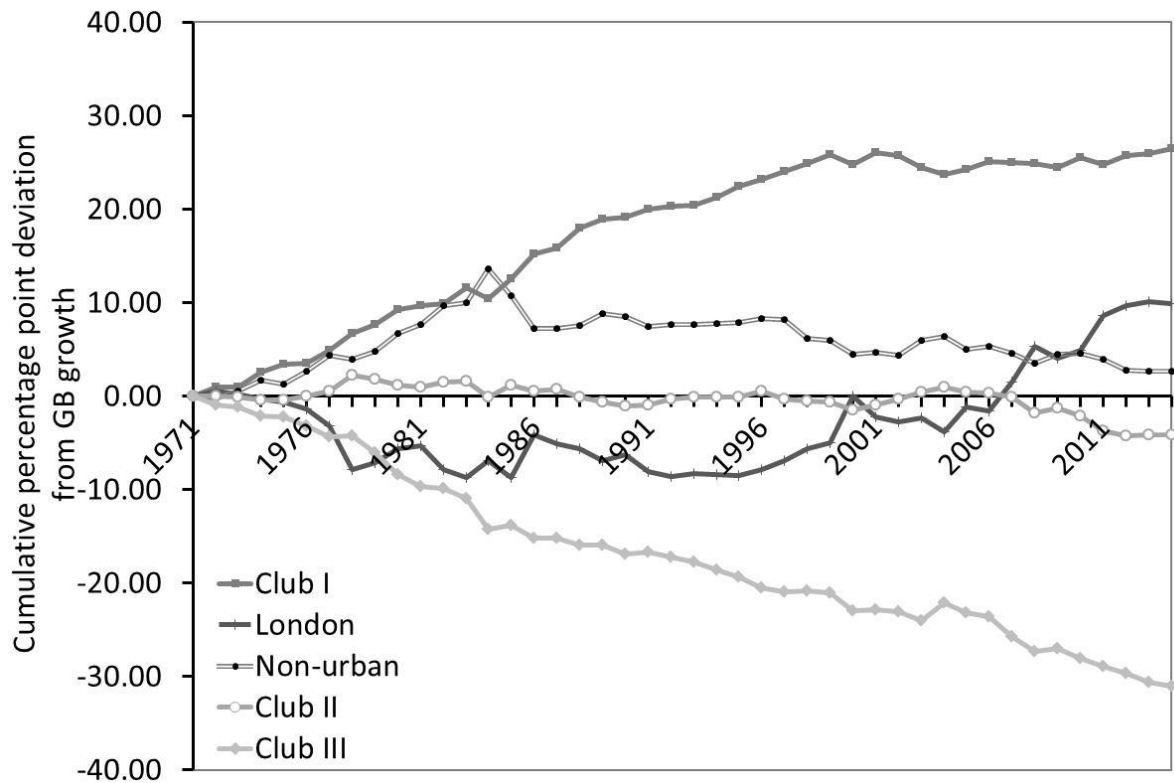


Figure 3.3:    Annual compound growth rates for GVA over 1971-2014: average for clubs,
with spread between maximum and minimum within clubs
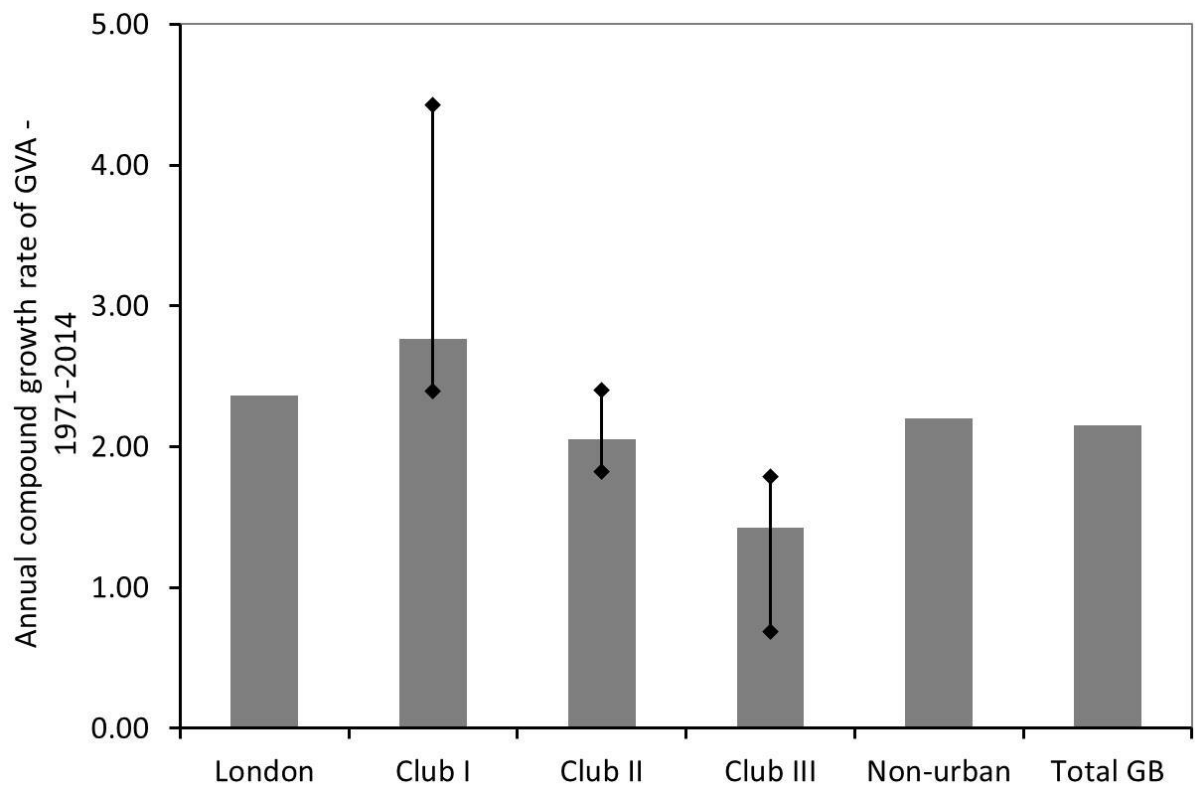
The relative fast-growing city Club I had an average growth rate of 2.76% (Figure 3) but some cities within the club did better than that, achieving almost 4.5%. The overall average growth of Club I cities exceeded that of London by a significant margin, and that of the non-urban travel to work areas. The club grew over a third faster than the Club II that tracked the national rate. Club II had relatively little dispersion within it. Club III grew at around half the rate of Club I at 1.42%, and there was wide club dispersion with the weakest performer growing at half the club average.

The cities in Club I have thus been characterised by very strong overall growth in output throughout the period of study; though this seems to have levelled off somewhat in the last 15 years of the period under investigation. This club includes Milton Keynes, Northampton, Telford, Peterborough, Reading, Cambridge, and Southampton. Several of these cities were promoted as New Towns and assisted by British spatial policy to become centres of growth. The New Town approach was to facilitate a planned approach to economic development whereby a Development Corporation was established with extensive powers relating to land assembly and the provision of infrastructure in order to promote economic development. The evidence suggests that they may have been quite successful in this respect. Club II has tracked the growth of the nation quite closely and includes cities like Oxford, Leeds, Bristol, Nottingham, Leicester, and Manchester. Club III comprises 23 cities that have more or less consistently grown well below the national rate. This club comprises many of the oldest industrial areas and includes Cardiff, Middlesbrough, Sheffield, Newcastle, Birmingham, Swansea, Glasgow, and Liverpool.

London shows a particularly interesting growth trajectory throughout the study period. After a period of relative decline up until the mid-1980s it then 'turned-around' and has grown relatively more quickly than that of the national average since. It is also of interest to note that the TTWA residual group has tended to grow slightly above the national average over the study period, in line with the relatively better performance of near accessible areas around the cities in the post-war period, as documented by Keeble and Tyler (1995).

## 3.4    Structural Transformation in the British Economy

As already noted earlier, the United Kingdom was the first major industrial nation to experience a strong relative decline in the growth of its manufacturing sector, a process that began in the mid-1960s, some time before the same process affected other nations (Rhodes, 1986). It has also been the case that the United Kingdom has experienced the greatest relative employment decline in the sector of all its major competitors (Townsend, 1983). Figure 3.4 shows the broad pattern of output change in Britain over the period for larger aggregations of the 81 sectors

(see Appendix). The differential growth performance across sectors reveals the scale of the change in the last five decades. As Table 3.2 shows, over the period overall output in the national economy has grown by around 150% since 1971. As outlined in section 3.2, sectors that have grown below the national average growth rate, will have seen their share in national output decrease, while sectors that have grown at a faster pace, will have expanded their share. Growth of output in manufacturing sectors, including high-tech has been far below the average, and hence their share has fallen: in some cases (especially in metals and textiles) output has actually declined. The sectors in which output has grown considerably faster than the British average – and hence now represent a larger share of output – have been oil and gas extraction, retail and personal services and especially Knowledge Intensive Business Services (KIBS).

*Figure 3.4:*     *Sectoral growth across the British economy 1971-2014*
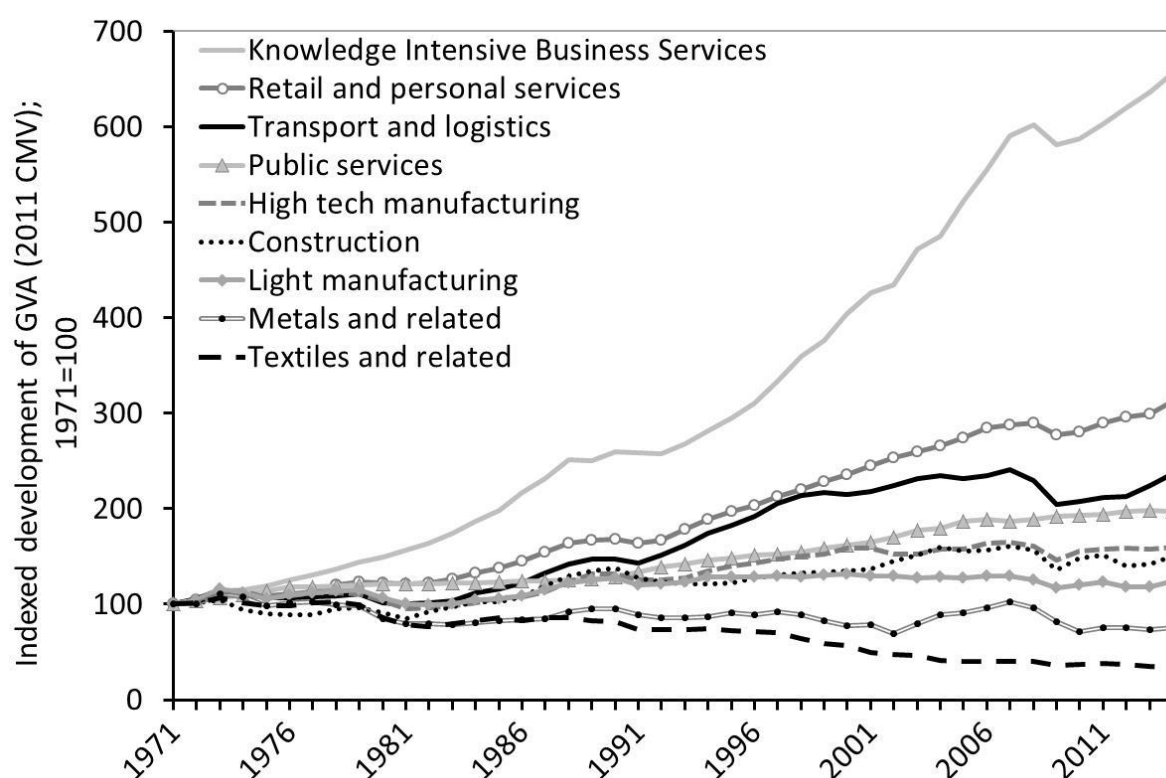
*Table 3.2:*     *Sectoral change across the British economy over 1971-2014*

| | Indexed change in GVA in 2014 (base 1971=100) | Indexed change of broad sector group relative to growth of GB |
|---|---|---|
| Agriculture and fishing | 158.6 | 63.6 |
| Coal and Other mining | 76.6 | 30.7 |
| Oil, Gas and Mining support | 400.9 | 160.7 |
| Metals and related | 75.0 | 30.1 |
| Textiles and related | 34.2 | 13.7 |
| Light manufacturing | 124.8 | 50.0 |
| High tech manufacturing | 160.1 | 64.2 |
| Utilities | 226.9 | 90.9 |
| Construction | 150.8 | 60.4 |
| Transport and logistics | 236.8 | 94.9 |
| Retail and personal services | 313.1 | 125.5 |
| Knowledge Intensive Business Services | 656.0 | 262.9 |
| Public services | 197.8 | 79.2 |
| Total | 249.5 | 100.0 |

The process of deindustrialisation has resulted in manufacturing declining from nearly 22% of output in 1971 to just over 10% of output in 2014. But also within the services some sections of the service economy (especially the Knowledge Intensive Business Services and to a lesser extent retail and personal services) have been growing at a faster rate than other sections. The share of services (both private and public) went from about 50% of output in 1971 to 68% in 2014; but within services, KIBS increased its share of total service output from about a quarter to nearly half.

We can now identify the sectors which have managed to grow above average over the period from 1971-2014 (and thus have seen an expansion of their share), and those which have performed below average (and hence will have decreased their share). Moreover, we can further distinguish between sectors according to their labour productivity performance, which reflects their dynamism and capability to generate high-value employment. Figure 3.5 shows the 81 sectors plotted according to their annual average output growth and growth in productivity over the 1971-2014 period. We can distinguish between four performance types, which are listed in Table 3.3. The first group contains those sectors that have had a growth of output and productivity below the national average.

*Figure 3.5: Sectoral growth in output and productivity in terms of annual compound growth rates over 1971-2014 (pecked lines indicate average rates for British economy as a whole)*
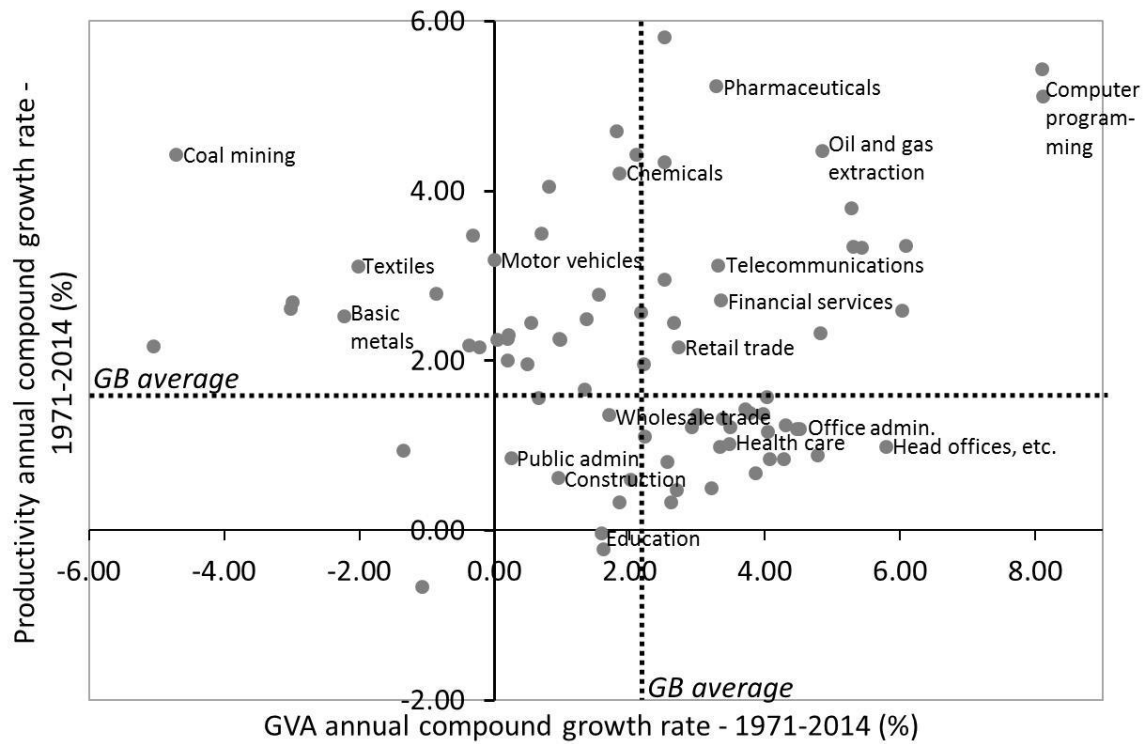


*Table 3.3: Sectoral change across the British economy*

| Performance type | Sectors | GVA change | Productivity change | Employment change |
|---|---|---|---|---|
| GVA below average, Productivity below average | Public administration and defence<br><br>Education<br><br>Construction<br><br>Wholesale trade<br><br>Accommodation and other leisure services | 1.07% on annual basis<br><br><br><br><br>58.2% over period | 0.41% on annual basis<br><br><br><br>19.4% over period | 0.66% on annual basis<br><br><br><br>32.5% over period |

| Performance type | Sectors | GVA change | Productivity change | Employment change |
|---|---|---|---|---|
| GVA below average, Productivity above average | Most manufacturing<br>Electricity and gas supply<br>Water transport<br>Insurance and pensions | 0.33% on annual basis<br><br>15.1% over period | 2.85% on annual basis<br><br>235.0% over period | -2.45% on annual basis<br><br>-65.6% over period |
| GVA above average, Productivity below average | Most personal services<br>Health care, residential care, and social work<br>Some KIBS<br>Warehousing<br>Waste disposal and management | 3.74% on annual basis<br><br>384.4% over period | 1.12% on annual basis<br><br>61.6% over period | 2.59% on annual basis<br><br>199.7% over period |
| GVA above average, Productivity above average | Most KIBS (including information services, computer programming, telecommunications, scientific research, and financial services)<br>Retail<br>Pharmaceuticals<br>Oil and gas extraction, and support activities<br>Land transport<br>Air transport | 3.69% on annual basis<br><br>374.5% over period | 3.03% on annual basis<br><br>260.2% over period | 0.64% on annual basis<br><br>31.7% over period |
| Total for Great Britain | | 2.15% on annual basis<br><br>149.5% over period | 1.59% on annual basis<br><br>98.6% over period | 0.55% on annual basis<br><br>26.8% over period |

This includes large sectors such as public administration and defence, education, and construction. The second group has had slow output growth, but above the national average

productivity growth compared to the national average as a result of employment loss. This group includes most of manufacturing. The third group has had faster growth of output but slower productivity growth than the national average. This includes most personal services, health care, and several of the KIBS. The fourth group are those that have experienced relatively faster output and also productivity growth, and are thus the most impressive performers across the sectoral groups. This group encompasses most of the KIBS, retail, pharmaceuticals, and oil and gas extraction.

## 3.5    Structural Transformation in British cities

This section is concerned to assess the how the structural transformation discussed in the previous section, has played out over the various cities in Great Britain. The economic growth prospects of cities will be importantly conditioned by the initial presence of certain sectors at the beginning of the period, and the general development of sectors over the period. Hence we will first look at how economic activities were distributed over the country in 1971 and how this has changed over the period until 2014. We will then analyse what this has meant for changes in GVA for the cities from 1971 until 2014.

Table 3.4 shows the economic structure of the clubs of cities in 1971. Clearly manufacturing was still a relatively important segment of the economy, with nearly 22% of the output in the nation. It is also clear that there was an overrepresentation of manufacturing – which as highlighted in section 3.4, has grown very little – in Clubs II and III, with Club II also specialising more in textiles and Club III more in metals and related industries. Private services – where a lot of the growth has taken place in the subsequent period – made up about 37% of the British economy in 1971. There is not that much disparity between the economic structures of the various types of cities and also the non-urban TTWAs in this respect. Also, private services had comparable share between the three main clubs of cities and in the non-urban TTWAs. The exception here is London, in which private services formed a much greater share (51%), mainly because of a far greater share of Knowledge Intensive Business Services (although transport and logistics also had a larger share than in the national economy). Hence London seemed to have been somewhat better placed to benefit from the structural transformations that were going to occur in the next decades, whereas Clubs II and III were at a comparative disadvantage. For the sake of contrast and of completeness, we have included Aberdeen as well in this table.

*Table 3.4:* *Economic structure in clubs of cities in 1971, with total GVA in 1971 for broad groups of sectors and for clubs (in million £s, 2011 Current Market Value)*

| | London | Club I: GVA + | Club II: GVA 0 | Club III: GVA - | Non-urban TTWAs | Aber-deen | Great Britain | Total GVA 1971 |
|---|---|---|---|---|---|---|---|---|
| **Broad sector groups** | | | | | | | | |
| Agriculture and fishing | 0.2% | 1.4% | 0.8% | 0.7% | 2.2% | 3.9% | 1.0% | 5,218 |
| Coal and Other mining | 0.2% | 0.2% | 0.4% | 0.2% | 1.0% | 0.0% | 0.4% | 2,074 |
| Oil, Gas and Mining support | 0.3% | 0.1% | 0.4% | 0.1% | 0.4% | 0.3% | 0.3% | 1,430 |
| Metals and related | 2.1% | 3.7% | 3.5% | 7.4% | 5.4% | 1.2% | 4.4% | 23,959 |
| Textiles and related | 1.4% | 1.3% | 4.1% | 1.6% | 2.3% | 0.9% | 2.2% | 12,029 |
| Light manufacturing | 5.3% | 8.5% | 8.4% | 9.5% | 8.5% | 16.3% | 8.1% | 43,733 |
| High tech manufacturing | 4.3% | 8.1% | 9.2% | 10.5% | 5.3% | 1.7% | 7.7% | 41,653 |
| Utilities | 1.1% | 2.4% | 3.0% | 2.8% | 3.1% | 4.7% | 2.5% | 13,485 |
| Construction | 10.3% | 10.5% | 10.7% | 11.5% | 11.7% | 13.2% | 10.9% | 59,022 |
| Transport and logistics | 15.1% | 12.4% | 10.7% | 10.9% | 10.7% | 12.2% | 11.9% | 64,362 |
| Retail and personal services | 11.2% | 13.8% | 13.5% | 12.1% | 14.7% | 11.2% | 12.9% | 69,463 |
| Knowledge Intensive Business Services | 24.7% | 9.1% | 8.6% | 9.0% | 7.6% | 8.7% | 12.0% | 64,529 |
| Public services | 23.9% | 28.3% | 26.5% | 23.6% | 27.1% | 25.7% | 25.7% | 138,334 |
| **Performance types** | | | | | | | | |
| GVA below average, Prod below average. | 44.4% | 44.8% | 42.6% | 41.0% | 47.9% | 44.7% | 43.7% | 235,658 |
| GVA below average, Prod above average | 16.5% | 23.4% | 26.2% | 31.2% | 23.6% | 27.4% | 24.6% | 132,637 |
| GVA above average, Prod below average | 19.8% | 16.2% | 15.5% | 13.9% | 14.0% | 12.0% | 15.9% | 85,590 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| GVA above average, Prod above average | 19.3% | 15.6% | 15.7% | 13.9% | 14.5% | 15.8% | 15.8% | 85,406 |
| **Total GVA 1971** | 111,959 (100.0%) | 84,466 (100.0%) | 133,067 (100.0%) | 130,019 (100.0%) | 76,202 (100.0%) | 3,579 (100.0%) | 539,291 (100.0%) | 539,291 |
| Share of Club in 1971 | 20.8% | 15.7% | 24.7% | 24.1% | 14.1% | 0.7% | 100.0% | |

Figures 3.6 to 3.10 show how the relative distribution of broad types of sectors over the clubs changed over time, by displaying the development of the location quotients. Agriculture and fishing, coal and other mining, and oil and gas extraction, are excluded as these made up relatively small shares of the British economy, and are moreover activities that mainly take place outside of cities.

*Figure 3.6:*      *London: Location quotients for broad groups of sectors based on GVA-shares*

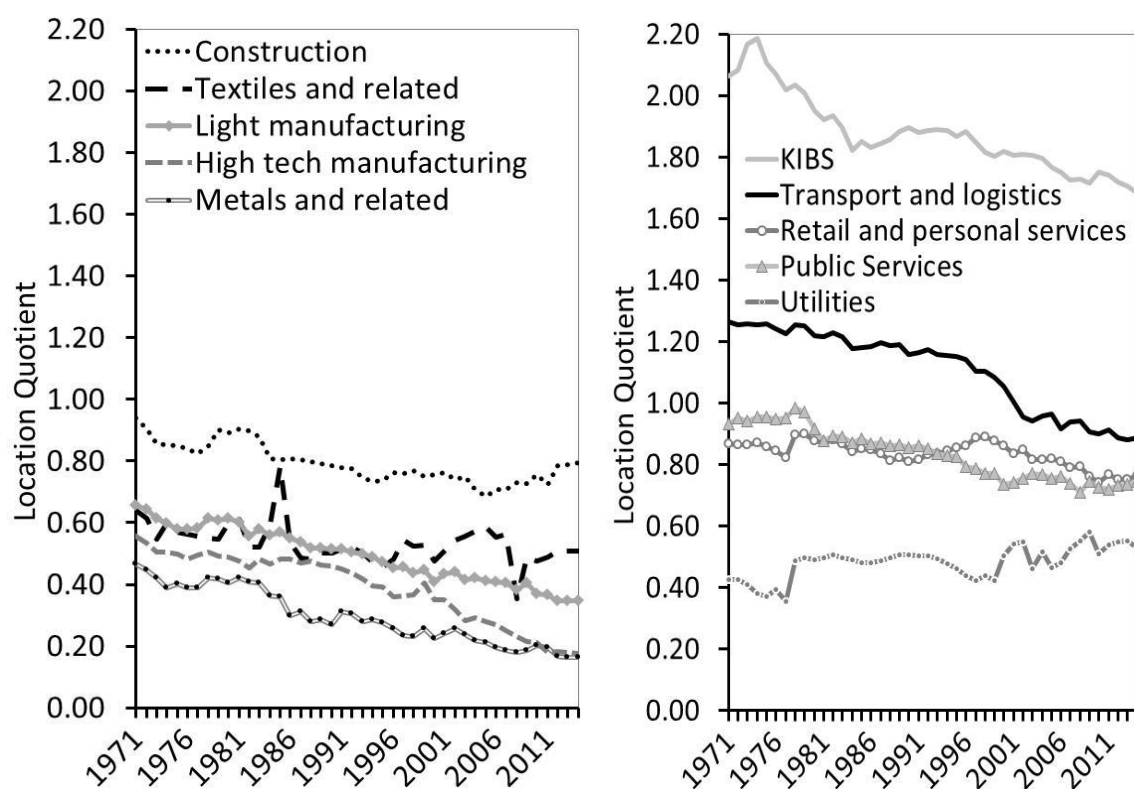*Figure 3.7:     Club I (GVA +): Location quotients for broad groups of sectors based on GVA-shares*
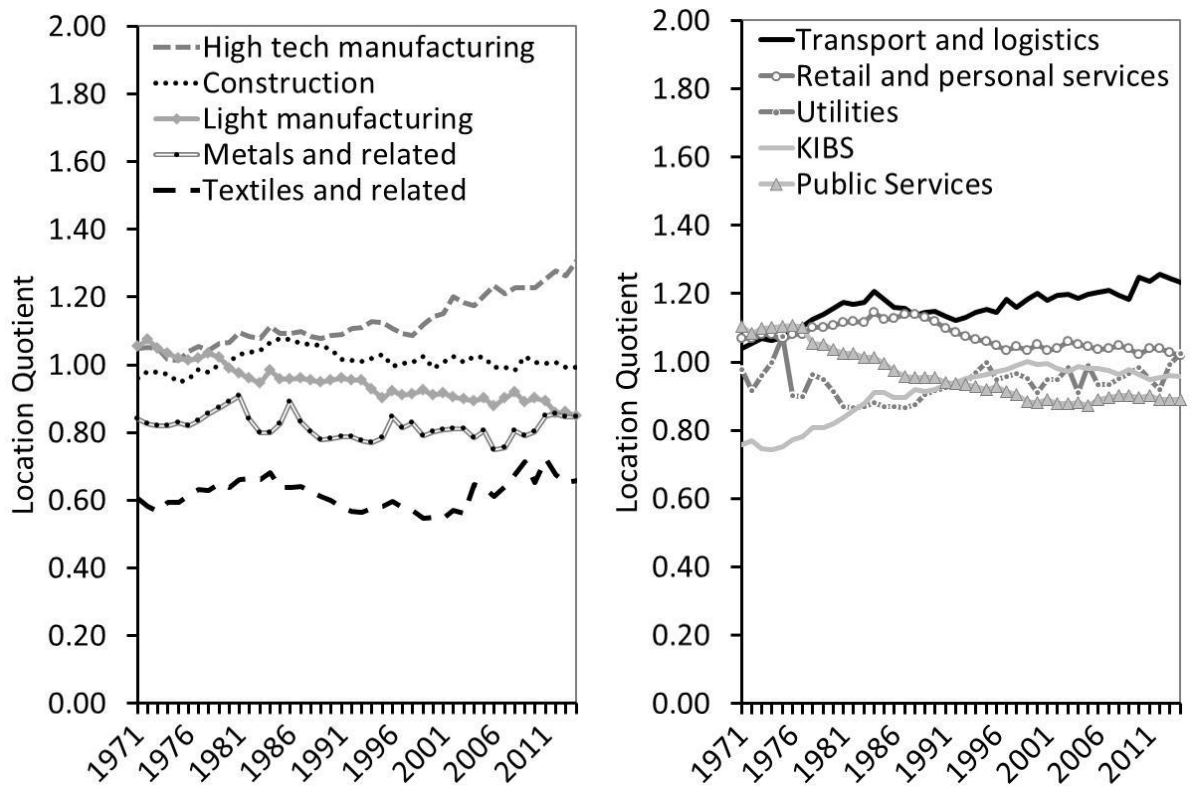


*Figure 3.8:     Club II (GVA 0): Location quotients for broad groups of sectors based on GVA-shares*
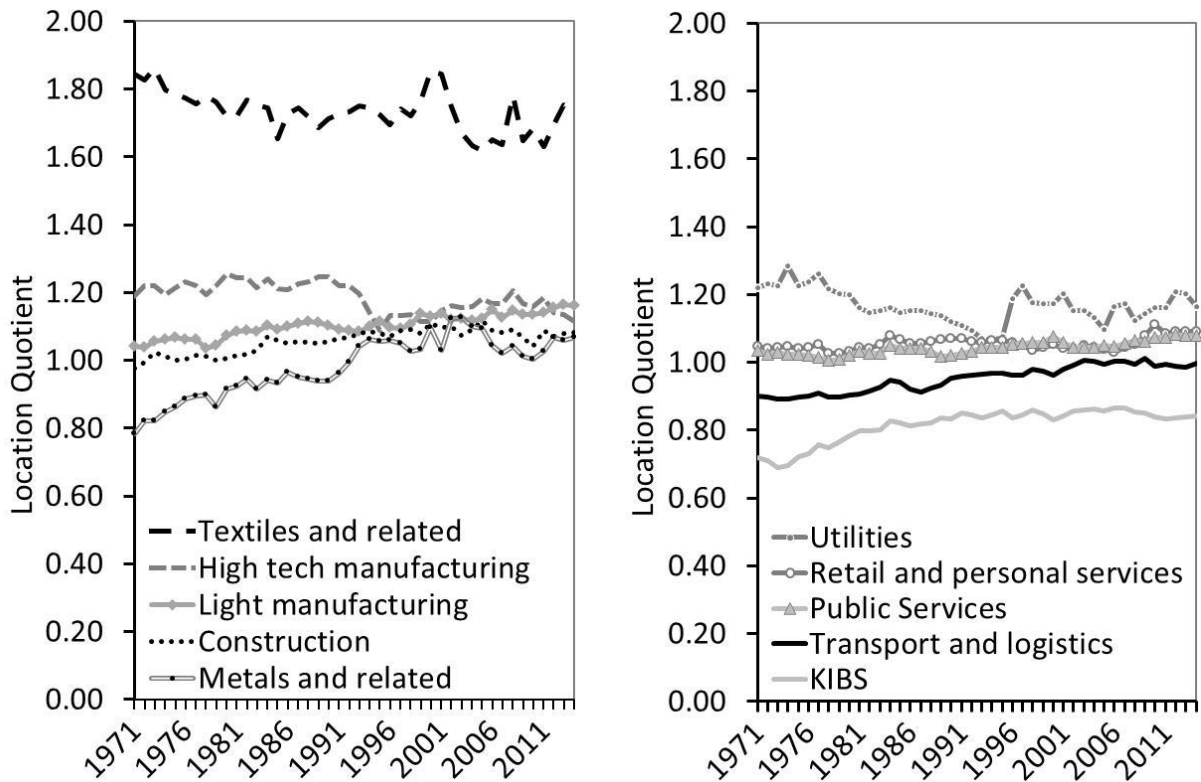
*Figure 3.9: Club III (GVA -): Location quotients for broad groups of sectors based on GVA-shares*
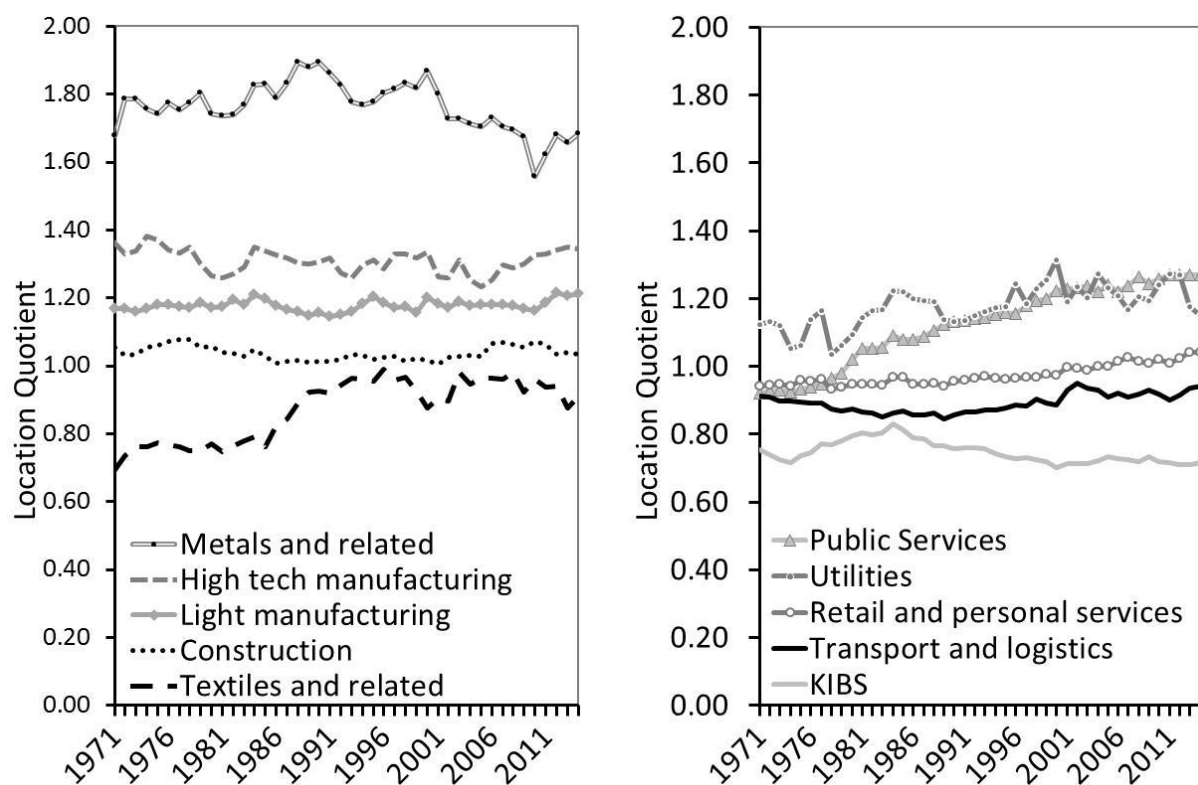


*Figure 3.10: Non-urban TTWAs: Location quotients for broad groups of sectors based on GVA-shares*
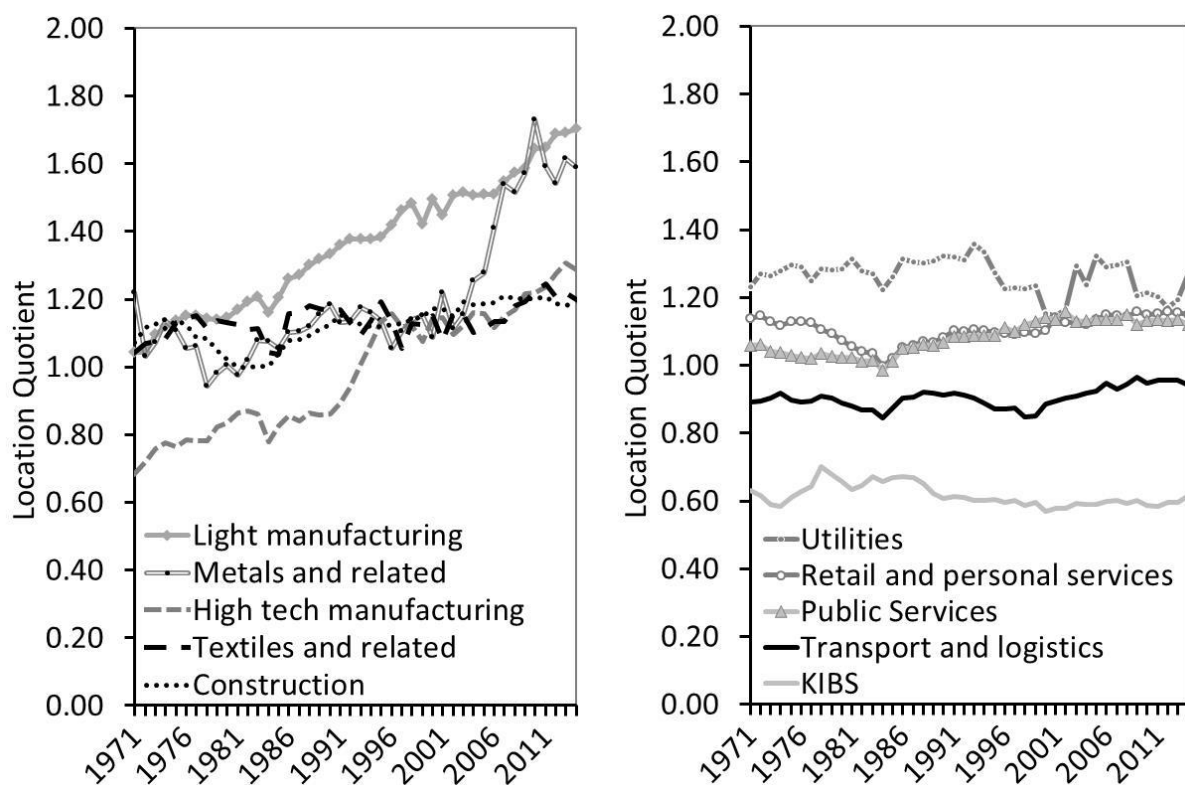
London already had relatively low concentrations of manufacturing activity, and these have been falling further over the period. The very high concentrations of output in Knowledge Intensive Business Services have remained high. But interestingly, the relative share declined somewhat over the 1970s before being restored in the 1980s probably because of the cessation of government policy activity designed to disperse office-based activity from London to its surrounding areas. Towards the end of the 1990s, the relative concentration began to fall somewhat again. London has experienced a marked drop in the concentration of output in transport and logistics and the public sector throughout the period.

The cities in the fast-growing Club I had somewhat lower concentrations of manufacturing initially. But they have increased their relative concentration in high tech manufacturing over the period, particularly after the mid-1990s (Figure 3.7). These cities have noticeably increased their relative concentration in transport and logistics and also Knowledge Intensive Business Services, whilst their share of public service output has gone down.

The cities in Club II, Figure 3.8, have historically been characterised by relatively greater concentration of textile related activity, which – even though this sector has declined very significantly at the national level – has remained concentrated in these cities. In terms of private services (as well as other types of manufacturing) there seems to be a convergence taking place, in which the cities in Club II increasingly emulate the economic structure of the nation as a whole.

The cities in Club III were historically characterised by a relatively high share of manufacturing, in particular of manufacturing in metal related industries, as is clear from Figure 3.9. This pattern has persisted. As noted manufacturing output has grown only very little over the period, hence there may be an indication that the comparatively high concentrations of manufacturing have contributed to the slow growth of these cities in general. The more fast growing private services remain underrepresented in the cities in Club III, and this is especially true for the Knowledge Intensive Business Services. By contrast, public services seem to have increased their share in these cities considerably relative to the nation as a whole. This may have provided something of a compensating development, but an increasing dependence on public services carries its own problems as a basis for sustained high growth over the long term.

Figure 3.10 makes clear that manufacturing is increasingly concentrated outside of the cities, in less urbanised and rural locations. Knowledge Intensive Business Services still seem to have a clear predilection for cities however, and the concentration of KIBS in more rural parts of the country has remained quite low.

These developments in the geographical distribution of industries over Great Britain are also reflected in the sectoral breakdown of changes in output across the various clubs over the period. Table 3.5 and Table 3.6 show the breakdown of output change over the period. Table 3.5 exhibits which sections of the economy experienced negative output change - i.e. decline in output - over the period. At the bottom of the table, the total absolute decline in each of the clubs is presented, which is broken down into the percentage contribution of each broad sector group and again of each sector performance type. Table 3.6 presents a similar breakdown for positive output change – in other words, growth in GVA – and shows the primary sources of growth in each of the clubs. Added together the negative change in Table 3.5 and positive change in Table 3.6, will represent the overall (net) GVA growth over the period for each club.

With regard to negative output change, it is clear that London and the cities in Club III have had to deal with more decline in their sectors than other parts of the country. In both cases this was due to substantial losses of output in manufacturing, which perhaps also had a further negative effect on transport and logistics. In London, furthermore, public administration and defence have lost output. In Club III, some parts of its metal related industry (in particular basic steel making and manufacture of metal products) and of its high tech manufacturing (especially production of motor vehicles and of machinery) have sustained heavy losses. In Club II the dramatic decline of the textile industry in Britain is clearly noticeable, but other segments in manufacturing have not suffered as much as in Club III and in London.

There have been very large differences in the capacity to generate output growth between the clubs over the period. On the one hand, there are the well-performing cities in Club I and London, which have seen a lot of expansion across their economies.

*Table 3.5: Breakdown of negative GVA change (million £s, 2011 CMV), by broad sector groups and performance types for clubs of cities; 1971-2014*

| | London | Club I: GVA + | Club II: GVA 0 | Club III: GVA - | Non-urban TTWAs | Aber-deen | Great Britain | Total neg. GVA change |
|---|---|---|---|---|---|---|---|---|
| **Broad sector groups** | | | | | | | | |
| Agriculture and fishing | 0.6% | | 0.2% | 0.3% | | 22.1% | 0.5% | -171 |
| Coal and Other mining | 1.4% | 1.4% | 6.3% | 0.9% | 7.4% | | 2.7% | -973 |
| Oil, Gas and Mining support | | | 7.2% | 1.0% | 0.5% | | 1.9% | -672 |
| Metals and related | 16.6% | 25.5% | 11.1% | 33.4% | 50.9% | 6.5% | 24.9% | -8,860 |
| Textiles and related | 11.3% | 27.2% | 51.3% | 10.5% | 35.8% | 6.1% | 22.2% | -7,917 |
| Light manufacturing | 21.1% | 20.0% | 7.2% | 12.7% | 2.7% | 56.9% | 13.9% | -4,944 |
| High tech manufacturing | 28.1% | 7.6% | 7.3% | 28.5% | | | 20.1% | -7,173 |
| Utilities | 3.4% | 18.4% | 9.4% | 6.9% | 2.7% | | 6.7% | -2,395 |
| Construction | | | | | | | | 0 |
| Transport and logistics | 9.2% | | | 5.8% | | | 4.7% | -1,659 |
| Retail and personal services | | | | | | | | 0 |
| Knowledge Intensive Business Services | | | | | | 8.4% | 0.1% | -25 |
| Public services | 8.3% | | | | | | 2.3% | -822 |
| **Performance types** | | | | | | | | |
| GVA below average, Prod below average. | 14.5% | 18.4% | 9.8% | 9.1% | 41.5% | 6.5% | 14.0% | -4,981 |
| GVA below average, Prod above average | 85.5% | 81.6% | 82.9% | 89.9% | 58.0% | 82.5% | 84.0% | -29,914 |
| GVA above average, Prod below average | | | 0.2% | | | | 0.0% | -12 |
| GVA above average, Prod above average | | | 7.2% | 1.0% | 0.5% | 11.0% | 2.0% | -704 |
| **Total negative GVA change** | -9,928 (100.0) | -2,169 (100.0%) | -7,364 (100.0%) | -12,889 (100.0%) | -2,963 (100.0%) | -298 (100.0%) | -35,611 (100.0%) | -35,611 |
| GVA in 1971 | 111,959 | 84,466 | 133,067 | 130,019 | 76,202 | 3,579 | 539,291 | |
| Negative GVA-change as % of GVA in 1971 | -8.9% | -2.6% | -5.5% | -9.9% | -3.9% | -8.3% | -6.6% | |

*Table 3.6: Breakdown of positive GVA change (million £s, 2011 CMV), by broad sector groups and performance types for clubs of cities; 1971-2014*

| | London | Club I: GVA + | Club II: GVA 0 | Club III: GVA - | Non-urban TTWAs | Aberdeen | Great Britain | Total pos. GVA change |
|---|---|---|---|---|---|---|---|---|
| **Broad sector groups** | | | | | | | | |
| Agriculture and fishing | | 0.5% | 0.3% | 0.2% | 1.2% | | 0.4% | 3,229 |
| Coal and Other mining | 0.1% | 0.1% | 0.1% | | | 0.3% | 0.1% | 488 |
| Oil, Gas and Mining support | 0.1% | 0.3% | | | 0.1% | 32.0% | 0.6% | 4,975 |
| Metals and related | | 0.3% | 0.4% | | 1.2% | 1.3% | 0.3% | 2,882 |
| Textiles and related | | | | | | 0.0% | 0.0% | 4 |
| Light manufacturing | 0.2% | 1.4% | 2.2% | 0.9% | 5.8% | 2.4% | 1.9% | 15,780 |
| High tech manufacturing | 0.3% | 5.8% | 3.1% | 4.8% | 6.9% | 3.0% | 3.8% | 32,190 |
| Utilities | 1.4% | 2.5% | 2.6% | 2.9% | 2.8% | 0.9% | 2.3% | 19,506 |
| Construction | 2.2% | 4.7% | 4.5% | 1.1% | 5.1% | 2.0% | 3.6% | 29,984 |
| Transport and logistics | 7.2% | 14.5% | 11.2% | 9.9% | 10.4% | 8.7% | 10.7% | 89,726 |
| Retail and personal services | 12.4% | 17.5% | 19.8% | 20.1% | 20.6% | 15.0% | 17.6% | 148,014 |
| Knowledge Intensive Business Services | 66.0% | 39.1% | 37.8% | 34.6% | 26.3% | 25.7% | 42.6% | 358,813 |
| Public services | 10.0% | 13.3% | 18.0% | 25.4% | 19.5% | 8.7% | 16.2% | 136,100 |
| **Performance types** | | | | | | | | |
| GVA below average, Prod below average. | 13.2% | 18.5% | 18.5% | 15.8% | 19.6% | 11.3% | 18.5% | 142,168 |
| GVA below average, Prod above average | 1.4% | 7.3% | 6.4% | 3.5% | 13.1% | 7.0% | 7.3% | 49,959 |
| GVA above average, Prod below average | 42.6% | 34.7% | 39.6% | 43.8% | 35.9% | 26.0% | 34.7% | 328,999 |
| GVA above average, Prod above average | 42.8% | 39.4% | 35.5% | 37.0% | 31.4% | 55.7% | 39.4% | 320,565 |
| **Total positive GVA change** | 203,378 (100.0%) | 190,442 (100.0%) | 192,694 (100.0%) | 121,695 (100.0%) | 121,239 (100.0%) | 12,243 (100.0%) | 841,691 (100.0%) | 841,691 |
| GVA in 1971 | 111,959 | 84,466 | 133,067 | 130,019 | 76,202 | 3,579 | 539,291 | |
| Positive GVA-change as % of GVA in 1971 | 181.7% | 225.5% | 144.8% | 93.6% | 159.1% | 342.1% | 156.1% | |

On the other hand, there are the poorly performing cities in Club III, which in addition to experiencing more decline in output, have also not been able to generate much output growth compared to other cities. Club II and non-urban TTWAs, have been tracking the national average in this respect. It is also immediately clear from this table that very little growth has come from manufacturing, with the exception perhaps of some parts of high-tech manufacturing (mainly pharmaceuticals, production of computers, and of motor vehicles) in Club I and non-urban TTWAs. By far the greatest share of growth in all the clubs has been in private services, especially KIBS and to a lesser extent retail and personal services. In London, KIBS account for around two thirds of positive change in output. Also Club I shows a greater increase of output because of growth in KIBS than the other clubs. The nature of the growth of KIBS between London and the cities of Club I is somewhat different though; with growth in London more driven by financial services, legal and accounting, and entertainment industries, and Club I more dominated by IT services and real estate activities. Club III is lagging behind somewhat in terms of the share of its growth due to KIBS. Club III by contrast shows a much greater share due to expansion of public services, especially health care and education. These developments then also explain the greater share of higher productivity growth activities in the output growth of London and Club I; while in Club III somewhat more of its growth is constituted of sectors with lower productivity growth.

## 3.6   Contribution of Structural Factors to the Growth of British Cities

The foregoing analysis would seem to suggest that output growth in cities has been strongly influenced by their initial sectoral structure and how that structure then changes over time; in other words, economic structure would appear to be a key determinant of city output growth. However, the performance of sectors is not uniform throughout the country, and thus the growth of cities may be importantly affected by sectors doing significantly better or worse in some cities than would be expected based on their national performance. The expansion or decline of some sectors can thus be concentrated in some cities while bypassing others. Hence a city's structural ensemble and how that ensemble changes over time will only partially explain the growth of cities. Other factors will be important, such as differences in levels of innovation and entrepreneurship, as well as the geographical spread of the types of functions within sectors (head offices, R&D, administration, production, etc.). These differences may in turn reflect local advantages in terms of human capital, agglomeration, policy and governance, etc. (Martin et al., 2016a). To explore the relative contribution of structural versus other, city-specific 'competitiveness' factors, we use a dynamic shift share analysis.

Shift share has been used extensively and there is a large literature discussing its application and relative strengths and weaknesses. Prominent amongst the literature is the work of Fothergill and Gudgin (1984), Selting and Loveridge (1990, 1992) and Loveridge and Selting (1998). A standard criticism is that the choice of weights used to represent the structural base influence the results. In an attempt to overcome this research has relied on dynamic versions that have the advantage over conventional models of allowing both growth rates and economic structure to change, rather than being pivoted on a set of weights at a particular point in time. Examples of this approach include Barff and Knight (1988), Chern et al. (2002) and Fritz and Streicher (2005). More recently, attention has been focused on incorporating regression analysis into shift share, with examples including Blien et al. (2013).

We adopted the dynamic shift share decomposition procedure as used in Gardiner et al. (2013). This has the advantage of recording and updating the levels of sectoral composition and the changes within this on an annual basis, so the point of reference to distinguish between structural effects and local city-specific effects is allowed to shift over time. It also provides additional information on dynamic transition, which could not be obtained from the standard comparative-static shift-share method. The analysis has been conducted at an 81 sectoral level.

The classic shift-share approach decomposes temporal change in a variable into three additive effects:

(i) National component (NC) - the change that would occur if all regions' sectors grow at national rate

(ii) Structure effect (SE) - the change that would occur if all regions' sectors grow at national sector rate (minus, or conditional on, the national share effect)

(iii) Local effect (LE) - the difference between the actual change and the sum of national and industry shifts, i.e. a residual designed to capture local-specific factors such as competitiveness, concentration of higher value functions, local policy, etc.

More formally, if we consider a variable X, defined over industry i, region r and time t, a temporal change between time t and t+n can be written as:

$$X_{ir}^{t+n} - X_{ir}^{t} = \Delta X_{ir}^{t+n} = NC_{ir}^{t+n} + SE_{ir}^{t+n} + LE_{ir}^{t+n}$$

Each of these three components can be expressed as follows:

$$NC_{ij} = X_{ij} * g_n$$

$$SE_{ij} = X_{ij} * (g_{in} - g_n)$$

$$LE_{ij} = X_{ij} * (g_{ir} - g_{in})$$

Where:

g = the growth of the variable X over the pre-defined time period (between t+n and t);

$g_n$ = the national (percentage) growth of variable X during this period,

$g_{in}$ = the national (percentage) growth by industry i of variable X during this period; and

$g_{ir}$ = the regional (percentage) growth by industry i of variable X during this period.

By summing over all industries in any given city, we arrive at the overall national, industrial mix and residual shift components:

$$NC_j^{t+n} = \sum_i X_{ij}^t * g_n \qquad SE_j^{t+n} = \sum_i X_{ij}^t * (g_{in} - g_n) \qquad LE_j^{t+n} = \sum_i X_{ij}^t * (g_{ij} - g_{in})$$

Using the dynamic version of the technique, and thus decomposing city changes in output on a year-by-year basis, we were able to investigate the contribution that changes in economic structure have made to each city Club's output growth differential over time. This differential growth already incorporates the national component, hence we focus on the contribution of the structure effect and local effect to the positive or negative gap in performance compared to national growth. Moreover, in order to see how matters evolve over the study period, we can track the relative contributions of the structure effect and local effect in the cumulative development of this gap over time. Figure 3.11 shows the results.

The findings in the case of London are clear. Throughout the period, London benefited from its particular economic structure; that is to say, London has benefited from having a high proportion of nationally fast growing sectors. However, London has certainly not managed to benefit as much as expected, as the structure effect was offset by a negative local effect, which held on persistently over many years until the mid-1990s. But in recent years this local effect has become strongly positive, making up for much of the accumulated losses with regard to the potential growth of London in the decades before (see Figure 3.2).

*Figure 3.11. The contribution of economic structure and of local factors to differential output growth relative the GB across the City Clubs, in GVA (billion £s, 2011 CMV) based on 81 sectors*

**London**



**Club I**



**Club II**

**Club III**



**Non-Urban**
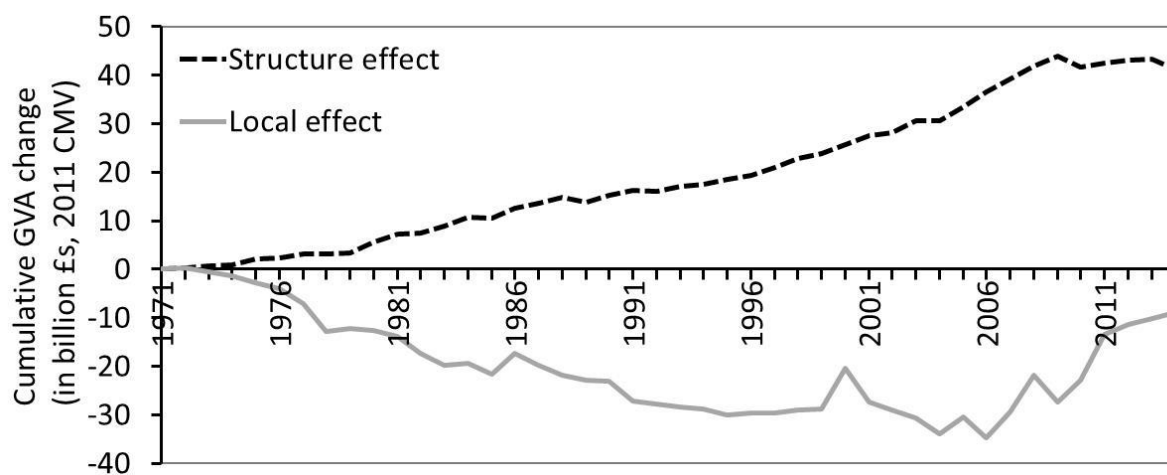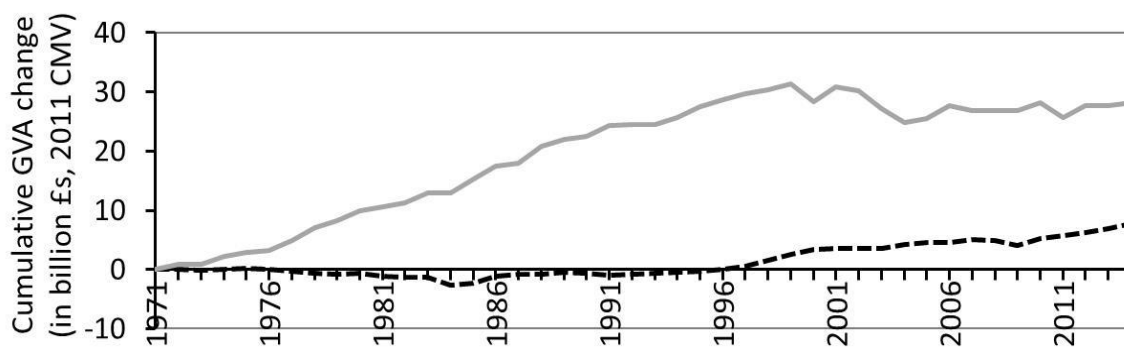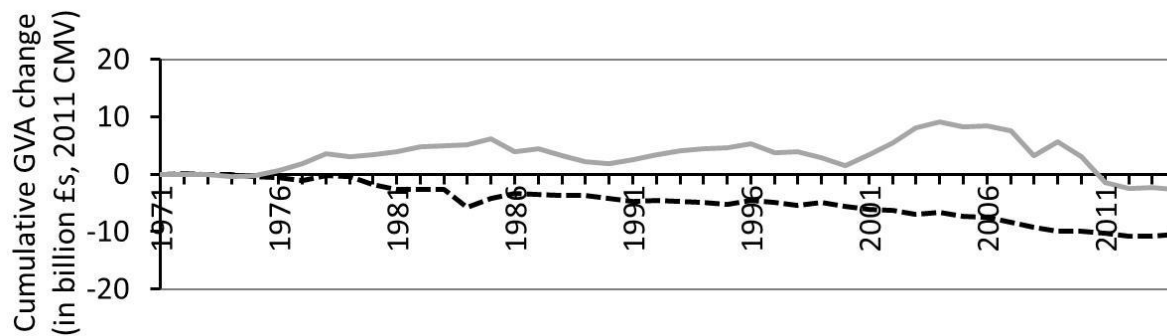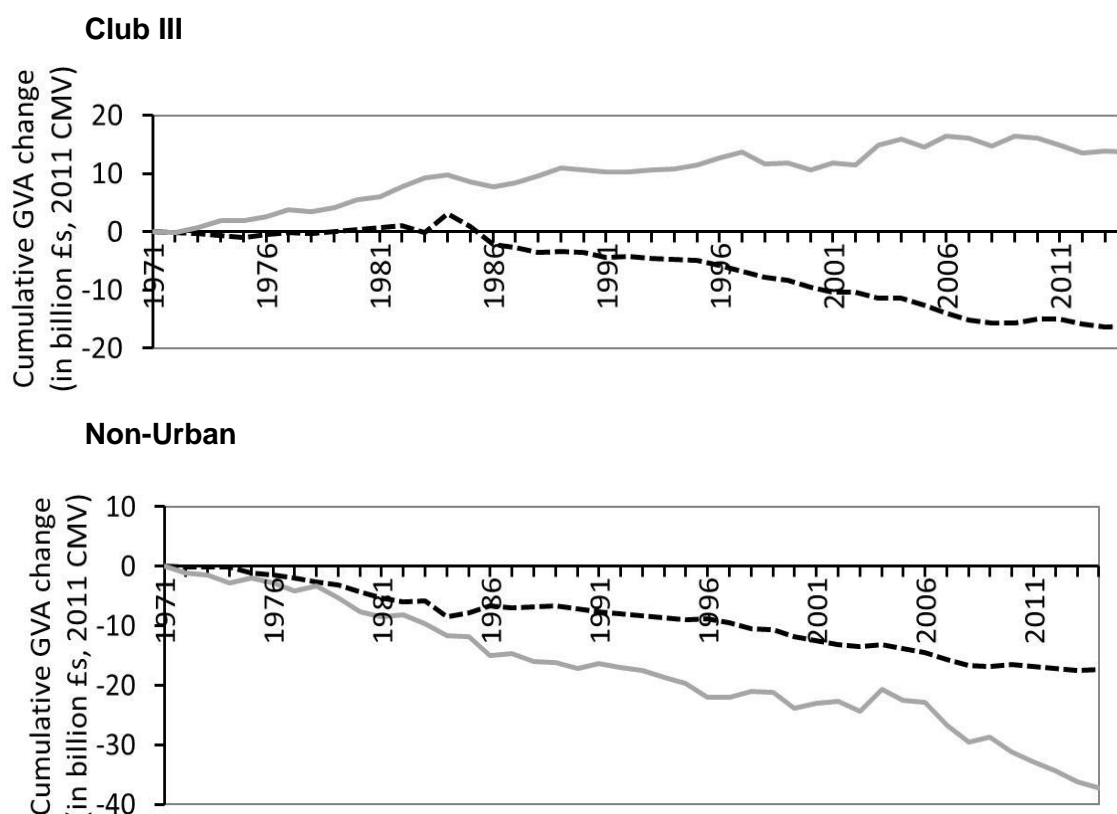


The structural effect also appears substantial in explaining the slow growth of the cities in Club III. Throughout the period, these cities have been at a disadvantage because of the composition of their economies, and especially until the mid-1980s this appears to explain about half of the negative gap in output growth with the nation as a whole. However, the negative impact of the local effect has been at least as large, and has only increased over time compared to the structural effect. This means that cites in this Club have not only lagged because they have an unfavourable mix of sectors, but that in general those sectors underperform compared to the performance of the sectors for the nation as a whole. This suggests that the various factors that influence a city's overall competitiveness have become increasingly unfavourable.

Club II and the non-urban TTWAs also had to cope with negative impacts of their industrial structure over the period, especially after the early 1980s. But these cities and non-urban TTWAs managed to compensate for this negative structure effect through a positive local effect for most of the period. Hence the performance of the sectors that are present in these locations has on the whole been better than expected.

The strong growth of the Club I cities has almost entirely been due to highly positive local effects: the sectors in these cities have strongly outperformed the national average trends in those sectors. Only from the mid-1990s onwards does a modest positive structure effect emerge, as a result of a higher concentration of high-growth sectors. But the local effect clearly

dominates, and seems to reflect a growing competitive advantage of these cities compared to other parts of Great Britain, although this advantage seems to have stabilised following the onset of the financial crisis in 2008.

## 3.7    Implications of Structural Transformation in British Cities for Employment

Thus while structural transformation goes some way in accounting for the observed patterns of output growth across cities, a full explanation would need to examine the host of factors and processes that are subsumed under the 'local effect' identified above. This is beyond the scope of this paper. However, also of interest are the implications of the patterns of output growth, for city employment trends. As we saw in Figure 3.1, there is a reasonably close correlation between output growth and employment growth across British cities. Tables 3.7 and 3.8 explore this relationship further, and show the breakdown of employment changes in the city clubs across broad sector groups and across sector performance types. The general picture is very similar to the one painted in section 3.5 (in terms of GVA), with the same patterns of growth and decline in the various Clubs and sectors. But much more than when examining output, the churn between and within different segments of the economy comes into view. From an employment perspective, the scale of the process of structural transformation over the past five decades is quite remarkable. Even within parts of the economy which exhibit substantial growth of output – such as transport and logistics, public services, utilities, and to a much lesser extent KIBS (with some job loss in insurance & pensions) – considerable movements take place, which are not visible when looking at changes in GVA alone.

Also the uneven effects of the process of structural transformation need to be highlighted. The decline in employment due to job loss in various sectors (especially in manufacturing), seems to have been particularly large in Club III, London, and Club II. But then London and Club II (and furthemore the non-urban TTWAs) seemed to have gained a lot of new employment in other other sectors (mainly services), following the national pattern in this respect. Employment in Club I clearly grew a lot faster than the average. Club III however has, by 2014, not even fully recovered from the losses of employment it sustained already in the 1970s and 1980s.

The focus on employment moreover further highlights differences in productivity across sectors, and also across cities. Those sectors where there has been relatively favourable output and productivity growth, compared to the nation, mainly most of the

KIBS, are of particular interest. About 40% of the growth in output in Great Britain over the period from 1971 until 2014 has come from these sectors, yet they have contributed less than 20% of the growth in employment. By far the most employment growth has been in sectors which have indeed also grown relatively fast in output, but in which the increase of output per job – labour productivity – has been below average (such as personal services, health and social care, and warehousing). The remaining source of employment growth has been in sectors which have experienced low output growth and consequently also low productivity growth (such as education, construction, and accommodation and leisure).

Moreover, the geographical distribution of the growth of high value-added employment across the cities is again quite uneven, being concentrated in Club I and London. In contrast, they have only constituted a small part of employment growth of the cities in Club III, in which employment gains have instead consisted disproportionally of jobs in sectors which have experienced below average growth in productivity. Thus, structural transformation in the British economy also seems reflected in divergent growth of productivity across cities, and thus ultimately real incomes. The divergent development of productivity across British cities – a critical issue attracting increasing attention from the UK Government in relation to its new Industrial Strategy (HM Treasury, 2017) – is examined in Martin et al. (2017).

*Table 3.7: Breakdown of negative employment change, by broad sector groups and performance types for clubs of cities; 1971-2014*

| | London | Club I: GVA + | Club II: GVA 0 | Club III: GVA - | Non-urban TTWAs | Aberdeen | Great Britain |
|---|---|---|---|---|---|---|---|
| **Broad sector groups** | | | | | | | |
| Agriculture and fishing | -7,612 (0.6%) | -53,847 (6.5%) | -82,352 (4.5%) | -50,453 (2.3%) | -88,113 (13.5%) | -9,369 (23.1%) | -291,746 (4.3%) |
| Coal and Other mining | -4,443 (0.4%) | -20,452 (2.5%) | -63,159 (3.4%) | -43,264 (2.0%) | -56,746 (8.7%) | -2 (0.0%) | -188,066 (2.8%) |
| Oil, Gas and Mining support | -3,872 (0.3%) | -6,366 (0.8%) | -31,055 (1.7%) | -30,216 (1.4%) | -33,415 (5.1%) | | -104,924 (1.5%) |
| Metals and related | -86,087 (6.8%) | -105,851 (12.8%) | -177,467 (9.6%) | -492,408 (22.7%) | -78,834 (12.0%) | -281 (0.7%) | -940,928 (13.8%) |
| Textiles and related | -69,172 (5.5%) | -76,772 (9.2%) | -504,546 (27.3%) | -173,599 (8.0%) | -138,716 (21.2%) | -4,593 (11.3%) | -967,398 (14.2%) |
| Light manufacturing | -205,669 (16.3%) | -208,146 (25.1%) | -344,002 (18.6%) | -514,838 (23.7%) | -75,315 (11.5%) | -21,574 (53.1%) | -1,369,544 (20.1%) |
| High tech manufacturing | -358,618 (28.4%) | -235,059 (28.3%) | -429,749 (23.2%) | -520,908 (24.0%) | -78,246 (11.9%) | | -1,622,580 (23.8%) |
| Utilities | -52,850 (4.2%) | -32,128 (3.9%) | -66,685 (3.6%) | -64,471 (3.0%) | -30,795 (4.7%) | -530 (1.3%) | -247,459 (3.6%) |
| Construction | | | | -63,292 (2.9%) | | | -63,292 (0.9%) |
| Transport and logistics | -296,847 (23.5%) | -6,608 (0.8%) | -27,239 (1.5%) | -161,892 (7.5%) | -15,832 (2.4%) | -982 (2.4%) | -509,400 (7.5%) |
| Retail and personal services | -4,827 (0.4%) | | | | | | -4,827 (0.1%) |
| Knowledge Intensive Business Services | -36,978 (2.9%) | | -9,123 (0.5%) | -22,305 (1.0%) | -9,552 (1.5%) | -3,285 (8.1%) | -81,243 (1.2%) |
| Public services | -133,924 (10.6%) | -84,856 (10.2%) | -114,320 (6.2%) | -32,893 (1.5%) | -49,334 (7.5%) | | -415,327 (6.1%) |
| **Performance types** | | | | | | | |
| GVA below average, Prod below average. | -212,177 (16.8%) | -102,143 (12.3%) | -137,965 (7.5%) | -164,340 (7.6%) | -65,962 (10.1%) | | -682,587 (10.0%) |
| GVA below average, Prod above average | -783,682 (62.2%) | -685,773 (82.6%) | - 1,557,262 (84.2%) | - 1,865,149 (85.9%) | -547,333 (83.6%) | -33,855 (83.4%) | - 5,473,054 (80.4%) |
| GVA above average, Prod below average | -948 (0.1%) | | -378 (0.0%) | | | | -1,326 (0.0%) |
| GVA above average, Prod above average | -264,092 (20.9%) | -42,169 (5.1%) | -154,092 (8.3%) | -141,050 (6.5%) | -41,603 (6.4%) | -6,761 (16.6%) | -649,767 (9.5%) |
| **Total negative employment change** | - 1,260,899 (100.0%) | -830,085 (100.0%) | - 1,849,697 (100.0%) | - 2,170,539 (100.0%) | -654,898 (100.0%) | -40,616 (100.0%) | - 6,806,734 (100.0%) |
| Employment in 1971 | 4,536,668 | 3,892,775 | 6,660,088 | 6,653,791 | 3,746,650 | 156,233 | 25,646,205 |
| Negative empl.-change as % of employment in 1971 | -27.8% | -21.3% | -27.8% | -32.6% | -17.5% | -26.0% | -26.5% |

*Table 3.8: Breakdown of positive employment change, by broad sector groups and performance types for clubs of cities; 1971-2014*

| | London | Club I: GVA + | Club II: GVA 0 | Club III: GVA - | Non-urban TTWAs | Aberdeen | Great Britain |
|---|---|---|---|---|---|---|---|
| **Broad sector groups** | | | | | | | |
| Agriculture and fishing | 1,542 | 2,225 | 9,974 | 3,533 | 26,307 | | 43,581 |
| | (0.1%) | (0.1%) | (0.3%) | (0.2%) | (1.1%) | | (0.3%) |
| Coal and Other mining | | | | | | 243 | 243 |
| | | | | | | (0.1%) | (0.0%) |
| Oil, Gas and Mining support | | 1,412 | | | | 30,822 | 32,234 |
| | | (0.0%) | | | | (18.2%) | (0.2%) |
| Metals and related | | | 1,874 | 646 | 1,988 | 2,348 | 6,856 |
| | | | (0.1%) | (0.0%) | (0.1%) | (1.4%) | (0.1%) |
| Textiles and related | | | | | | | |
| Light manufacturing | 840 | | | | | 1,745 | 2,585 |
| | (1.0%) | | | | | (1.0%) | (0.0%) |
| High tech manufacturing | | | | | 596 | 3,493 | 4,089 |
| | | | | | (0.0%) | (2.1%) | (0.0%) |
| Utilities | 14,993 | 25,952 | 29,582 | 26,763 | 21,819 | 599 | 119,708 |
| | (0.7%) | (0.8%) | (0.8%) | (1.2%) | (0.9%) | (0.4%) | (0.9%) |
| Construction | 4,014 | 132,563 | 109,510 | | 100,235 | 3,129 | 349,451 |
| | (0.2%) | (3.9%) | (3.1%) | | (4.2%) | (1.9%) | (2.6%) |
| Transport and logistics | 9,459 | 269,001 | 163,857 | 56,397 | 120,105 | 7,807 | 626,626 |
| | (0.5%) | (8.0%) | (4.6%) | (2.6%) | (5.1%) | (4.6%) | (4.6%) |
| Retail and personal services | 463,845 | 907,323 | 905,220 | 517,827 | 691,876 | 37,324 | 3,523,415 |
| | (22.4%) | (27.0%) | (25.5%) | (24.1%) | (29.3%) | (22.1%) | (25.8%) |
| Knowledge Intensive Business Services | 1,175,802 | 1,192,231 | 1,257,638 | 660,621 | 589,942 | 50,374 | 4,926,608 |
| | (56.7%) | (35.4%) | (35.5%) | (30.7%) | (25.0%) | (29.8%) | (36.0%) |
| Public services | 402,386 | 835,846 | 1,068,706 | 884,087 | 809,794 | 31,070 | 4,031,889 |
| | (19.4%) | (24.8%) | (30.1%) | (41.1%) | (34.3%) | (18.4%) | (29.5%) |
| **Performance types** | | | | | | | |
| GVA below average, Prod below average. | 368,785 | 860,358 | 821,478 | 432,754 | 640,595 | 27,844 | 3,151,814 |
| | (17.8%) | (25.6%) | (23.2%) | (20.1%) | (27.1%) | (16.5%) | (23.1%) |
| GVA below average, Prod above average | 1,108 | 7,800 | | | 15,749 | 7,576 | 32,233 |
| | (0.1%) | (0.2%) | | | (0.7%) | (4.5%) | (0.2%) |
| GVA above average, Prod below average | 1,280,866 | 1,734,371 | 2,147,743 | 1,480,757 | 1,300,643 | 67,960 | 8,012,340 |
| | (61.8%) | (51.5%) | (60.6%) | (68.9%) | (55.0%) | (40.2%) | (58.6%) |
| GVA above average, Prod above average | 422,122 | 764,024 | 577,140 | 236,363 | 405,675 | 65,574 | 2,470,898 |
| | (20.4%) | (22.7%) | (16.3%) | (11.0%) | (17.2%) | (38.8%) | (18.1%) |
| **Total positive employment change** | 2,072,881 | 3,366,553 | 3,546,361 | 2,149,874 | 2,362,662 | 168,954 | 13,667,285 |
| | (100.0%) | (100.0%) | (100.0%) | (100.0%) | (100.0%) | (100.0%) | (100.0%) |
| Employment in 1971 | 4,536,668 | 3,892,775 | 6,660,088 | 6,653,791 | 3,746,650 | 156,233 | 25,646,205 |
| Positive empl.-change as % of employment in 1971 | 45.7% | 86.5% | 53.2% | 32.3% | 63.1% | 108.1% | 53.3% |

## 3.8 Conclusions

Structural change is an ongoing process in dynamic economies. What the foregoing analysis demonstrates is that the profound structural transformations in the British since the beginning of the 1970s have played out quite differently across the country's various cities, shaping to a significant extent their divergent growth trajectories. Moreover the relative importance of structural change compared to other determinants of growth has varied across different types of city.

The cities in Club I (mainly cities in the South of England) – and London - have benefitted substantially from structural transformation, and have seen strong growth on the back of high-growth sectors, especially KIBS. In contrast, the cities in Club III (mainly cities in the North of England, Wales and Scotland) have seen decline or little growth in the traditional mainstays of their economy (mainly in manufacturing), and at the same time have been insufficiently able to grow and attract high-value private service activities. A third group of cities – Club II (those that have grown at more or less the national rate) – also have had to cope with the negative effects of structural change (though on average not quite to the same extent), but fared much better, and managed to make a relatively successful transition to a post-industrial economy, albeit with deep new patterns of inequality and labour market divisions. Non-urban TTWAs have on the whole had to face less of the negative impacts of change in the economic structure; moreover they actually seem to have profited to some extent from some manufacturing moving out of cities. Furthermore, the growth in private and public services in such areas has in general been on a par with the average for the nation. However, structural factors cannot in themselves account for the strong growth of cities in Club I, and many cities in Club II (and the non-urban TTWAs) also managed to deal with structural transformation better than Club III. Moreover, these factors are also insufficient to explain the very lacklustre performance of London until the turn of the century with a sudden turn-around in its fortunes thereafter, as well as the full extent of the lagging growth in Club III cities.

These results imply that the economic trajectories of cities are the complex and uneven outcomes of three fundamental sets of processes, all of which are interactive and potentially shaped by their policy and institutional contexts. These processes have often been distinguished in recent analyses of productivity growth. The first are those structural changes in output and employment shares which we have analysed here in depth. They centre on what we might term *between-sector changes* and refer to the rise of some industries and the decline of others. Our analysis has demonstrated the importance of these processes in some

cities and has allowed us to understand the extent to which post-industrial transition produces growth-reducing structural change in some categories of city.

A second set of processes concerns *within-sector changes* and includes the way in which different parts of the same industry change and evolve over time. They highlight the way in which different firms within the same industry may have different productivity and innovation capabilities and track records. Cities host firms that are classified as belonging to the same industry but are actually quite different in their capabilities, employment, business models and strategies, and these 'within-sector' effects will also contribute to divergent economic performances. Our findings on the importance of 'local effects' in some types of cities may well indicate in part that these 'within-sector' effects also have a significant and growing spatial dimension. There are certainly many theoretical arguments which support and envisage this, as they suggest that globalisation and new supply chains and divisions of labour are widening differences between firms within industries and creating new types of specialisations in terms of functions, tasks and capabilities rather than entire sectors (Massey 1995; Baldwin, 2016). Different rates of entrepreneurship and firm demographics, as well as investment and foreign ownership, may also be reinforcing these spatial variations.

However, a third set of processes centring on the *development of cities' local supply factors* are also interacting through time with both of these two types of industrial change. We know that there are important differences in the capabilities of cities to offer firms an attractive business environment through the supply of both appropriate 'hard and soft' infrastructure and the development of a local labour force sought by knowledge intensive and tradable industries. As we have argued elsewhere (Martin, et al 2016a) local areas start with an inherited pattern of land use and a resource base and institutions that were tailored to another era and the legacy of the past weighs heavily on their ability to adjust to new economic futures. Thus, the Club III cities tend to be amongst the oldest industrial cities with infrastructure, labour forces and a constrained land use pattern to match (See Fothergill and Gudgin, 1982). In constraint our fast growing Club I cities contain post second world war New Towns characterised by plentiful and planned land assembly, up to-date infrastructure and labour with skills more appropriate to the new age. While there is considerable scope for policy initiatives to modify and improve these local supply factors and characteristics, it is also the case that their development is primarily the outcome of a long-term cumulative and path dependent process in which industrial change plays a key role and accumulates different types of asset and institution (Storper, 2015).

In the course of the dynamic specialisation seen in city economies, the relationships between these three sets of processes are deeply recursive through time. Moreover, while beyond the

scope of this paper, in order to properly understand the direction and degree of 'within and between sector' effects in a particular urban area we need to understand how city economies sit within regional ensemble of industries as well as within national and global markets and supply chain relationships (McCann, 2016).

What this suggests is that unambiguously determining the effects of consequences of structural change for urban economic performance is much more complex and difficult than might be assumed. While our dynamic shift-share analysis has allowed us to rigorously distinguish and pull out the direct effects of structural change on variations in city growth, it is not intended to identify more indirect and evolutionary path dependent effects that stem from structural change. But these indirect effects may be important and may be closely integrated with both within-sector and local supply-side development in specific ensembles. More specifically, studies of deindustrialisation in particular cities have increasingly emphasised that it is a long-term process which has lasting damaging and continuing effects on communities and economies (Martin and Gardiner, forthcoming). Indeed sociologists have described 'the half-life of deindustrialisation' to capture these lasting inhibiting influences effects on cultures and individuals (see Linkon, 2013; Strangleman, 2016).

In economic terms our evidence suggests that such effects have been particularly strong in Club III cities and it may be significant that cities in this group appear to have a stronger concentration of metals and related industries. Further investigation might find that the lasting effects of deindustrialisation may be strongest in such cities, where industrial plant and premises are hardest to convert, where land is often contaminated and where negative images of industrial decline are most often entrenched. Interestingly, Club II cities seem to have had greater concentrations in textiles which may have experienced less severe obstacles to conversion and renewal. But without further research we can at this stage only speculate about the causes of the differences between the two Clubs of cities in responding to negative structural change. It may be that varied legacies of decline have shaped within-sector effects in service industries. It could also be that the two groups are distinguished more by their policy environments and character of their collective and institutional agency. Nevertheless, the broader point is that structural change and deindustrialisation are a key source of lasting path dependent effects in some cities (Martin and Sunley, 2006).

While it is important not to paint too deterministic and bleak a picture, as deindustrialised economies undoubtedly contain many resources and assets for renewal, our interpretation is that the legacies of these economies have frequently constrained and filtered the development of growth of service sector firms, as well as the provision of a skilled and educated labour force that is well-suited to knowledge-intensive firm growth. There may well

be a type of spatial differentiation and sorting in which the emergence and growth of knowledge-intensive and high-productivity firms is shaped by the degree to which path dependence allows some cities to be more valued by these firms and their employees. Our decomposition techniques are not suited to fully capturing these long-term legacies and indirect effects as they will show up only as local competitiveness effects and residuals. They require much fuller and more detailed intensive investigation than we have been able to offer in this extensive and synthetic paper. Nevertheless, we hope to have highlighted their potential importance in conjunction with measurable structural industrial change.

# 4 Reviving the 'Northern Powerhouse' and Spatially Rebalancing the British Economy

## 4.1 Introduction: The Rhetoric of Britain's Spatially Unbalanced Economy

From the late-1970s and early-1980s onwards a very particular model of economic growth was championed across many of the advanced nations, and indeed beyond. Based on deregulation, privatization, financialization, and enthusiastic belief in ever deeper free-market globalization, this model was hailed as finally bringing an end to recessions and inflation, as driving a new age of stable growth, what in the USA became labeled as the 'Great Moderation' (Bernanke, 2004), and in the UK as a new 'NICE' era (of *n*on-*i*nflationary *c*ontinued *e*xpansion).[59]  Above all, it was a model driven by a dramatic and seemingly unstoppable expansion of finance and banking.  Banks made record profits, the world's financial centres prospered, and many regions and cities, indeed whole nations, experienced rapid growth on the back of the booming housing and real estate markets that the banks were eager to fund and profit from.  In the UK, the financial success of London was openly celebrated by the Labour Government at the time, and even held up as a model for the rest of the country to follow:

I believe it will be said of this age, the first decades of the 21st century, that out of the greatest restructuring of the global economy, perhaps even greater than the industrial revolution, a new world order was created…. [M]ost importantly of all in the new world order… [t]he financial services sector in Britain, and the City of London at the centre of it … shows how we can excel in a world of global competition.  Britain needs more of the vigour, ingenuity and aspiration that you [London's financial class] already demonstrate is the hallmark of your success (Chancellor Gordon Brown, Mansion House Speech, June 20, 2007).

No sooner had this praise been lavished, however, than the economic boom on which it was based was brought to an abrupt halt. The financial crisis revealed the boom for what it was, a form of development that was highly *unbalanced*: on a global level, between creditor and debtor nations (especially China and the USA respectively); within the Eurozone, between the strong core members such as Germany and France, and the weaker peripheral members such as Spain, Italy and Portugal; and within countries, between consumption and

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[59] The acronym NICE is usually attributed to the former Governor of the Bank of England, Mervyn King.

investment, between services and production, between state revenues and spending, between rich and poor, and, spatially, between different cities and regions.  For while the 'long boom' between the early-1990s and 2007 may have lifted most regions and cities, it lifted some much more than others. Indeed, in some instances, and the UK is a particularly prominent case, it reinforced regional inequalities.

In recognition of these inequalities, since 2010, when the Conservative-Liberal Coalition Government came to power, a new spatial imaginary has risen to the fore in UK Government policy thinking on the need to 'spatially rebalance' the national economy. The argument is that the financial crisis of 2007-2008 had exposed the fact that the economy had become too dependent for growth on a narrow range of activities - especially finance - and on one corner of the country, namely a London and the Greater South East.  As David Cameron, shortly after he had been elected Prime Minister, opined:

Our economy has become more and more unbalanced… Today our economy is heavily reliant on just a few industries and a few regions – particularly London and the South East.  This really matters. An economy with such a narrow foundation for growth is fundamentally unstable and wasteful – because we are not making use of the talent out there in all parts of our United Kingdom (Cameron, 2010).


The Deputy Prime Minister, Nick Clegg, held to a similar view:

For years, our prosperity has been pinned on financial wizardry in London's Square Mile, with other sectors and other regions left behind. That imbalance left us hugely exposed when the banking crisis hit. And now Britain has a budget deficit higher than at any time since the Second World War. It is time to correct that imbalance. We need to spread growth across the whole country and across all sectors (Clegg, 2010).

And yet more recently, Theresa May, David Cameron's successor as Prime Minister, once again stressed the need to secure an

an economy that's fair and where everyone plays by the same rules. That means acting to tackle some of the economy's structural problems that hold people back. Things like the shortage of affordable homes. The need to make big decisions on – and invest in - our infrastructure. The need to rebalance the economy across sectors and areas in order to spread wealth and prosperity around the country (May, 2016).

The Government's initial response was to prosecute a new localism, a new 'local growth agenda' (H.M Government, 2010). Local Enterprise Partnerships (to replace the previous Regional Development Agencies) were established, together with a regional growth fund, local enterprise zones, city deals, and various other measures, all intended to promote local

growth and greater 'spatial balance' across the economy.  And then, from mid-2014 onwards, the Chancellor George Osborne began to talk of his offensive to promote what he called a 'Northern Powerhouse' to rival London in scale and dynamism:

Something remarkable has happened to London over these recent decades. It has become a global capital, the home of international finance, attracting the young, the ambitious, the wealthy and the entrepreneurial from around the world in their tens of thousands. And it's a great strength for our country that it contains such a global city…  But something remarkable has happened here in Manchester, and in Liverpool and Leeds and Newcastle and other northern cities over these last thirty years too. The once hollowed-out city centres are thriving again, with growing universities, iconic museums and cultural events, and huge improvements to the quality of life…  The cities of the north are individually strong, but collectively not strong enough. The whole is less than the sum of its parts. So the powerhouse of London dominates more and more. And that's not healthy for our economy... We need a Northern Powerhouse too. Not one city, but a collection of northern cities - sufficiently close to each other that combined can take on the world (George Osborne, 2014)

However, at the same time the Government has also been anxious that the growth of London is not hindered or compromised in any way.  Herein lies a key conundrum: how to achieve a greater degree of 'spatial balance' in the economy whilst also wanting to protect and enhance the gains from spatial agglomeration of economic activity and growth in the already prosperous London-South East mega-region.  Much of the debate surrounding this issue has revolved around a stark question: "is London good or bad for the rest of the UK"? On the one side are those who point to the benefits of the Greater London economic machine in generating demand for goods and services in the rest of the UK, as a vital source of export earnings, and as a major contributor to the taxes needed to help fund welfare payments and public spending across the nation as a whole (see for example, City of London Corporation, 2011, 2014). But on the other side are those who see London as akin to a 'country apart', even a quasi-independent 'city-state', as a region which has become increasingly detached from the rest of the UK in terms of its level of prosperity, its economic growth, its global orientation, and its cyclical behaviour (Deutsche Bank, 2013).  Some go further, and regard it as having become a sort of 'economic black hole', sucking in key human and financial resources from, and to the detriment of, the rest of the country. For example, Vince Cable when he was Secretary of State for Business in the Coalition Government was quite emphatic that

One of the big problems that we have at the moment…  is that London is becoming a kind of giant suction machine, draining the life out of the rest of the country (Cable, 2013)

A similar view was subsequently voiced by Scotland's First Minister:

London has a centrifugal pull on talent, investment and business from the rest of Europe and the world. That brings benefits to the broader UK economy. But as we know, that same centrifugal pull is felt by the rest of us across the UK, often to our detriment. The challenge for us all is how to balance this in our best interests – not by engaging in a race to the bottom, but by using our powers to create long-term comparative advantage and genuine economic value (Sturgen, 2014).

This 'spatial imbalance' in the UK economy, of an economy tipped too far in favour of London and the South East, is not in fact some new or recent feature, but a long-standing problem, one that goes back to the Victorian period if not earlier.  We have been here before, repeatedly. As early as 1919, Sir Halford Mackinder, successively a prominent Oxford political geographer, Director of the London School of Economics, and Liberal Unionist (Conservative) MP, had argued for a more 'balanced' national socio-economy:

As long as you allow a great metropolis to drain most of the best young brains from the local communities, to cite only one aspect of what goes on, so long must organizations centre unduly in the metropolis and become inevitably an organization of nation-wide classes and interests (Mackinder, 1919).


Barely two decades later, in equally direct terms, the milestone report of the Barlow Commission in 1940 on the distribution of the nation's industrial population expressed a similar view, again in language highly prescient of that used by Vince Cable nearly seventy-five years later:

The contribution in one area of such a large proportion of the national population as is contained in Greater London, and the attraction to the Metropolis of the best industrial, financial, commercial and general ability, represents a serious drain on the rest of the country (Barlow Commission, 1940).


But how then to 'power up' the economies of the country's northern cities in order to reduce this dominance of London?   What is the scale of the challenge?  In the remainder of this chapter we focus particularly on this latter question. We start by showing how a north-south pattern of spatial economic imbalance - of a more prosperous London and South East, and a lagging North and West - was already well established in the 19th C.  We then move forward to the period since the beginning of the 1970s. Using new novel data, we show how major northern cities have lagged behind in terms of growth of employment, output and productivity over the past forty years or so. A crucial aspect of the issue is shown to be the dramatic decline in the manufacturing export base of the northern cities, and, unlike London, their

failure to replace this shrinking base on a sufficient scale with new tradable activities. This problem is not readily attributed to northern cities being 'too small' as some observers have claimed. What is arguably more important is the fact that London has long enjoyed the position of hosting all of the key economic, financial and political institutions that govern the economy and determine national economic policy. Spatial imbalance in the UK is not just an economic issue: it is also one of a major spatial imbalance in the location and operation of the key levers of economic, financial, political and administrative power. The UK is one of the most politically centralised countries in the OCED: it is surely not simply coincidental that it also has one of highest levels of regional economic inequality. What emerges from our brief analysis in this chapter is that spatial economic imbalance is in fact an entrenched, persistent and indeed institutionalized feature of the national economy, and as such is a major challenge for policymakers. Although new policies are being introduced that are aimed at 'spatially rebalancing the economy' – including the creation of a 'Northern Powerhouse' to rival that of London – and even a partial devolution of fiscal powers and policies to cities is underway, we conclude that these will have only a limited impact on what has long been a systemic and deep-seated London-centric bias in Britain's national political economy. We begin our narrative with some economic history.

## 4.2 The Long-standing Nature of Britain's Spatially Unbalanced Economy

According to many economic historians and geographers, during the 19th C it was the towns and cities of northern Britain – in the regions of the North West, North East and Yorkshire-Humberside – that were the country's economic 'powerhouses'. Throughout the long Victorian period, so the argument runs, the 'North' was the most dynamic and prosperous part of the country, centred on the growth of key export-based industries, especially cotton and woollen textiles, shipbuilding, and heavy engineering equipment and manufactured products, associated with the expansion of Empire and Britain's domination of international trade. For example, back in the 1880s, the Lancashire cotton mills ranked as one of wonders of the industrial world. Much of the Victorian industrial economy was located in the northern towns and regions of the country. Unemployment was primarily a problem of the 'South', with its difficulties of agricultural depression and the decline of old craft industries, especially in London.

Immediately following the First World War, however, the story continues, adverse shifts in Britain's world trade position imposed severe shocks on the industrial 'North'. The decline of Empire and the rise of new international competitors, such as the United States, Germany and Japan, combined with a lack of technological modernisation in Britain's old staple industries, restrictive domestic economic policies, and recurrent deep recessions in the 1920s

and early-1930s, resulted in structural decline and the emergence of acutely high unemployment in many northern towns and cities. Meanwhile, the 'new growth industries' of the period, based on light engineering, motor vehicles, and a variety of electrical and mass consumer goods, became clustered in London, the South East and the Midlands (Scott, 2007). Hence, according to these same economic historians, a major reorientation occurred in the geography of the British economy: "in terms of many of the basic measures of social inequality, the geography of the country had to a large extent been reversed" (Massey, 1986, p.31 The old geography of sectoral specialisation and economic organisation, which had favoured the 'North', was being replaced by a new and different pattern of sectoral specialisation and organisation that favoured the 'South'.

Now while many aspects of this historical narrative are correct and well documented, there is also more recent evidence that suggests that some important qualifications and modifications are called for. New analyses by leading economic historians suggests that the argument that the national economy was led by the 'North' up until the inter-war years, when the 'South' suddenly took over that role, may be exaggerated, and that in fact even by the middle of the 19thC London had already pulled well ahead of the North of the country in terms of output and prosperity (Crafts, 2005; Geary and Stark, 2015, 2016) - see Tables 4.1 and 4.2. London was the single largest centre of manufacturing industry in the country, even though for the most part it consisted of small scale factories and workshops. The city also had the nation's largest port and docks.  In addition, and crucial in determining the city's subsequent economic development several decades later, even by the early 19thC London had become firmly established as the nation's trading and financial capital, and indeed one of the world's most important financial centres, having taken over that role from Amsterdam. Up until the middle of the 19thC, the British banking system had been a regional and county-based system, but through merger, acquisition and amalgamation, and successive waves of local bank closures, by the close of the century most of the surviving major banks had become headquartered in London, where the primary institutions of the Bank of England, Lloyds Insurance and the main Stock Exchange had been established more than two centuries earlier.

Similarly, the spatial distribution of middle- and upper-class wealth in 19thC Britain was not concentrated in the industrial towns of the 'North', as is often claimed,[60] but rather was focused on London (Rubenstein, 1977, 1981). The importance

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[60] For example, in commenting on the 'North-South Divide' debate that arose in the mid-1980s, Lord Young the then Secretary of State for Trade and Industry under the Thatcher Government ventured to claim that

**Table 4.1: Regional Shares of UK GDP 1861-1911**

|  | 1861 | 1881 | 1911 |
|---|---|---|---|
| London | 17.1 | 19.9 | 20.1 |
| South East | 11.2 | 10.9 | 13.1 |
| East Anglia | 3.1 | 2.4 | 2.2 |
| South West | 8.1 | 6.1 | 5.9 |
| East Midlands | 4.7 | 4.6 | 5.4 |
| West Midlands | 7.1 | 6.9 | 6.8 |
| Yorks-Humberside | 6,8 | 7.3 | 7.7 |
| North West | 11.1 | 13.3 | 13.7 |
| North | 4.1 | 5.2 | 5.3 |
| Wales | 4.3 | 4.2 | 4.4 |
| Scotland | 10.3 | 10.4 | 9.5 |
| Ireland | 12.0 | 9.3 | 5.8 |
| UK | 100.0 | 100.0 | 100.0 |

**Source:** Geary and Stark (2015)

**Note:** Because of the lack of consistent data for Northern Ireland, Geary and Stark use Ireland to define the UK.

**Table 4.2: Spatial Imbalance in the British Economy, 1901-1931 Regional GDP per Capita Relative to the Average (GB=100). Geary-Stark Estimates**

| GB=100 | 1901 | 1911 | 1921 | 1931 |
|---|---|---|---|---|
| London | 134.2 | 133.8 | 137.4 | 144.3 |
| South East | 107.0 | 104.1 | 101.2 | 114.0 |
| East Anglia | 83.7 | 83.5 | 83.5 | 82.7 |
| South West | 91.7 | 92.4 | 91.3 | 92.3 |
| East Midlands | 92.4 | 97.2 | 88.6 | 86.6 |
| West Midlands | 86.0 | 90.5 | 82.1 | 95.7 |
| Yorks-Humberside | 88.3 | 90.1 | 93.6 | 86.4 |
| North West | 103.7 | 104.8 | 109.3 | 88.6 |
| North | 85.8 | 83.0 | 83.1 | 81.1 |
| Wales | 80.3 | 82.1 | 76.5 | 81.1 |
| Scotland | 90.5 | 86.9 | 92.3 | 94.3 |

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"Until 70 years ago the North was always the richest part of the country…that is where all the great country houses are because that's where the wealth was. Now some of it is in the South. It's our turn, that's all" (Quoted in *Business*, 1987, p.17). This was a highly simplistic and not altogether accurate reading of the country's historical economic geography, and a dismissive interpretation of the widening gap between the prosperous South and lagging North in the 1980s as some sort of 'natural justice of history'.

| Coefficient Variation, (%) | 16.9 | 16.6 | 18.5 | 22.6 |
|---|---|---|---|---|

of northern trading cities such as Liverpool, Manchester, Leeds and Glasgow notwithstanding, more than 50 percent of middle-class income in Victorian times was accounted for by London. This was due not just to its larger middle class population, but also to its higher middle-class per capita income.

This brief excursion into economic history is not intended to refute the undoubted industrial success of much of northern Britain in the 19th C, and the crucial role that many northern towns and cities - such as Manchester, Liverpool, Leeds, Sheffield, Newcastle, Hull and Glasgow - played in the Industrial Revolution, the Victorian economy and the development of Empire that took place in that era. They were unquestionably successful, and were certainly industrial powerhouses. However, as the new analyses by Crafts (2005) and Geary and Stark (2015, 2016) show, while the North West was certainly the second or third wealthiest region in the country, and while a distinct shift towards London and the South East definitely occurred in the inter-war period, the fact of the matter is that London was already in a league of its own by the middle of the 19th C. Doubt can thus be cast on the view that it was only in the interwar years that economic advantage 'suddenly shifted' to the 'South'. London and the South East were established as the most prosperous areas of Britain well before the re-orientation of the national economy that took place in the 1920s and 1930s. It was precisely because these regions were already positioned as the prosperous core - in which the nation's major financial, political and economic institutions were already well established - that they attracted the bulk of the new industries that emerged in the inter-war period. In a certain sense, the 'greater London' region – London and neighbouring parts of the South East – in effect 'reinvented' itself in those years, in as much that this part of Britain led the 'new economy' just as the 'North' experienced the structural upheavals and decline of the 'old economy' inherited from the previous century.

What is clear is that the problem of 'spatial imbalance' in the British economy that has become the focus of political concern and rhetoric since 2010 is in fact hardly new. It has roots that go back well into the 19thC, if not earlier. Thus, while our leading politicians have been correct to recognise that the British economy is too spatially unbalanced, with growth too dependent on and concentrated in London and much of the surrounding South East, and although the

problem intensified during the long phase of uninterrupted growth between 1992-2007, the spatially unbalanced nature of the national economy is of much longer historical standing. This suggests that in explaining the current pattern of spatial economic imbalance it is not sufficient to appeal to contemporary factors and causes, but also necessary to understand how the past has shaped the present: there is a strong degree of path dependence in regional economic development (see Martin and Sunley, 2006). Furthermore, and a key element in making for such path dependence, past structures of spatial economic organization can in effect become institutionalized and reproduced by the national political economy – the geographical configuration of national economic and political power and policy.   This is a large part of the problem in the UK.  We return to this issue later in the chapter.  But first, we look at the economic performance of individual major northern English cities over the past 40 years to get a sense of how they have fared relative to the rest of the country over this period, and hence the scale of the challenge of reviving the 'Northern Power House' as a route to spatially rebalancing the British economy.

## 4.3     The Recent Economic Performance of Major Northern Powerhouse Cities

As Jane Jacobs (1984) famously argued, it is not possible to understand a 'national' economy without reference to the performance of the cities and city-regions of which it is composed. It is in cities and city regions that the bulk of a nation's wealth is created, its exports are produced, its jobs are located, and its incomes are spent.  It is perhaps somewhat ironic, therefore, that while national economic policy thinking has come to recognise the crucial role played by cities in shaping the nation's economic fortunes and progress, UK governments have never collected regular or consistent data on the economies or economic performance of our cities. Our understanding of how economic growth has varied across urban Britain is surprisingly poor: we know relatively little about the productivity of our cities, their trade balances, or the innovativeness of their economies.  There is even no general agreement about how our cites should be meaningfully defined geographically.

Constructing reliable and meaningful economic data series for British cities has been part of a major research programme with which we are involved.  This is concerned, *inter alia*, with compiling consistent time series on some key dimensions of city economic performance – particularly employment, output and productivity - back to the 1970s. The complete data set covers some 82 sectors of activity for 85 cities annually over the period 1971-2014. The cities are defined in terms of travel-to-work areas (using 2011 geographical definitions), and hence have a functional character. These are the most complete data series of their kind, and

enable us to provide some interesting insight into the comparative economic performance of individual cities and how that performance has varied over time.[61]

A useful way of exploring this issue is to compute the cumulative difference between the annual growth rate (for example, of employment and output) in a given city and the corresponding rate for the country as a whole.[62] This allows comparison of cities one against another by reference to their performance relative to a national 'yardstick'. The computed cumulative differential growth series for employment and output for the major northern cores cities of Manchester, Liverpool, Leeds, Sheffield and Newcastle - the main cities that make up the 'northern powerhouse' area - together with London for comparison, are shown in Figures 4.1 and 4.2. A number of key features are evident.

**Figure 4.1: Annual Growth of Employment in Northern Core Cities and London, 1971-2014: Cumulative Deviation from Great Britain Average**
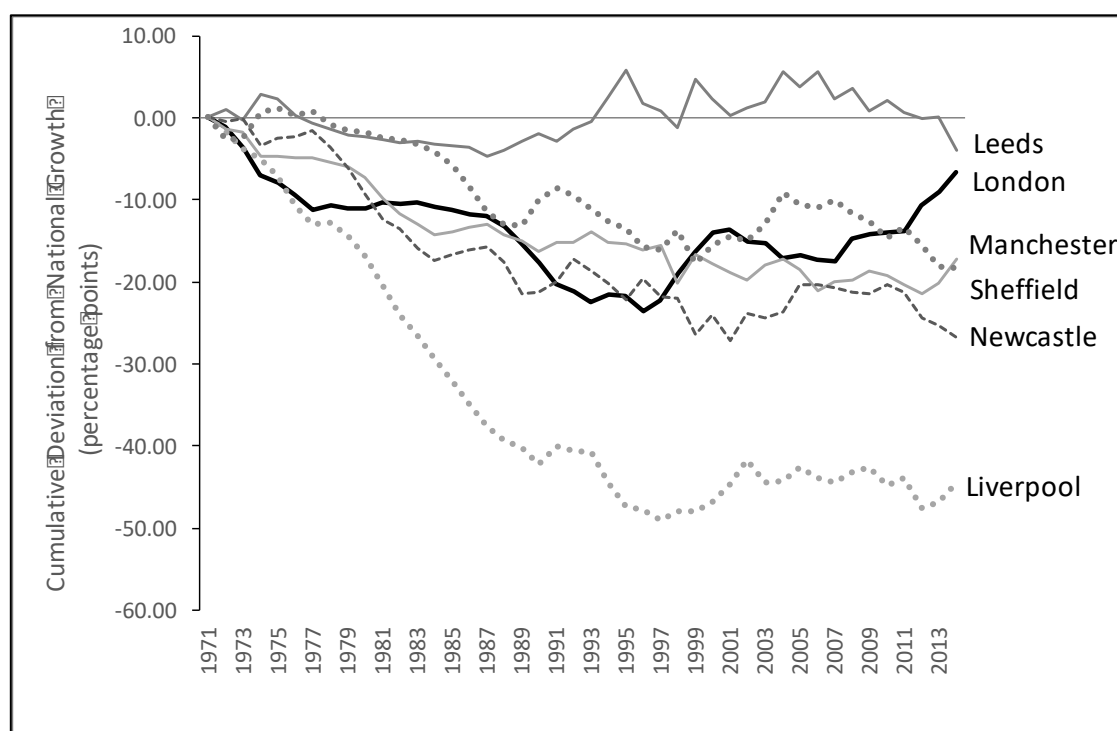


**Source of data:** Authors' own data. See also Martin et al (2016)

**Notes:** Total employment. Cities defined in terms of 2001 travel-to-work areas.

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[61] Details of this ESRC-funded research programme, entitled *Structural Transformation, Adaptability and City Economic Evolutions* (Grant ES/N006135/1) can be found at http://www.cityevolutions.org.uk

[62] Technically, this is measured as $Cumy_{iT} = \sum_{t=1}^{T}(y_{it} - y_{Nt})$, where $y_{it}$ is the percentage change in, say, employment or output in year t, and $y_{Nt}$ is the corresponding percentage change in Great Britain as a whole, and $Cumy_{iT}$ is the cumulative sum of the growth differential for city $i$ from time $t$ up to time $T$. This simple technique was used to interesting effect by Blanchard and Katz (1992) to chart the disparate economic evolution of US states in the post-war period.

First, it is clear that for both employment and output growth, all of the northern English core cities except Leeds have lagged well behind the national economy as a whole since the beginning of the 1970s, as indicated by their negative growth gaps. This was particularly the case up to the mid-1990s, since when they have tracked national economic growth more closely but have failed to recover any of their cumulative lost ground to any significant degree. As a result, by 2014, cumulative growth in Manchester, Sheffield and Newcastle had fallen behind the Great Britain average by some 20 percentage points.  Second, the plight of Liverpool is particularly striking: its cumulative growth gaps are well over 40 percentage points on both employment and output. Third, Leeds emerges as the only northern English core city to have more or less matched the growth record of the national economy as a whole over the forty-year period. In terms of output growth, in fact, from the late-1980s up to the recent recession its growth outstripped that nationally, and kept pace with London.  And London's comparative performance is itself of key interest. Up to the early-1990s it too lagged behind national growth, much more so in the case of employment than for output.  However, since then it has undergone something of a major 'turnaround', experiencing much faster growth than the national economy, and the northern cities, except Leeds in output terms, so that by 2014 it had almost eliminated its cumulative growth gap in employment, and turned its cumulative negative growth gap in output into a positive growth lead.  What is also striking is that output growth recovered far more strongly in London after the 2008-2010 recession than in the northern cities, including Leeds, which like its other northern counterparts, has been much slower to recover.

For any city, the comparative growth rates of output and employment define a corresponding rate of growth in labour productivity.[63] Considerable concern has been expressed by the UK Government at the poor productivity performance of the national economy (HM Treasury, 2016). The annual rate of productivity growth has in fact been on a downward trend since the late-1970s, in common with a number of other major advanced economies (Carmody, 2013) There is debate over the causes of this slowdown: whether it is due to the structural shift amongst the advanced economies from high-productivity growth manufacturing to lower-productivity growth services; to a failure of advances in technology (especially computing) to show up in productivity; to a slowdown in transformative innovation itself; to a slowdown in

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[63] Estimating total factor productivity (TFP) by city is not possible because we do not have data on capital stock or investment over time at this spatial scale.

investment; to a lack of a skilled workforce; or to measurement problems (the argument that productivity in some service activities is possibly under-estimated).

**Figure 4.2: Annual Growth of Gross Value Added in Northern Core Cities and London, 1971-2014: Cumulative Deviation from Great Britain Average**
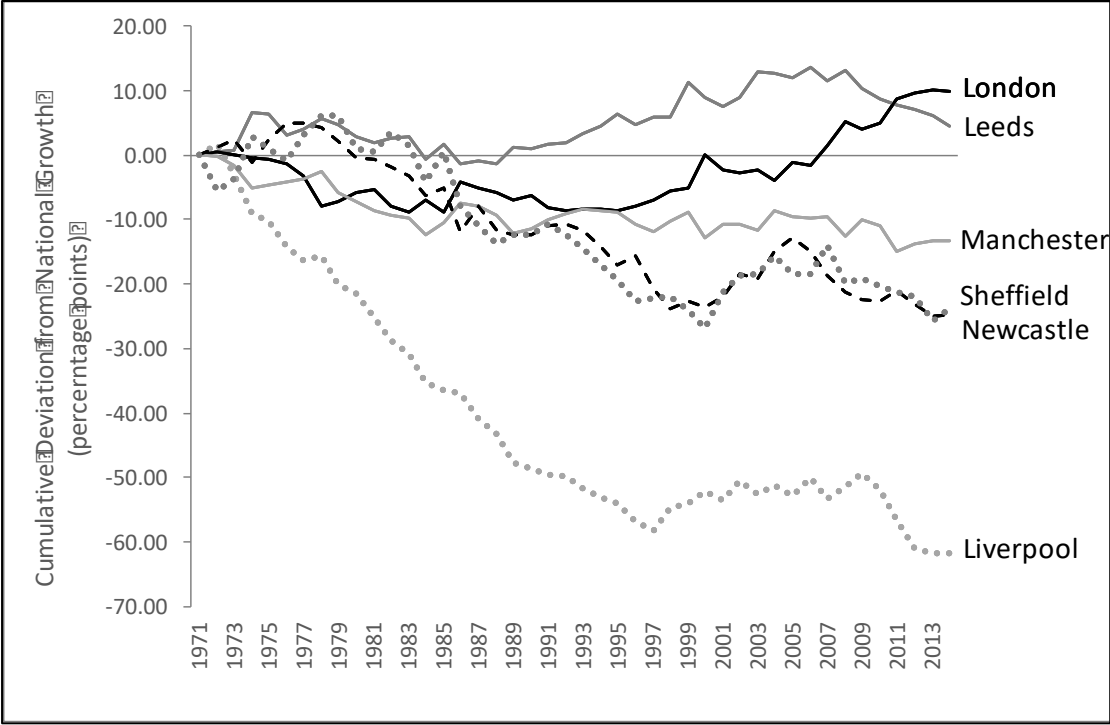


**Figure 4.3: Labour Productivity across 85 British Cities, 1971 and 2014**

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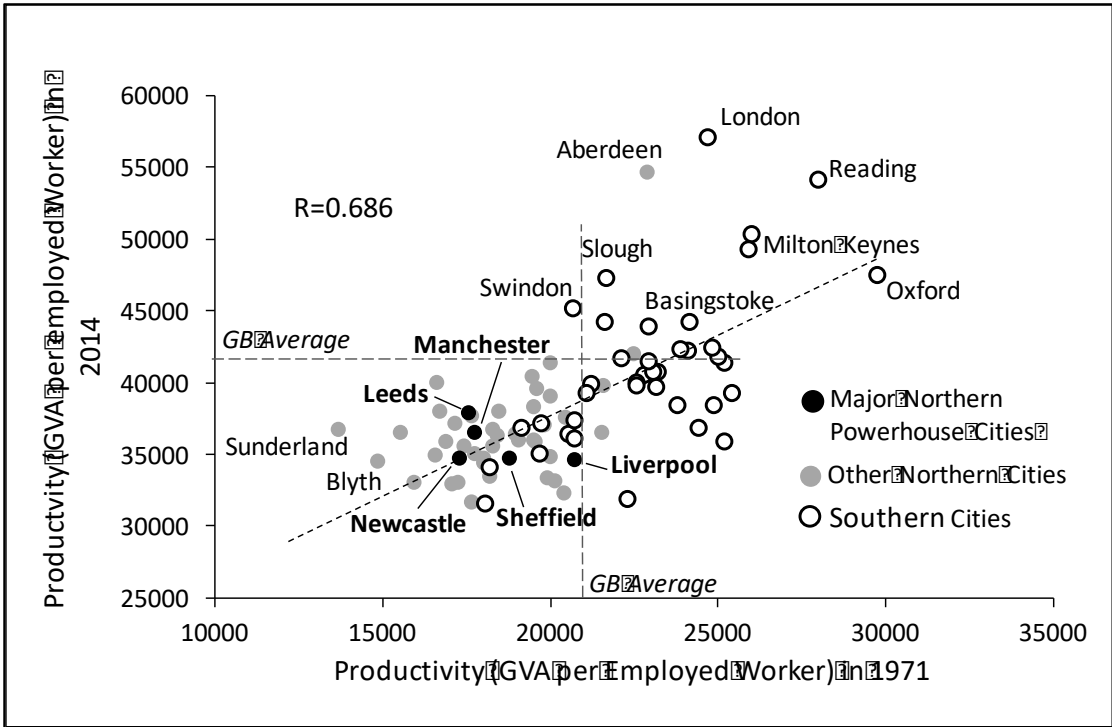
Whichever of these possible causes has been operative, an additional dimension to the productivity problem in the UK is the low productivity of many northern cities: most of these have labour productivity levels below the national average, while most southern cities have levels above the average; and the disparity has a high degree of persistence over time (see Figure 4.3).[64] Moreover the labor productivity in the major 'Northern Powerhouse' cities has remained consistently below the national average over the past four decades or more, while in London labour productivity has steadily pulled ahead of that for the national economy as a whole, so that, for example, there is now a 50 percentage point gap between London and Manchester (see Figure 4.4).

**Figure 4.4: Relative Labour Productivity (GVA per Employed Worker) in Northern Core Cities and London, 1971-2014, (Great Britain =100)**
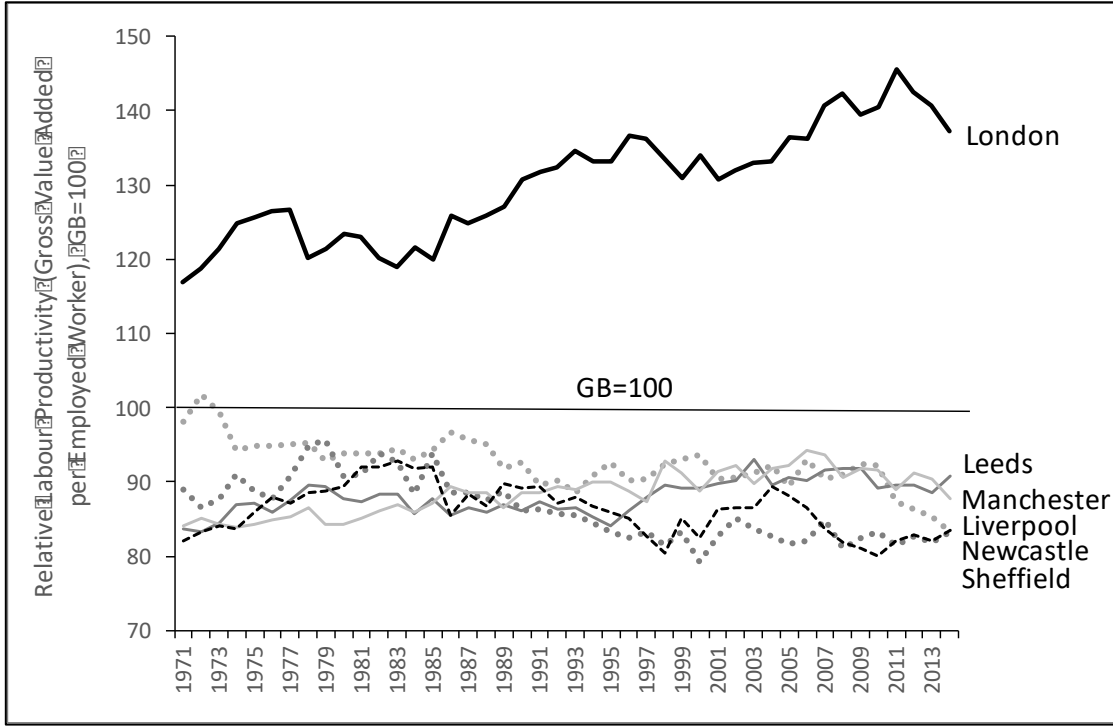


**Source of data:** Authors' own data. See also Martin et al (2017)

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[64] Southern are cities defined as those in the following regions: London, South East, East of England, South West and East Midlands. Northern cities are defined as those in the West Midlands, Yorkshire-Humberside, North East, North East, Scotland and Wales. Great Britain averages shown by intersecting pecked lines.

## 4.4    The Collapse of an Export Base

One of the key arguments in Jane Jacob's discussion of the importance of cities in the national economy is the role cities play in generating exports. This idea links closely of course with export-base theories of economic growth.  In Kaldor's (1981) growth model, for example, other things being equal the more competitive (in terms of productivity) an economy's export sectors the greater will be the external demand for those exports, the faster will be the growth of output in those sectors (and via multiplier effects, the economy  more generally), which growth in its turn will stimulate investment, innovation and labour productivity, which will boost competitiveness still further, which then stimulates additional demand for that economy's exports, and so on, in a circular and cumulative manner (see also Setterfield, 1998; Martin, 2017). Kaldor himself used this framework to explain regional differences in economic growth. A city's export or tradable base may thus be expected to play a crucial role in determining its growth performance.

Building on these ideas, Rowthorn (2010) argues that, in the absence of actual regional trade data, the 'export base' is a useful proxy because it "consists of all those activities which bring income into the region by providing a good or service to the outside world, or provide locals with a good or service which they would otherwise have to import." He therefore suggested that the 'export base' of a region could be approximated by the following sectors: agriculture, manufacturing, extractive industries, finance and business services, and hotels and restaurants.  He goes on to argue that the much-debated 'North-South Divide' in the UK's economic landscape can be attributed to the fact that the North has seen a particularly severe decline in its manufacturing export sector while the southern regions, particularly the Greater South East, have specialised more in high-end tradable services. In relative terms, he estimates that the cumulative decline of employment in the northern private export base since 1971 has been around 30 percent.

Using the detailed sectoral employment and output series referred to in the previous section, Martin et al (2016) employ two definitions of a region's 'export intensity', based on those sectors that nationally export at least 50 percent and 25 percent of their output overseas. Using the latter measure to define the export base of the three main regions making up the 'Northern Powerhouse', Figure 4.5 confirms Rowthorn's general finding: in both Yorkshire-Humberside and the North West export-base employment has shrunk by around 25-30 percent since the beginning of the 1970s, although in the North East region the contraction has been almost 50 percent.     A significant proportion of this decline occurred in the recessions of the early-1980s and early-1990s. In all three of the Northern Powerhouse regions the erosion in export base employment was particularly rapid during the 1970s and

first-half of the1980s, precisely when these regions experienced pronounced deindustrialization. These trends stand in stark contrast to that for London. While London's export base employment also shrunk up until the early-1990s, it then underwent a major turnaround and increased sharply thereafter so that by 2014 it had more than made up for the previous decline. If we look at the major cities within the Northern Powerhouse regions, only Leeds show a similar pattern: after witnessing a major fall in export base employment during the 1970s and 1980s, it too then experienced something of a recovery, although since the onset of the financial crisis in 2007 it has failed to keep up with the capital (Figure 4.6).

**Figure 4.5: Export Base Employment in the Northern Powerhouse Regions and London, 1971-2014 (Indexed 1971=100)**
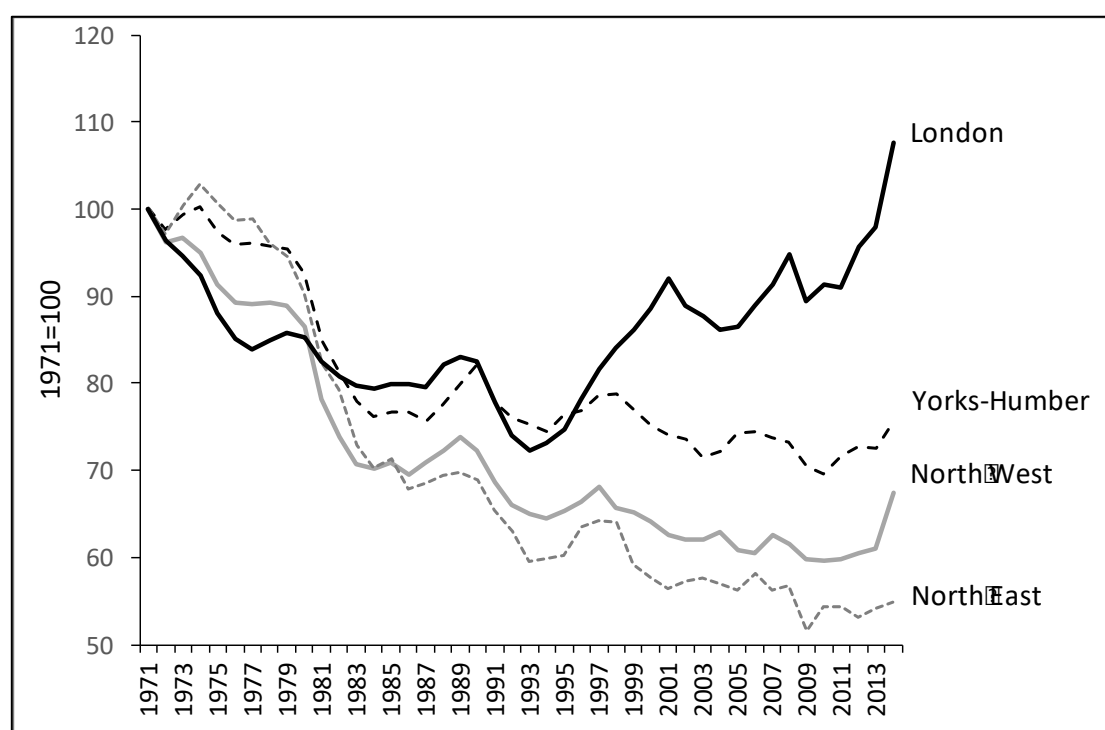


**Source of data:** Authors' own data

A closer look at these trends by broad sector (Table 4.3) indicates that in the 1971-1991 subperiod, in London and all of the major Northern Powerhouse cities the dramatic decline in employment in manufacturing export sectors far outweighed the increase in employment in exporting knowledge-intensive business services (KIBS), which include finance and related activities. While in all cases the scale of the absolute decline of employment in exporting manufacturing activities lessened during the 1991-2014 subperiod, only in three cities – London, Leeds and Manchester – was this loss offset by the increase in employment in exporting KIBS. Taking the period 1971-2014 as a whole, however, only in London had the

growth in the KIBS export base more than compensated for the decline of the manufacturing export base in terms of employment.

**Figure 4.6: Export Base Employment in the Northern Core Cities and London, 1971-2014 (Indexed 1971=100)**
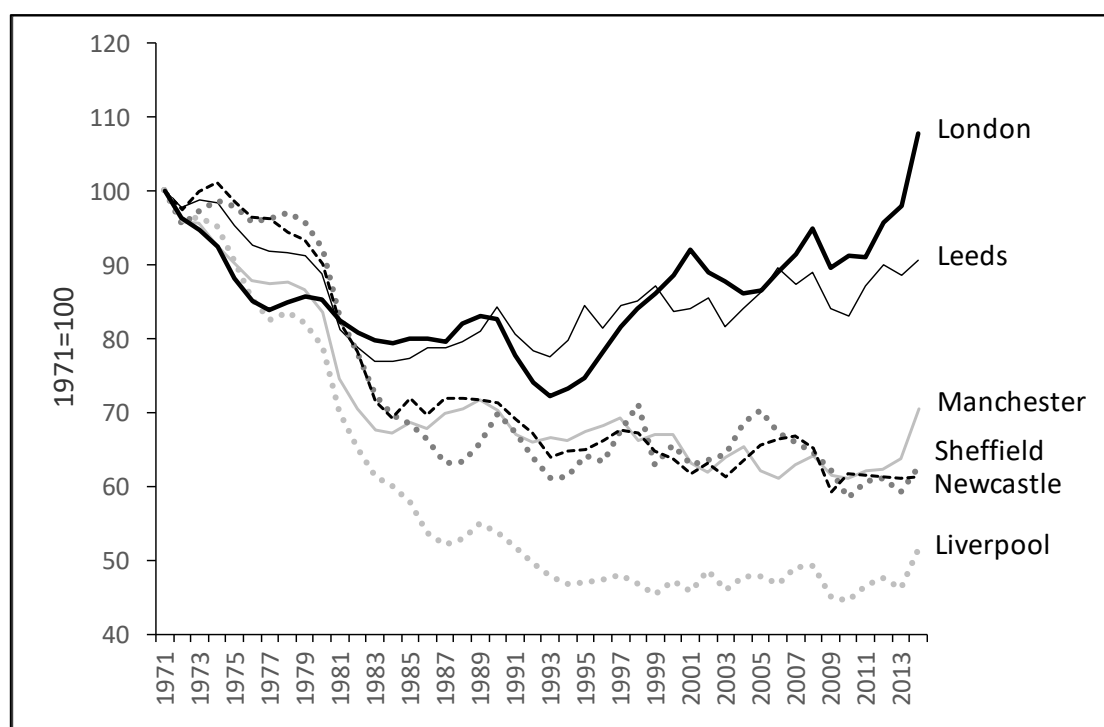


**Source of data:** Authors' own data

**Table 4.3: Export Base Employment by Broad Sector, Major Powerhouse Cities and London, 1971-2014**

|  | 1971-91 | 1991-2014 | 1971-2014 |
|---|---|---|---|
| **London** |  |  |  |
| Manufacturing | -607856 | -188818 | -796674 |
| KIBS | 208492 | 738584 | 947076 |
| Other Sectors | 11031 | 130831 | 141862 |
| Total | -388333 | 680597 | 292264 |
|  |  |  |  |
| **Leeds** |  |  |  |
| Manufacturing | -60085 | -36921 | -97006 |
| KIBS | 27899 | 50257 | 78156 |

| | | | |
|---|---:|---:|---:|
| Other Sectors | -759 | 5559 | 4800 |
| Total | -32945 | 18895 | -14050 |
| | | | |
| **Liverpool** | | | |
| Manufacturing | -117211 | -24964 | -142175 |
| KIBS | 8808 | 21495 | 30303 |
| Other Sectors | -4772 | 5570 | 798 |
| Total | -113175 | 2101 | -111074 |
| | | | |
| **Manchester** | | | |
| Manufacturing | -246875 | -107640 | -354515 |
| KIBS | 56783 | 121909 | 178692 |
| Other Sectors | -8765 | 11469 | 2704 |
| Total | -198857 | 25738 | -173119 |
| | | | |
| **Newcastle** | | | |
| Manufacturing | -70741 | -36438 | -107179 |
| KIBS | 15496 | 20477 | 35973 |
| Other Sectors | -7341 | 2433 | -4908 |
| Total | -62586 | -13528 | -76114 |
| | | | |
| **Sheffield** | | | |
| Manufacturing | -73510 | -29254 | -102764 |
| KIBS | 17260 | 18887 | 36147 |
| Other Sectors | -997 | 3689 | 2692 |
| Total | -57247 | -6678 | -63925 |

**Source of data:** Authors' own data

The problem with using these export base employment estimates is that they assume that a given sector behaves in the same way in the regions and cities as it does nationally. Depending on the sector, this is obviously a questionable assumption. For example, the finance sector in Liverpool or Leeds is assumed to have the same export propensity as that of London, and that all that differs is the relative importance (in employment share terms) of financial services in each city's economy. Thus, while the results are interesting, they must be taken in the context of the assumptions on which they are based. As far as actual regional

trade is concerned, there are some limited estimates produced by HMRC.[65]  Unfortunately, these data only refer to manufactured goods: data for services are patchy and not reliable. Nevertheless, they provide some insight into certain aspects of the trading position of the northern regions relative to the rest of the UK.

The results for the three 'Northern Powerhouse' regions as a whole show that the growth in tradable goods exports has outstripped that of the rest of the UK over the 1996-2015 period (Figure 4.7), which on the surface would seem to give a different picture from that given by the relative growth trends of total output in the major Northern Powerhouse cities (Figure 4.2). However, this picture relates only to goods exports, and excludes trade in high-value services (including finance), in which London has a particular specialization. Further, it is not just exports that are important. What also matters in the long run is each region's or city's trade balance (Rowthorn, 2010). The degree to which a region or city imports goods from overseas contributes to the national trade balance, as well to its own long-run performance.  It is well known that the UK as a whole has been running a trade deficit in manufactured goods for some time, and that it has worsened over recent years. The HMRC data contain estimates of the manufactured goods trade balance by region, and these show, perhaps not surprisingly, that in 2015 half of the nation's trade deficit in goods was accounted for by London (Table 4.4).   However, while the Northern Powerhouse regions' balance of trade in manufactured goods was in surplus in the mid-1990s, this too has turned into a deficit over the past two decades, with only the North East region still showing a small excess of exports over imports.  This of course means that the UK and its regions now depend crucially on exportable services to fill the trade gap.

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[65] It should also be borne in mind that the HMRC trade figures are in current prices, and thus reflect both movements in the volume of trade as well as their prices.

**Figure 4.7: International Exports of Manufactured Goods from the Northern Powerhouse Regions and London, 1995-2015 (Nominal Prices, 1996=100)**
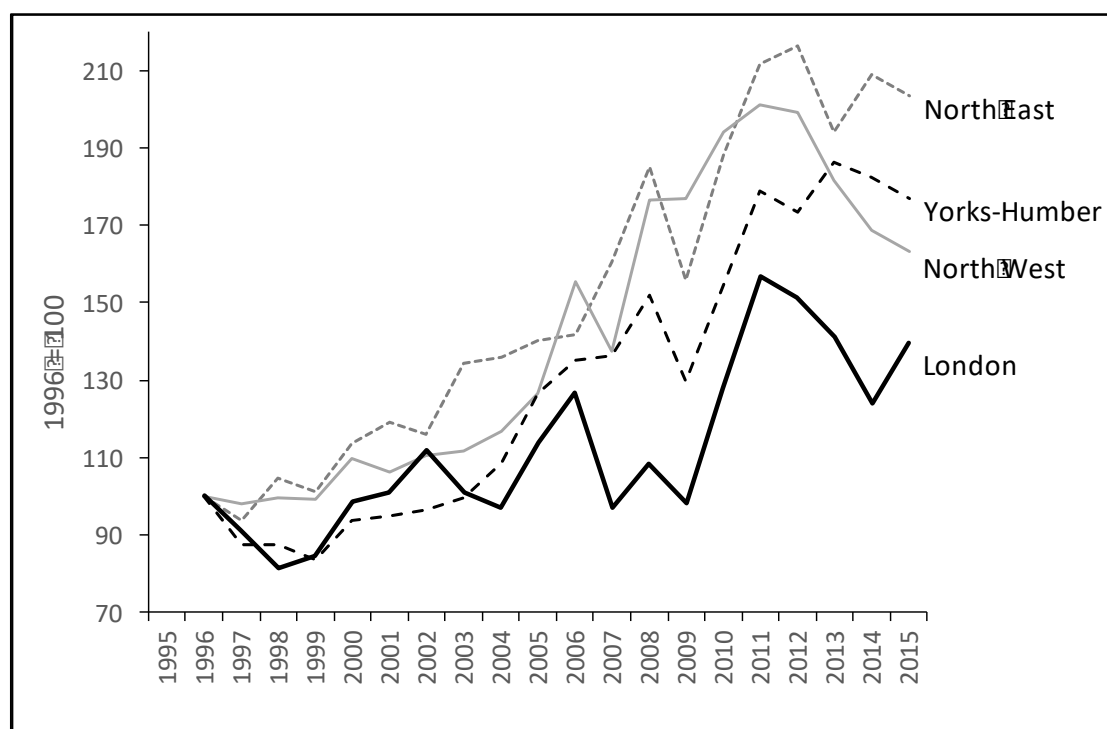


**Source of data:** HMRC data on regional (NUTS1) goods exports and imports

**Table 4.4: Balance of Trade in Manufactured Goods, Northern Powerhouse Regions, London and UK, 1996-2015 (£m)**

|                   | 1996   | 2000   | 2005   | 2010   | 2015    |
|-------------------|--------|--------|--------|--------|---------|
| North East        | 2654   | 2234   | 2109   | 1549   | 761     |
| North West        | 2945   | 2099   | -313   | 4369   | -790    |
| Yorks-Humberside  | 1368   | -1908  | -966   | -2488  | -6366   |
| Total NPH regions | 6968   | 2425   | 831    | 3430   | -6394   |
| London            | -14900 | -21228 | -16959 | -34949 | -49816  |
| UK                | -2041  | -31034 | -60565 | -97556 | -100086 |

**Source of data:** HMRC data on regional (NUTS1) goods exports and imports

According to TheCityUK (2017), London's financial sector, together with related professional services (legal services, accountancy and management consultancy) generated an estimated trade surplus of some £71 billion in 2014, which more than offset its goods trade deficit of £40 billion for that year.   Unfortunately, there are no comparable data for the other UK regions, let alone other cities, so we do not know the contribution of tradable services to the trade balance of the Northern Powerhouse regions or cities. However, the Centre for Cities (2017) has recently estimated the value of exports by tradable services per job by city

106

(Table 4.5), and this suggests  - not unexpectedly – that the export  value per job of London's tradable services sector far outstrips that for the major northern cities.[66]  These estimates also suggest that, with the exception of Manchester, despite the deindustrialisation they have suffered over recent decades, the major Northern Power house cities still export more manufactured goods than they do services.  In this respect, their economies differ markedly from that of London.

**Table 4.5: Exports per Job in the Northern Core Cities and London, 2014**

|  | Total Exports (£) | Goods Exports (£) | Service Exports  (£) |
|---|---|---|---|
| Leeds | 8,260 | 4,470 | 3,790 |
| Liverpool | 12,920 | 6,950 | 5,970 |
| Manchester | 11,470 | 5,370 | 6,100 |
| Newcastle | 8,900 | 5,680 | 3,210 |
| Sheffield | 8,640 | 5,810 | 2,820 |
| London | 23,470 | 5,770 | 17,710 |
| UK average | 15,690 | 8,240 | 7,450 |

Source: Centre for Cities (2017) and Centre for Cities Data Tool

Note: Total city employment is used as the denominator for both Goods and Services

Exports, so that the sum of the two equals the value of total exports per job.

A number of key points emerge from this brief analysis of the economic performance of the major Northern Powerhouse cities over the past four decades. In what has been a period of historic change and transformation of the UK economy – most notably the shift from an industrial to a service-based, globalized, and financialised 'post-industrial' mode of growth – the Northern Powerhouse cities have fallen increasingly behind London in terms of employment and output growth, and productivity.  Deindustrialisation has seriously eroded their manufacturing export base, but unlike London, they have yet to rebuild that base around tradable, high-value service activities on a scale to compensate for the loss of manufacturing capacity. Another implication is that while London's labour productivity has pulled well ahead

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[66] The definition of cities used by the Centre for Cities is the Primary Urban Area, essentially the contiguous Local Authority Districts which contain the built-up area of a city. These differ from the Travel-to-Work Area definitions used in our analyses. The Centre for Cities estimate the value of exports per service job by apportioning national service export data to cities on the assumption that each city's service sector has the same export orientation as it does nationally. The estimates should thus be interpreted with the same caveat that applies to our estimates of city export intensity used above.

of the national average since the mid-1980s, that in the major northern cities has remained below the national figure, with the result that the 'productivity gap' between London and the northern cites has widened.  Overall, the divide between the more prosperous London and the South East regions on the one hand, and the regions making up the 'Northern Powerhouse'– the North West, Yorkshire Humberside, and the North East – on the other, that, as we have seen, existed back in the 19[th]C, is as pronounced as ever.  (Table 4.6). Indeed, the lead of London is arguably greater now than it was more than a century ago (cf. Table 4.2).

**Table 4.6:  Regional Gross Value Added per capita, 1971-2014, indexed to UK=100**

| UK=100 | 1971 | 1981 | 1991 | 2001 | 2007 | 2014 |
|---|---|---|---|---|---|---|
| London | 153.3 | 163.7 | 163.0 | 165.6 | 169.3 | 174.3 |
| South East | 105.7 | 104.3 | 107.1 | 110.8 | 106.0 | 109.4 |
| East of England | 103.8 | 100.1 | 98.1 | 97.4 | 95.3 | 92.9 |
| South West | 90.9 | 94.1 | 92.0 | 92.3 | 90.6 | 89.3 |
| East Midlands | 80.7 | 85.0 | 84.7 | 82.9 | 83.4 | 82.3 |
| West Midlands | 96.4 | 89.8 | 90.0 | 87.4 | 84.4 | 83.4 |
| Yorkshire-Humberside | 80.7 | 85.5 | 84.7 | 81.4 | 85.8 | 80.2 |
| North West | 93.9 | 85.8 | 85.0 | 86.1 | 87.7 | 85.3 |
| North East | 75.3 | 79.2 | 75.8 | 72.0 | 75.5 | 73.5 |
| Wales | 78.5 | 78.2 | 75.3 | 71.5 | 73.7 | 72.0 |
| Scotland | 92.2 | 97.8 | 103.1 | 99.2 | 95.9 | 94.6 |
| Northern Ireland | 80.1 | 84.6 | 77.8 | 80.9 | 82.8 | 76.3 |
| *CV* | *21.0* | *22.9* | *23.8* | *25.2* | *23.3* | *27.7* |

**Source of data:** ONS and Cambridge Econometrics

**Notes:**  Gross value added per capita in 2011 prices.  Workplace (production-based) estimates.  Converted to per capita values by dividing by resident population not resident workforce. Government Office Regions. CV is the Coefficient of Variation, a measure of the regional 'spread' (disparity) in per capita relativities: the larger the value the more regionally uneven or unbalanced is the economy.

### 4.5   Why has Spatial Economic Imbalance been so Persistent?

The fact that the pattern and scale of spatial economic disparity across the UK are not much different today than they were more a century ago raises some fundamental questions about the operation of the economy, as well as for policy.  After all, according to conventional economic theory, large spatial disparities in economic performance and prosperity should not persist over long periods of time. Market forces - notably the free movement of labour and capital – should automatically operate in a self-correcting way to reduce such gaps.  To be sure, there may be short-run frictions to such adjustments, but in the medium to long term

term we should see a convergence across regions and cities in per capita incomes, productivity and the like. The lack of any significant convergence can be given various interpretations.

The first, often advanced by advocates of conventional economic theory, is that there must be major impediments and barriers that are preventing market forces from operating freely. Such 'market failure', they go on to argue, is the only justifiable basis for policy intervention – especially on the 'supply side' of the economy.  Yet the UK has had some form of regional and urban policy directed at promoting faster growth and levels of prosperity in economically lagging areas in the country for almost 90 years, since the late-1920s.  A second line of argument is thus that these policies have failed. Some are of the view, for example, that the resources devoted to regional and other spatial policy measures has never been adequate to the scale of the task. Others levy the charge that regional policy has never been sufficiently strategic or developmental in its goals.  A further interpretation, again one that tends to be preferred by the followers of conventional economic theory, is that the lack of any substantial and lasting positive impact confirms that regional and urban policy can never achieve much since it is trying to work 'against the forces of the market', which in the UK 'naturally' favour the concentration of growth in the already prosperous London and the South East (for an extreme version of this argument, see Leunig and Swaffield, 2008). In general, these spatial economists are of the view that there is no case for spatially targeted or selective policies, only general (nation-wide) policies aimed at improving the movement of skilled labour (and capital) to where the markets opportunities and rewards are greatest, in combination with the deregulation of land and housing markets (by dismantling planning systems) in and around particular cities – especially London -  so that so that further growth can be more easily accommodated there. This line of reasoning reached its most extreme in the Policy Exchange argument that:

There is no realistic prospect that our [Northern] regeneration towns and cities can converge
with London and the South East. There is, however, a very real prospect of encouraging
significant numbers of people to move from those towns to London and the South East. …
The implications of economic geography for the South and particularly the South East are
clear. Britain will be unambiguously richer if we allow more people to live in London and its
hinterland (Leunig and Swaffied, 2007).

A third and quite different conceptual account of the persistent nature of spatial economic imbalance is that market forces, even if allowed free rein, do not tend of themselves to reduce or eliminate spatial imbalance in economic growth and prosperity, but rather tend to perpetuate or even intensify such imbalance.  The main process at work in this case is that

of the increasing returns associated with spatial agglomeration of economic activity. Spatial agglomeration is seen as conferring various external economies on firms, including 'home market size' effects, the attraction of skilled workers, increased knowledge flows and interactions between firms, backward and forward linkages between firms, and so on, all of which are held to increase productivity, innovation, and higher wages. Correspondingly, spatial economic imbalance is not necessarily seen as problematic or inefficient, witness the HM Treasury statement that

Theory and evidence suggests that allowing regional concentration of economic activity will increase national growth. As long as economies of scale, knowledge spillovers and a local pool of skilled labour result in productivity gains that outweigh congestion costs, the economy will benefit from agglomeration… policies that aim to spread growth amongst regions are running counter to the natural growth process and are difficult to justify on efficiency grounds (HM Treasury, 2007).

And the same view seemed to lurk in the Government Paper on *Understanding Local Growth:*

This new understanding [the New Economic Geography] of how economics works across space also alters the expected equilibrium. As both people and firms move to areas of high productivity there will be no simple convergence of productivity levels. Even with fully functioning markets, there can be an uneven distribution of economic performance, and persistent differences that are not necessarily due to market failure (Department of Business, innovation and Skills, 2010, p.23)

The theory being referred to here - Krugman-style New Economic Geography - has on various occasions been used to promote the idea of an 'equity-efficiency trade-off', as in the quote above, whereby the pursuit of a more spatially balanced economy is believed to be at the cost of national economic efficiency (Martin, 2008; 2015). The empirical evidence for such a 'trade-off', however, is far from equivocal. While some studies claim to find a negative relationship between national growth and the degree of spatial agglomeration or regional inequality (Dall'erba and Hewings, 2003; P. Martin 2005; Crozet and Koening, 2007), others do not (Sbergami, 2002; Bosker, 2007; Martin, 2008). To add to this ambiguity, Krugman himself (2009) has recently voiced some doubt as to whether increasing returns to spatial agglomeration as important as they once were:

There's good reason to believe that the world economy has, over time, actually become less characterised by the kinds of increasing returns effects emphasized by new trade theory and new economic geography. In the case of geography, in fact, the peak of increasing returns occurred long before the theorists arrived on the scene (2009, p. 569).

So even one of its former leading exponents seems less convinced that spatial agglomeration necessarily promotes faster growth. Nevertheless, the spatial agglomeration argument has proved a powerful discourse. It underpins the contention that one of the reasons that Britain's northern cities – especially the major cities making up the 'Northern Powerhouse' – have lagged in economic performance is that they are too small, with the consequence that they do not benefit from the agglomeration economies found in large cities like London. Thus, according to Overman and Rice (2008) while medium-sized cities in England are, roughly speaking, about the size that Zipf's law would predict given the size of London, the largest city, the major second-tier cities (which include 'core' cities like Manchester, Birmingham, Sheffield and Newcastle) all lie below the 'Zipf line' and hence are smaller than would be predicted.[67] They go on to state that "this feature is not a consequence of London being too 'large'", but rather that "second tier cities may be too small" (op cit, p.30). Such an argument would suggest that increasing the size of the core cities, and especially those of the 'Northern Powerhouse', would boost the advantages of agglomeration and hence their economic performance. However, as other authors have cautioned, Zipf's law should not be expected to hold in countries that have a capital that is also the political centre, as is the case with London. As Krugman (1996) himself emphasises in his discussion of Zipf's law, such political centres "are different creatures from the rest of the urban system". A similar point is made by Gabaix (1999) who argues that "In most countries Zipf plots usually present an outlier, the capital, which has a bigger size than Zipf's law would warrant. There is nothing surprising there because the capital is indeed a peculiar object, driven by unique political forces." (op cit, p.756, emphasis added).[68]

The argument that northern cities are 'undersized' is thus open to debate; improving their performance is a much more complex issue than simply increasing their size. The fact is that some of the fastest rates of productivity growth across Britain's urban system over the past four decades have been recorded among smaller and medium-sized cities, especially those in southern England (Martin et al, 2016): there is no simple relationship between city size and growth, and the lack of any such relationship appears to be a common feature across most

[67] Zipf's law refers to the relationship between city size and city rank. If cities are ranked by population size and the slope of a plot of the log of city rank (by size) against the log of size is -1, this is referred to as Zipf's law.

[68] In an important study of city size distributions in 75 countries, Soo (2005) found that departures of the rank-versus size relationship from a slope of -1 are explained by political factors rather than by economic geography factors like economies of scale or agglomeration economies.

OECD countries (Dijkstra and McCann, 2013). A different way of looking at the issue might be to argue that the benefits of agglomeration –can be realized not by making Northern cities substantially bigger but by vastly improving the connectivity between them so as to enable them to function as an efficiently-interconnected and integrated multi-centric 'super-city regional system', in which the whole could indeed be "greater than the sum of its parts" (City Growth Commission, 2014). Investing in the infrastructures required to achieve that would arguably yield a greater economic dividend for the Northern cities than the High Speed 2 rail connection between London, Birmingham and Manchester, the case for which has never been convincingly proven.

The key question remains: why has spatial economic imbalance in the UK been so persistent? Another way of posing this question is to ask why is it that the London-South East corner of the country has been able to successfully 'reinvent' its economy and its export base twice over the last century – in the 1920s-1930s, and again since the 1990s – while northern regions and cities have found it much more difficult to do so? Why is it that the legacies of an industrial past, and what Linkon (2013, 2014) calls the 'half-life of deindustrialization' (see also Strangleman, 2016), lingered longer and have been more inhibiting to economic reorientation and diversification in the northern cities and regions than in London? Part of the answer obviously lies in the different capabilities, specialisms and structures as between the northern regions and cities on the one hand and London on the other. London suffered deindustrialisation over the 1970 and 1980s no less than many northern cities. But it also had other key sectors of activities - especially finance, banking and the raft of related services that both support and depend on finance – which had long been established there around which a new phase of growth could be organized. Northern cities did not have the same potential growth sectors 'waiting in the wings'. So, part of the different experience of London compared to northern cities undoubtedly resided the inherited scope for economic diversification.

But without question, part also lies in the fact that London has long been the power-centre of national economic, financial and political life. As such it has long exerted a dominating influence over the orientation, operation and priorities of those institutions that shape the national economy. While most of the policies followed by those institutions are ostensibly 'non-spatial' and supposedly geographically (and socially) 'neutral', invariably they have profoundly uneven effects, spatially and socially. As Lord Heseltine argued in the mid-1980s, all too often those policies have effectively functioned as 'counter-regional' policies, operating in favour of and serving to protect or reinforce the interests and priorities of London (and even

more specifically the financial City) over the conditions and interests of the rest of the country.[69]

## 4.6    Conclusion: What is to be Done?

Although it is certainly the case that in today's globalized economy the notion of 'combined and uneven geographical development' needs to be reworked to reflect the fact that many of our cities and regions are linked as much if not more to global markets, production networks and value chains than they are to one another (see, for example, Baldwin, 2016), how they compete and function in those global arenas nevertheless remains strongly influenced by and dependent on national economic policies and interventions.  And in the UK, those policies and interventions are shaped by London-centric institutions and priorities.  In recent decades, successive Governments have been concerned – one might say obsessed - to enhance and protect the role and competitiveness of London as a global city and global financial centre. Indeed, for many, finance is seen as the   central role that the UK can and should play in the new global economy, as the primary or perhaps only activity in which it commands a comparative advantage. Hence the attention given to London. There is little discussion about what other actual or potential competitive strengths the UK has that can also be promoted to help the nation compete in the global economy.  Thus, while the banks could not be allowed to fail in the crisis, the threat to the UK steel-making sector by the dumping of cheap Chinese steel, or the loss of domestic manufacturing and technology firms through takeover by foreign competitors receive no such defensive support. Yet to maintain London's success, and its attractiveness to financial institutions, skilled workers and foreign investment, has become ever more costly: ever more major infrastructural investment is needed just to protect, let alone enhance, London's competitiveness.  Though often held up as a beacon of prosperity driven by 'market forces', London's economy is hugely underwritten by the state (Oxford Economics, 2007). The attention and support accorded by central Government to our major northern cities, to help them to establish competitive roles in today's global economy, has been marginal by comparison.

But with the Government's new-found concern over spatial economic imbalance, and its new spatial imaginary of the 'Northern Powerhouse' and the 'Midlands Engine', are we now at a policy crossroads? Is the new political credo of 'spatially rebalancing the economy' being translated into policy actions capable of achieving that goal? Over recent years the

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[69] This argument was set out in a speech that Michael Heseltine gave to the Brick Development Association in London in the mid-1980s. He was Secretary of State for Trade and Industry at the time.

departments of Government responsible for economic policy – Business, Energy and Industrial Strategy, Communities and Local Government, and even the Treasury - have all 'discovered geography' and the 'importance of place'. Several new policy initiatives have been introduced and announced with the aim of setting the national economy on a higher productivity growth path, and spatially rebalancing the economy as part of that objective, including: new Local Enterprise Partnerships, a Local Growth Agenda, City Deals, a National Infrastructure Commission, a Productivity Commission, a Patient Capital Review, an Industrial Strategy Green Paper, changes to local business rates, and the beginnings of devolution of (limited) fiscal and policy powers to cities and city- regions (conditional on the establishment of 'metro-mayors'). While these and others measures are to be welcomed, it remains unclear whether together they add up to a strategy that is sufficiently radical, bold and coherent to secure the desired outcome, especially as the Government continues at the same time to pursue its programme of fiscal austerity, including cuts in central grants to local government.

Some thirty years ago, Michael Heseltine, a long-time 'one-nation' Conservative, bemoaned the over-centralization of the national political economy in London:

In a sense we are becoming a rather monopolistic political society. I don't say that in the narrow party sense. I say it in terms of the domination of Britain by the City of London, in terms of ownership and wealth. I say it in terms of the lack of obvious roots of power outside the major political parties and the increasing location of the major corporate headquarters in London, the drift south of the public sector… (Heseltine, 1987, Quoted in *Marxism Today*, p.17).

Even further back, in the 1960s, that journalistic bastion of free-market economic thinking, *The Economist*, was moved to argue that what the north of Britain needed was its own 'London'. It has more recently reiterated that view:

So much of what is wrong with Britain today stems from the fact that it is unusually centralised. Draw a circle with a 60-mile radius centred on Charing Cross. Within that circle, the vast majority of public spending is administered. Also: all major decisions pertaining to foreign policy, defence, the economy, the national debt, interest rates… That circle contains all the major banks, most of the major theatres, the media and arts worlds, the five best universities (according to the Times Higher Education rankings for 2017), the hubs of all the country's major industries, 70% of the FTSE 100, most of Britain's airport capacity. The divide between Britain inside the circle and Britain outside it concentrates too much power within too few city districts … So, while moving Britain's capital would not solve every problem, it would go a long way to addressing the complaints that lead to today's divided country. It would contribute hugely to the rebalancing of the economy. It would help drive the urban integration needed to raise productivity and thus living standards outside the charmed south-east (*The Economist*, 2017).

Stimulated in part by Heseltine's (2012) provocative call for a devolution of fiscal and other powers, the UK has begun the first tentative steps in this direction. But just how far down this path the London-based political establishment and financial elites will be willing to go, remains to be seen (indeed, the Coalition Government's initial enthusiasm for devolution seems to have lost some momentum under Theresa May's Conservative administration).[70] At the same time, the 'combined authority' model of devolution that has been championed does not readily mesh with the complex two-tier layering of local political power and responsibilities that exists across the country: many local authorities are themselves not yet convinced that the proposed model of devolution will bring much material benefit. Nevertheless, the fact is that other OECD countries have devolved or federalized systems of political-economic governance that seem to work more effectively and productively than the UK's over-centralised model, and most enjoy much greater regional economic balance. A century and a half of spatially unbalanced prosperity and growth in the UK is surely sufficient cause to warrant a fundamental reform of the nation's political economy. At present the changes underway are ad hoc, rather than based on a detailed analysis of what the most beneficial and effective political and geographical configuration across the whole nation would look like. What is clear, however, is that the growing popular disaffection now evident across the cities and regions with the remoteness and self-serving nature of the London establishment is a long-overdue wake-up call that fundamental reform is needed.

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[70] Only six cities or city-regions are due to hold mayoral elections in May 2017 (Cambridgeshire-Peterborough; West Midlands; Liverpool City-Region; Greater Manchester; Tees Valley; and West of England).

# 5 The City Dimension of the Productivity Growth Puzzle

## 5.1 Introduction

As Paul Krugman (1994) states, while productivity is certainly not the only measure of an economy's performance, it is certainly a key attribute, since it influences the generation of the wealth necessary to support high incomes and public services. As such, it is a basic determinant of societal welfare. Of course, productivity is not the same thing as welfare: the latter also includes a wide range of 'non-market' activities and free services that are not costed or captured by conventional measures of output, such as GDP or GVA, and thus do not enter into calculations of productivity, even though they contribute to societal wellbeing (Coyle, 2014). Nevertheless, until some better concept of 'output' is devised, traditional measures of productivity will continue to be used to make temporal and geographical comparisons of 'economic performance'. And over the long-run, wage growth and per capita income in an economy depend on productivity growth. To that extent, a low level or a slow rate of growth of productivity is justifiably a cause for concern. And in many advanced economies, there is just such concern, for in most OECD countries labour productivity growth has been on a downward trend since the 1970s (Lindbeck, 1983; Carmody, 2013).

There has in fact been considerable debate over this slowdown in productivity growth. Some attribute the apparent decline to measurement problems, to the fact that technological advances and shifts simply do not show up in conventional measures of (both labour and total factor) productivity (the so-called 'Solow Productivity Paradox' – see Triplett, 1999; Crafts, 2002). Others dispute this argument, however, and contend that the slowdown is real (Owen, 2011; Cowen 2016; Gordon, 2016; Syverson, 2016). According to Gordon (2016), for example, innovation has stalled, and technological progress no longer produces the gains in GDP that it once did (see also Pilat et al, 2002; Dupont et al, 2011). A similar view is espoused by Cowen (2016), who argues that high-tech developments have not saved advanced economies from a slowdown in productivity. Yet another explanation points to the fall in business dynamism over the past two to three decades (European Central Bank, 2016), as reflected in new firm formation rates: new firms are assumed to embody more advanced technology and to be more productive than old existing firms. Still others suggest that the slowdown derives in part at least from an over-regulation of product and labour markets (e.g. Conway and Nicoletti, 2007), while others focus on misallocations and mismatching of skilled and educated labour (OECD, 2015).

One of the most contentious arguments locates the cause in the structural changes that have transformed advanced economies over recent decades, specifically the shift from manufacturing and production industries to economies based overwhelmingly on services. The contention is that many services (such as retail, hospitality, personal services, public services, and even some professional and business services) have limited potential for high productivity growth, and may even be 'stagnant' as far as productivity is concerned (Baumol, 1967; Baumol et al, 1985; Williamson, 1991; Kim, 2006). What this narrative suggests, in other words, is that the observed slowdown in productivity growth has been an inevitable consequence of the progressive shift to a 'post-industrial' service economy that has occurred over the past 40 years or so. Other authors, however, take a more guarded view, pointing out that just as some services may have limited scope for productivity advance, so too do some manufacturing activities. Further, many services function as intermediary inputs to the manufacturing sector, and may not only help to raise the productivity of the latter, but themselves may have as much scope for increasing their own productivity (Oulton, 2001). The trend for manufacturing firms to outsource certain routine service activities that were previously carried out 'in house', while at the same time often developing their own customer-orientated service activities (from finance to after-care), may well also have impacted on the measurement and allocation of productivity advance as between 'manufacturing' and 'services' in complex ways. To compound matters, it may well be that measuring output and hence productivity in certain services is not at all straightforward; for example, the 'value' of certain services may have more to do with the quality of provision (including their performativity) than in their monetary cost or value. The impact of structural change on productivity growth is thus a key but difficult issue, the more so since it is widely claimed that structural change is integral to the process of economic growth (Kuznets, 1957, 1973; Pasinetti, 1993; Laitner, 2000; Freeman and Louca, 2001; Cornwall and Cornwall, 1994; Metcalfe et al, 2006; Kruger, 2008; Roncolato and Kucera, 2014). Yet, as Kruger (2008) points out, despite the importance of structural change for growth theory, the topic of structural change and its potential relevance for productivity growth are frequently neglected topics in economic research. How far structural change has contributed to the slowdown in productivity in the major economies is thus an important issue and in need of much more analysis.

Such analysis is not just of national, macro-economic interest, however. In recent years, there has been a veritable explosion of interest in cities as the 'engines' of wealth creation in the national economy (Jacobs, 1984; Glaeser, 2011; Florida, 2008; Moretti, 2013). One of the many facts to have emerged from this burgeoning body of work is that cities appear to differ in their growth paths of employment and per capita incomes (see for example, Glaeser, 2005;

Markusen and Shrock, 2006; Moretti, 2013; Power et al, 2010; Hobor, 2013; Dijkstra et al, 2013; Michaels et al, 2013; Cowell, 2014, Storper et al, 2015; Martin et al, 2014; Martin, 2016; Martin et al, 2016). In most of these studies, the differences (and often divergence) in growth paths between cities is attributed, in part at least, to differences in their economic structures and specialisms, and particularly the extent to which cities have suffered from deindustrialisation and the success with which they have managed to rebuild their economies around a new service and 'creative sectors' mode of growth.  Less is known about how far and in what ways the slowdown of national productivity growth in the advanced economies can be related to differential patterns of productivity change across cities.  Given that in such nations cities account for the bulk of the aggregate economy, a city-level analysis could clearly help throw light on the causes of productivity growth slowdown.  This point is stressed by Muro and Parilla (2017), who in commenting on the United States situation argue that

While the pundits are right to debate the facts and causes of slowing productivity growth at the national level, they would do well also to explore the local dimension of the problem. After all, while many of the proposed causes of malaise—less competition in industries and fewer technological breakthroughs among others— remain national, many of them may be distinctly local.

By 'local' they refer specifically to the need to examine what has been happening across US cities.

This is precisely the focus of this paper, in which our aim is to analyse the productivity growth paths of British cities since the beginning of the 1970s, and how far and in what ways these city experiences help to throw light on the 'puzzle' of national-level productivity slowdown. Such an enquiry is in fact particularly pertinent in the British case since over recent years a major debate has resurfaced over the spatially unbalanced nature of the national economy, specifically the disparity in growth and prosperity between a buoyant south of the country and a less dynamic north (see Martin, 2015).  Arguments over this 'north-south divide' in fact go back to the 1980s (see Martin, 1987) – indeed, in some respects, back as far as the 1930s – but more recently the focus of the debate has shifted from the regional level to the city scale: the reasons for the slower growth of northern Britain, it is argued, are to be found in the cities of the north, and their failure to match the growth rates of those in the south.  In terms of employment and output growth, most southern cities have pulled well ahead of their northern counterparts (see Martin et al, 2016). The logical question that then follows is what these disparities in employment and output growth across cities imply for labour productivity

growth.[71] How far the slowdown in national labour productivity growth is itself the outcome of different trends in productivity advance across the country's cities is thus a pertinent policy issue, especially given the UK Government's recent recognition of the need for a 'place-based' dimension to national industrial policy (HM Treasury, 2015; Department of Business, Energy and Industrial Strategy, 2017). Further, the 2016 UK referendum vote to leave the European Union – so-called 'Brexit' - makes the need to improve the productivity of the nation's cities and regions all the more urgent, given that they could well face tariffs on their exports to Europe and will need to compete in other overseas markets to export their goods and services.

## 5.2    Labour Productivity Growth Paths of British Cities

While much of the concern over productivity growth in the UK, and in other major economies, has been over its recent slowdown, in fact the problem is of much longer standing (see, for example, Dolman, 2009; Carmody, 2013). Figure 5.1 shows the post-war trend in labour productivity growth (real gross domestic product per person employed) in the UK economy, with other major OECD countries for comparison.[72]   The general trend across these countries, allowing for cyclical effects, has been one of a long-run slowdown in productivity growth over the post-war period, especially since the mid- or late-1960s. The UK experience has been broadly in line with this pattern. After a rising trend from the beginning of the 1950s to the mid-1960s, the trend rate of productivity then fell up to the mid-1970s, remained flat up to the early-1990s, and then fell again. In the UK, as in many other OECD countries, since the Global Financial Crisis of 2007-2008, productivity growth has been all but stagnant. How have these trends in UK productivity growth worked out across the nation's cities?

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[71] Because of the lack of any reliable or consistent time series data on capital stock at the local or city levels in the UK, it was not possible to analyse total or multiple factor productivity. Some truly heroic assumptions would have to be made to derive such time series estimates. Thus, throughout the paper, productivity refers to labour productivity, that is output (gross value added) per employed worker. These estimates are workplace based, not residence based.

[72] A very similar picture emerges if labour productivity is measured by output per hour worked, as also recorded in the Conference Board Total Data Base.

**Figure 5.1: Long Run Trends in the Annual Growth Rate of Labour Productivity in the UK and other Leading Economies, 1951-2016**
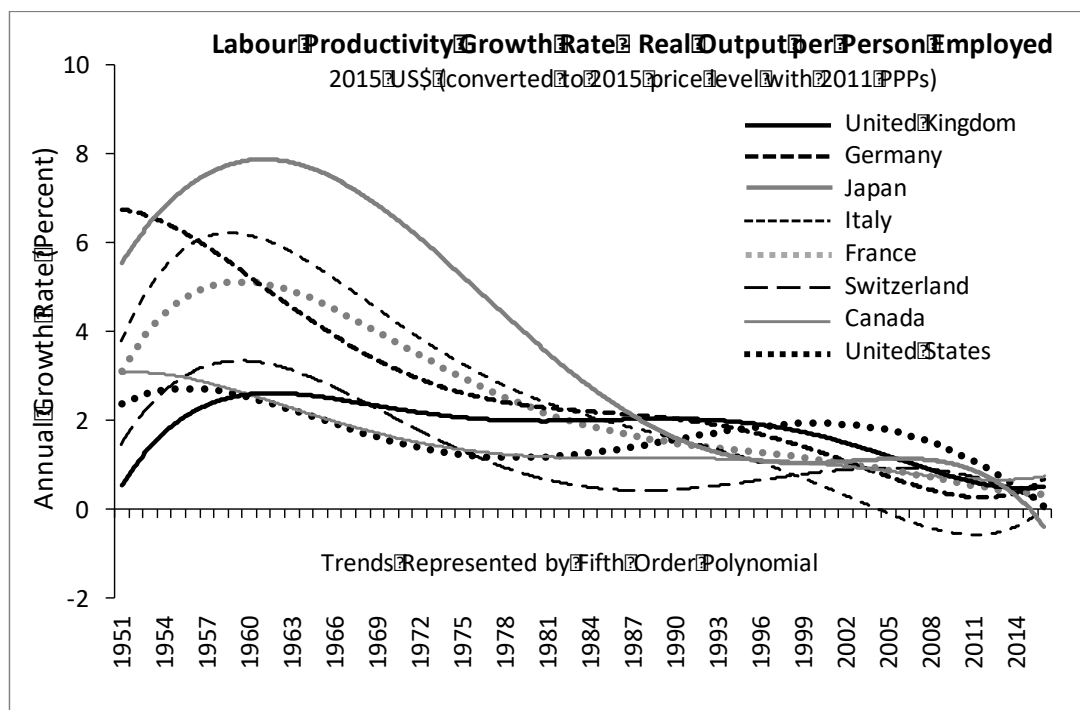


**Source of data:** Conference Board Total Data Base (Productivity converted to 2015 US$, 2011 PPP). Labour productivity measured as GDP per person employed.

**Note:** A fifth-order polynomial in time gives a close-fit trend (with an $R^2$ of at least 0.70) for a majority of the countries) and is thus shown here. In the case of the UK, a fourth order polynomial trend provides almost as good a fit, but the fifth-order trend is shown here for consistency. In her study of national productivity trends over the period 1965-2012, Carmody (2013) used a Hodrick-Prescott filter to identify trends, with very similar results, with a declining trend found in every country over the period.

The variation in labour productivity levels across the 85 cities in 1971 and in 2014 is shown in Figure 5.2. The cities have been grouped into 'northern' and 'southern' sets according to the region of their location, using the conventional way of dividing the UK into these two broad geographical areas. This gives 45 'northern' cities and 40 'southern'. Also shown is the national average (Great Britain) productivity level for the two years. What is striking is that all bar four northern cities (Aberdeen, Edinburgh, Chester and Telford) are in the bottom left-hand quadrant of the Figure, having productivity levels less than the national average both at the beginning of the period and at the end. However, at the same time, the correlation between productivity levels in 1971 and 2014, though reasonably high (R=0.686), is not perfect, indicating that certain shifts in relative position occurred over the period; in other words, productivity growth rates across cities have differed.

**Figure 5.2: Labour Productivity Across 85 British Cities, 1971 and 2014 (Gross Value Added per employed worker, 2011 prices**
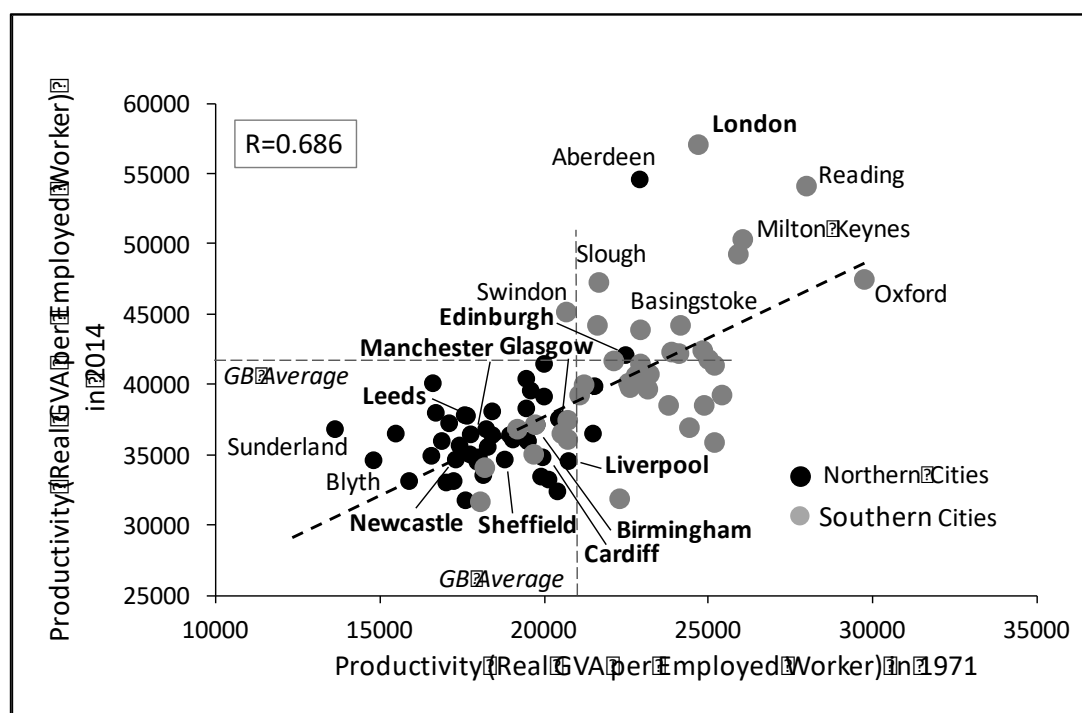


**Source:** Authors' data

**Note:** Following the 'conventional' 'North-South' division of regional Britain, 'southern' cities are defined as those in the following regions: London, South East, East of England, South West and East Midlands; while 'northern' cities are defined as those in the West Midlands, Yorkshire-Humberside, North East, North East, Scotland and Wales.

Great Britain averages shown by intersecting dashed lines. Major cities shown in bold.

In this context, an interesting feature emerges in the relationship across cities between their initial productivity levels and their subsequent productivity growth when the whole study period is divided into sub-periods, 1971-1981, 1981-1991, 1991-2001, and 2001-2014 (Figure 5.3). This reveals that over time the relationship across cities between initial productivity levels and subsequent growth has progressively changed from being negative, indicating that cities which had initially low labour productivity tended subsequently to experience faster productivity growth and 'catch up' with cities that initially had higher productivity levels, to a weakly positive relationship. Thus, while productivity levels tended to converge over the 1970s and 1980s, this tendency disappeared over the 1990s and 2000s. Further, and significantly, if we group the 85 cities into those in the 'south' of Britain, and those in the 'north', there is clear evidence of a 'switch' in relative labour productivity growth between these two geographical groups between 1971-1991 and 1991-2014, with northern

cities as a group outpacing southern cities in the first period, but the latter out-performing the former in the more recent period (Table 5.1).

**Figure 5.3: Shifting Patterns of Labour Productivity Growth across British
Cities, 1971-2014 (Gross Value added per employed worker, 2011 prices)**



**1991-2001**

R=0.141

Average Annual Rate of Prductivity Growth, 1991-2001 (Percent)

Productivity Level (GVA per Worker, £), 1991

Derby
Bedford
Guilford
Reading
Wolverhampton
London
Blackburn
Sheffield
Barnsley



**2001-2014**

R=0.091

Average annual Raste of Productivuty Growth, 2001-2014 (Percent)

Productivity Level (GVA per Worker, £), 2001

Chester
Mansfield
Merthyr Tydfil
Swansea
Milton Keynes
High Wycombe
Reading
London
Crewe
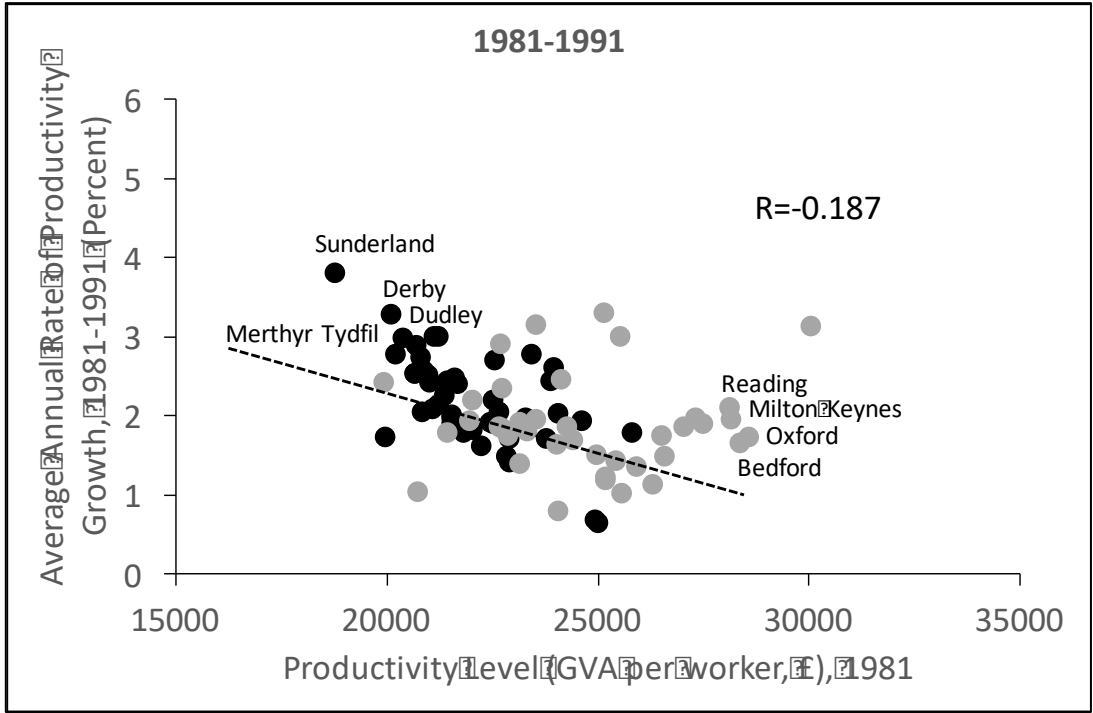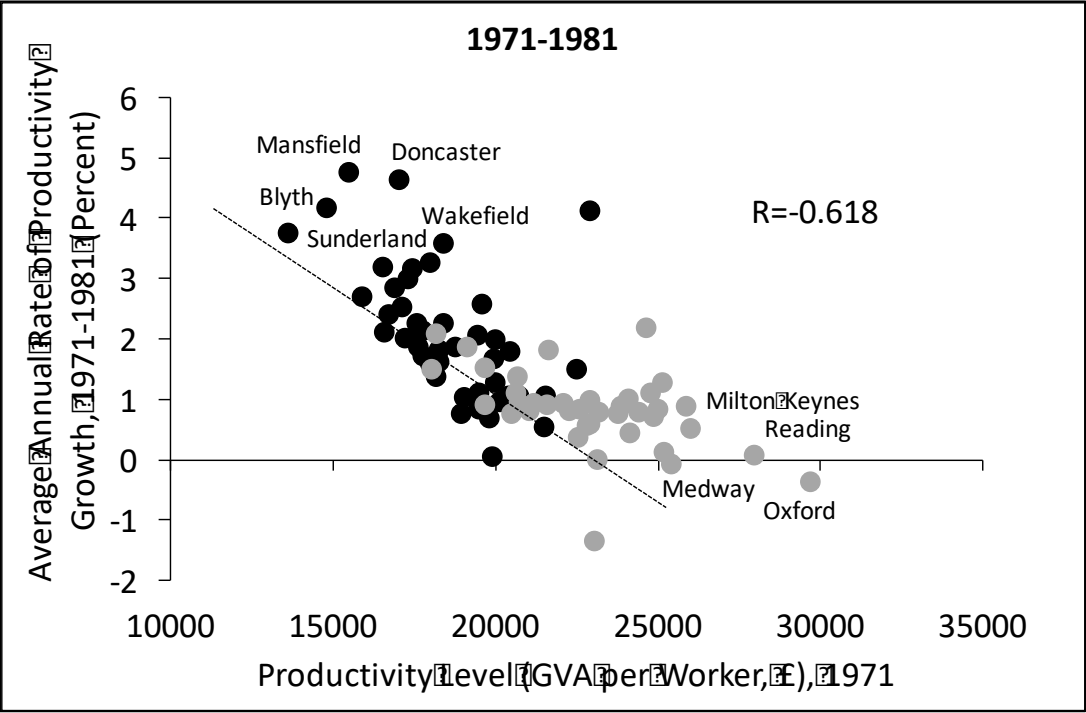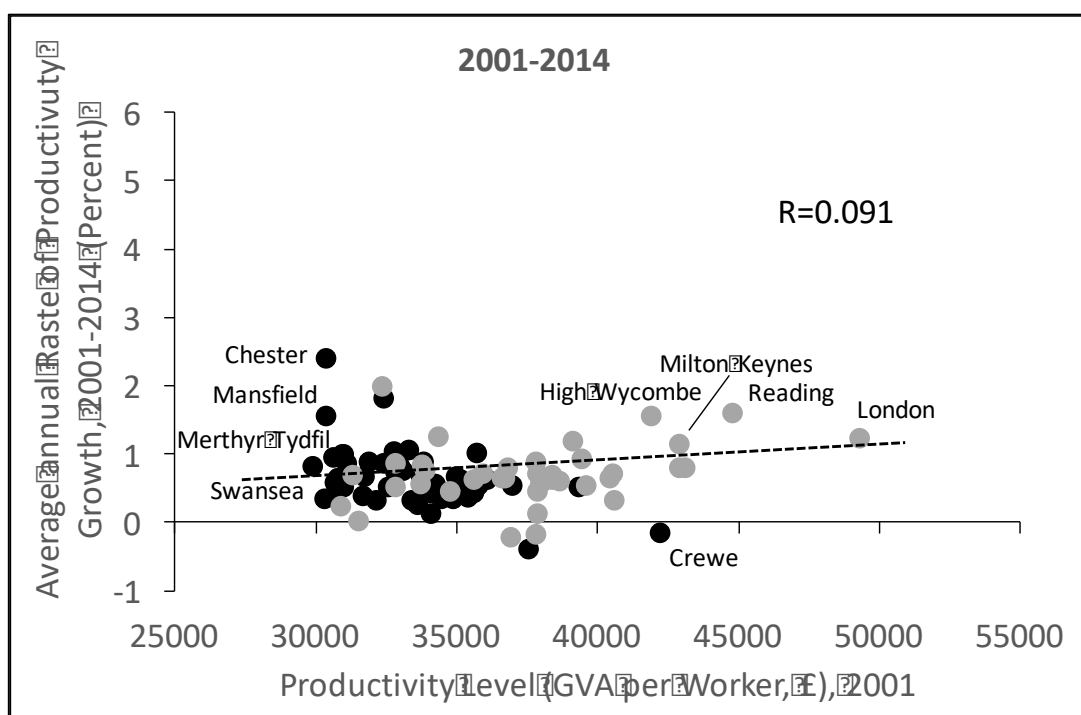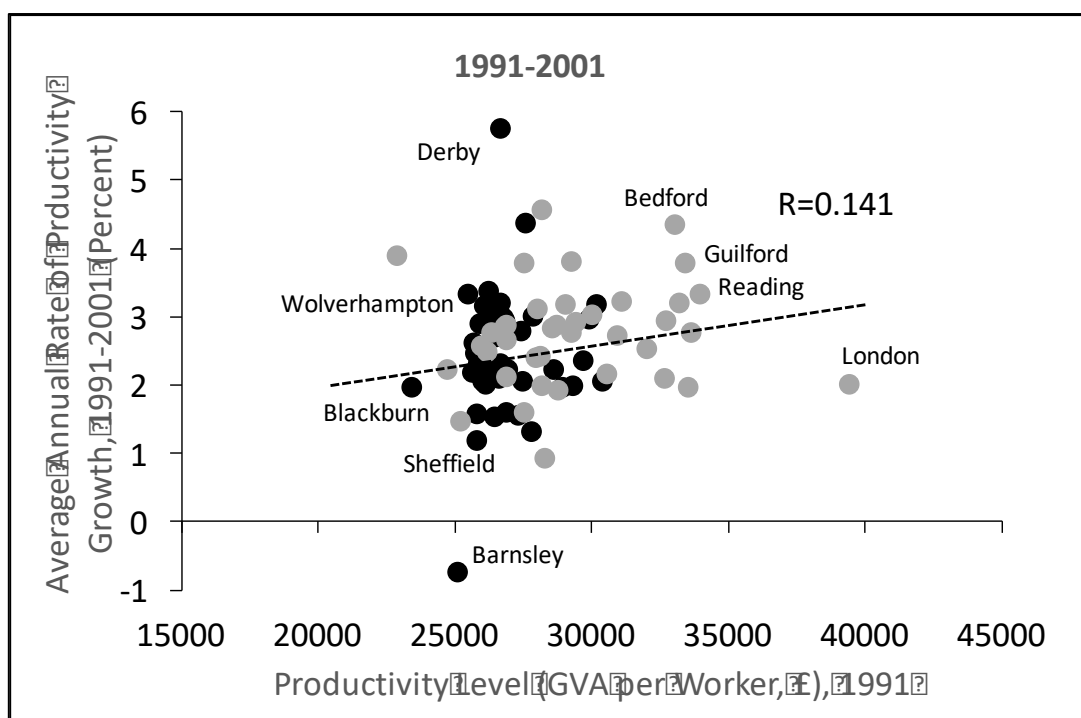
**Source:** Authors' data

**Note:** Southern cities and northern cities defined and depicted as in Figure 5.2. Aberdeen is excluded from these graphs on account of its very atypical structure, dominated by North Sea Oil production.

**Table 5.1:  Productivity Growth in Southern and Northern Cities**
**(Average annual growth in GVA per employed person, percent per annum)**

|                   | 1971-1991 | 1991-2014 |
|-------------------|-----------|-----------|
| **Southern Cities** | 1.84    | 2.05      |
| *London*          | *2.98*    | *1.95*    |
| **Northern Cities** | 2.28    | 1.51      |
| *Manchester*      | *2.45*    | *1.63*    |
| *Birmingham*      | *1.93*    | *1.54*    |
| **Great Britain** | 2.08      | 1.69      |

**Source**: Authors' data
**Note:**  Southern cities and northern cities defined as in Figure 5.2.

However, while the average annual growth rate of the southern cities in the second period was higher than that group managed in the first period, it was nevertheless lower than that achieved by the northern cities in that earlier period (see also Figure 5.4).  At the same time, the growth rate of the northern group of cities slowed appreciably between the two subperiods in question. The net result is that aggregate productivity growth for the economy as a whole slowed down: the slowdown of the northern cities between 1971-1991 and 1991-2014 has been a major contributing negative factor, for which the improvement in performance of the southern cities in the 1991-2014 period has not been able to compensate.  There are, then, two interrelated questions that arise from these city dimensions of the national 'productivity puzzle', namely: why the trend productivity growth rate of northern cities fell after 1991, and why the trend rate of productivity growth of southern cities after 1991, while certainly an improvement over that for 1971-1991, has not matched that of the northern cities during that earlier period.

**Figure 5.4: Long Run Trends in the Annual Growth Rate of Labour Productivity in Southern and Northern Cities, 1971-2014**
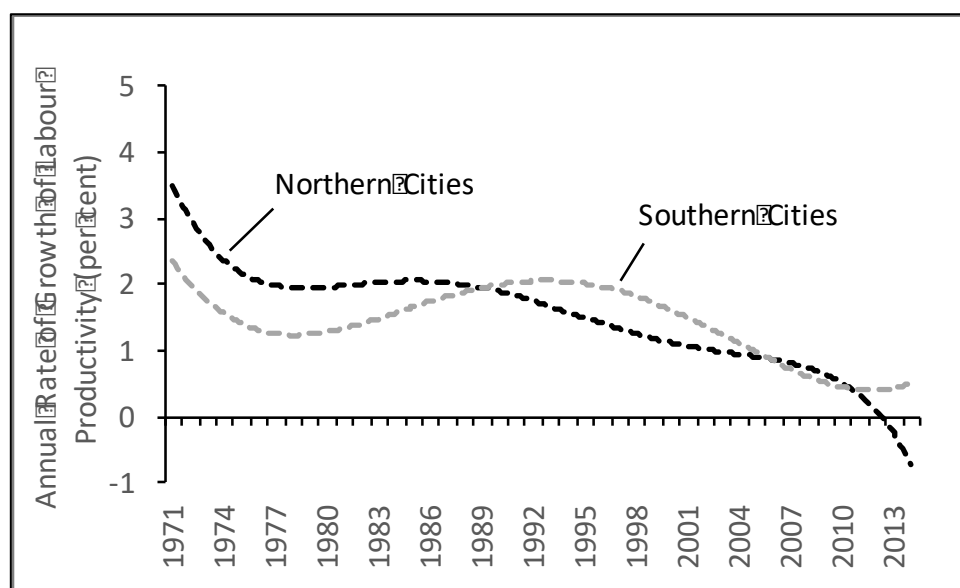


**Source:** Authors' data

**Note:** A fifth-order polynomial is used to estimate the trend for each city group. The latter are as defined for Figure 5.2.

## 5.3 Structural Change and Productivity Growth

The fact that different cities across the UK have experienced different degrees of productivity growth slowdown immediately suggests that the causes or factors involved have themselves varied between cities, and particularly as between those in southern Britain and those in the north.

Within economic geography, much of the recent discussion of city (and regional) economic performance, including productivity, has focused on the issue of economic structure, and in particular on whether a specialised structure or a diversified one is most conducive to city (regional) growth (for a review of these two main perspectives, see for example, van der Panne, 2009). While some find that a diversified structure is more likely to promote innovation and productivity advance, in line with the notion of Jacobsian-type urban externalities, others find that specialisation is more beneficial, thus supporting the case for Marshall-Arrow-Romer type economies. Yet others have sought to move beyond the debate by positing that it is 'related variety' (or related diversity) that is the most conducive to growth and productivity advance, because it is the presence of activities that share similar or complementary inputs, knowledge or products, that promotes adaptability of a city's or region's economic structure

and the development of new, innovative activities, which help maintain productivity growth over time (Frenken et al, 2007; Boschma, 2016). Further, still others have proposed that it is 'clustered diversity' that matters, that is the presence of several Porterian- type dynamic business clusters (Farhauer and Kröll, 2012).

Nevertheless, according to some economic geographers, it is specialisation that is *the* motor of city growth (Storper, 2013; Storper, et al, 2015). In their analysis of US cities, Kemeny and Storper (2014), seek to answer the question of what drives a city's economic performance by distinguishing two types of specialisation: *relative* specialisation in particular sectors, as measured by sector shares of a city's total employment (or output) - the conventional way of measuring city or regional specialisation - and what they call *absolute* specialisation, that is actual sectoral size, as measured for example by its total employment (or output). They argue that of the two measures, the clearest case is for the absolute measure. In contrast, they argue, there is less consensus around whether having a high or increasing share of an activity – an increase in (what they call) relative specialisation - would improve productivity. However, by focusing on the absolute size of sectors in cities, these authors would seem to be blurring the distinctions between concentration, agglomeration and specialisation made by Brakman, Garretsen and Marrewijk (2009). In fact, much of Kemeny and Storper's discussion is really in terms of agglomeration, and in any case their analysis of city performance is in terms of comparative *wage levels* rather than comparative *productivity growth*.

What may matter more is not sectoral specialisation or diversity (or variety, related or unrelated) as such, but what those sectors are. Arguably a key determinant of a city's economic performance and productivity growth is the nature and success of its export or tradable base (Kaldor, 1981). The demand for a city's exports (both to the rest of the domestic economy as well as to international markets) will influence its output growth. According to Verdoorn's law (and also Frabricant's law), the rate of growth of output of a sector determines the potential for scale effects, increasing returns, new investment, and innovation in that sector (and by extension through the multiplier, in other local sectors of activity).[73] These effects will influence productivity growth, which in turn (and depending on local versus external wages, and hence prices), will shape the competitiveness of the sector in export markets, and thence the demand for its output. This circular and cumulative causation process is normally assumed to operate in a positive direction (Kaldor, 1981), and

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[73] For a useful discussion of Verdoorn's and Fabricant's laws and how they relate to productivity growth see Scott (1989). How these laws link to processes of cumulative causation in a geographical setting is discussed in Martin (2017).

was argued to apply much more to manufacturing than to services. But if the demand for a city's exports begins to decline (for example by being undermined by cheaper cost competitors elsewhere), then this circular process could be interrupted or even go into reverse, leading to a stagnation or even fall in productivity, thence a loss of competitiveness (again depending on what happens to wages and prices), and further erosion of export demand and slower output growth. Of course, the sector's firms may respond by shedding labour and/or investing in labour saving equipment in order to maintain or revive productivity advance. But if sustained, the loss of a city's tradable base could have a major dampening effect on the city's overall rate of productivity growth.

To some extent this is what has happened in manufacturing over recent decades, in the UK and most other industrialised economies. Faced by the rise of cheap labour competitors overseas, manufacturing firms in countries like the UK sought to increase productivity and hence maintain or grow demand and output by raising efficiency by shedding their less-skilled workforces. For a while at least, such rationalisation or deindustrialisation – the historic reduction in the absolute size of the manufacturing workforce – was accompanied by, and helped to maintain, productivity growth. But note that, in this instance, productivity growth was associated with a *decline*, not an increase in the absolute size of the manufacturing sector, an association that would seem to run counter to the Kemeny-Storper thesis. Of course, this route for securing higher productivity obviously has it limits, however, and eventually productivity growth in manufacturing becomes crucially dependent on innovation and investment.

But as some export sectors may shrink in absolute or relative employment terms, so others may expand, both absolutely and relatively. Thus, what matters also is what scope these expanding activities have for exports and productivity growth. Do these new sectors benefit from specialisation economies (of a relative or absolute kind) to the same extent and in the same way as the tradable activities that are experiencing employment decline? Specialisation economies may be specific to the activities concerned. Or the new sectors may not have the same scope for innovation, or for exports. These are precisely among the arguments that have been made about the shift to a post-industrial economy. The key point is that, as Rowthorn (2010, p. 373) stresses, the "long-run prosperity of a region is determined by the strength of its export base", where the latter includes not just manufacturing but also tradable

services of various kinds, particularly knowledge based professional and business services (so-called KIBS). This argument applies no less to cities.[74]

Changes over time in sectoral structure may therefore have either positive or negative consequences for a city's long-run productivity growth. Such changes reflect not just the different rates of employment (or output) growth (or decline) of different sectors, but also structural shifts and recompositions associated with the branching and recombination of sectors to produce new activities with associated productivity characteristics. We have already mentioned the most obvious 'between-sector' structural change associated with the long-run decline in importance, in employment terms for example, of manufacturing, and the ongoing growth in importance of services.

## 5.4    The Changing Economic Structure of British Cities

The scale of this structural change from an economy based on production industries (manufacturing, construction and utilities) to one dominated by private market services, followed by public services (central and local government), has been dramatic. The decline in UK production[75] employment from its peak of 11.2 million (or 41.1 percent of total jobs) in 1966 to 5.7 million (18.6 percent) in 2014 represents one of the most rapid rates of deindustrialisation in the western world. Likewise, having increased over the two decades after the Second War, the share of production industries in total output steadily increased to reach a peak of 38.6 percent in 1969, and thereafter progressively declined, falling to 19.2 percent by 2014.  At the same time employment in private market services increased from 8.8 million (34.1 percent) in 1969 to 15.1 million (50.8 percent).  If we add in local and central government, the service economy increased its share of total employment from 53.3 percent in 1969 to 79.1 percent in 2014, and its share of total national Gross Value Added from 38.4 percent to 80.1 percent over the same period.  The macro-structure of the national economy today looks very different indeed from that of forty or so years ago.

Both northern and southern cities have been transformed by these changes (Figure 5.5). But some significant differences are also evident between the two groups. In 1971, the share of total employment accounted for by manufacturing in northern cities, as a group, was

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[74] In his study, Rowthorn shows how the tradable sectors of the northern regions of Britain have lost substantial employment, compared to southern regions, over the past forty years. He does not, however, examine productivity growth as between these two broad divisions of the country. As we have just argued, it is possible, at least for a while, for a region, or city, to sustain or even improve productivity growth precisely by shedding labour.

[75] Manufacturing plus construction, mining, electricity, gas and water.

substantially higher than in southern cities (34.7 percent and 24.9 percent, respectively). Since then, the share of manufacturing has fallen relentlessly in both groups, but faster in northern cities, so that by 2014 the absolute difference between the two groups of cities had been much reduced (9.4 percent and 5.6 percent, respectively). At the same time, while the share of public (government) services in total employment was initially higher in southern cities, and has grown in both groups over the period, by 1991 northern cities had 'caught up' with their southern counterparts, and thereafter have moved ahead. As for knowledge-intensive business services (KIBS), their share of total employment has risen steadily in both northern and southern cities, with the share in the former consistently below that in the latter, and failing over time to match the growth of that sector in southern cities. Interestingly, in the southern city group, taken as a whole, KIBS overtook manufacturing in employment share terms in the early-1980s, whereas it was not until nearly two decades later that this occurred in the northern city group.

**Figure 5.5: Structural Change in Southern and Northern British Cities: Employment Shares by Broad Sector, 1971-2014**
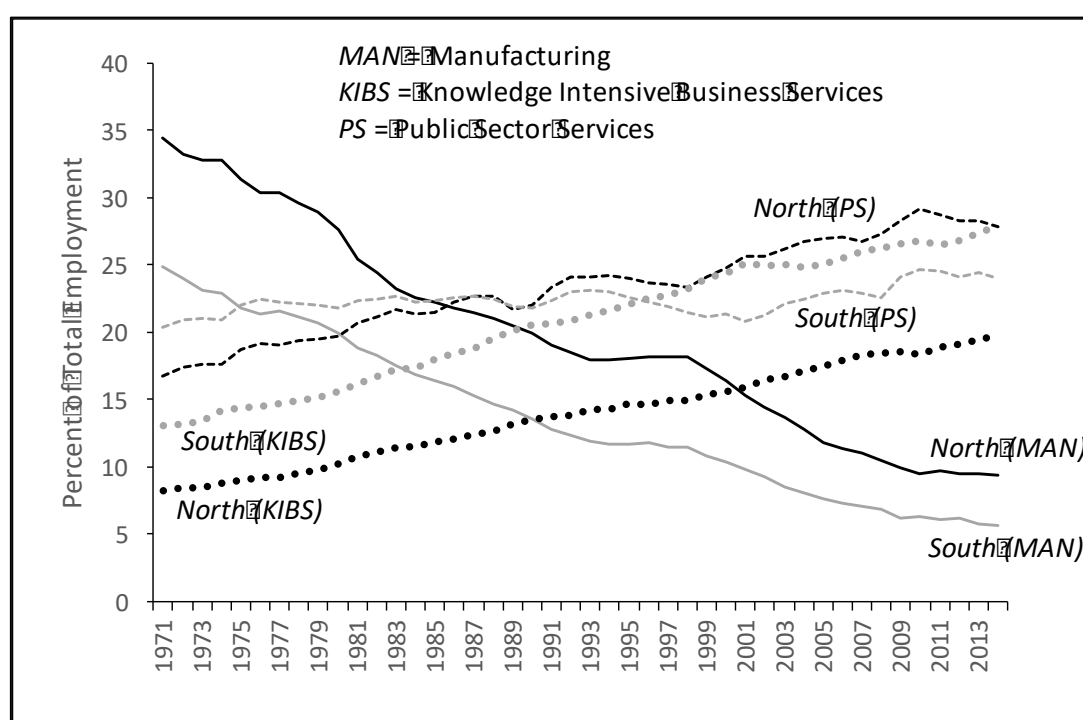


**Source:** Authors' own data

**Note:** Southern cities and northern cities defined as in Figure 2. Employment share are of the Great Britain total.

To explore these structural trends in more city and sectoral detail, we used the *coefficient of relative specialization* (see Isard, 1960; Dixon and Thirlwall, 1975).[76] This has been deployed by Krugman on a number of occasions to examine city and regional specialization (Krugman, 1991; 1993), and for that reason is often called the 'Krugman Index'. It takes the form

$$CRS_{jt} = \sum_{i=1}^{N} | s_{ijt} - s_{it}^* | \qquad\qquad (1)$$

where, $s_{ij}$ is the share of total employment (or output) in city *j* accounted for by sector *i* at time *t*, $s_i^*$ is the corresponding employment (or output) share of that sector in the comparator 'reference economy' also at time *t*, and *N* is the number of sectors involved in the analysis. As defined, the index takes the value of zero when a city (or region) has exactly the same structure as the reference economy (since each absolute sectoral share difference in (1) would itself be zero), and a maximum of 2 in the case where the city shared no sector in common with the reference economy.[77] According to Krugman, the index is a "rough way of quantifying differences in structures, and hence regional specialization" (1993, p. 250). Strictly speaking, however, it tells us more about *structural dissimilarity* between regions, or cities, than about regional or city specialization per se, since even if the index for a city is close to zero, suggesting little difference from the reference economy, the reference economy itself could be narrowly specialized in particular sectors, so in this case both the city and the nation would be equally and similarly specialized.

Thus an additional measure is required in order to capture whether a city is specialised or diversified economically. The obvious approach to measuring the *degree of diversity* of a city's economic structure is to compare actual sectoral (employment or output) shares against

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[76] There are several measures that can be used to summarise and compare city (and regional) economic structures and their evolution over time. For surveys of different measures, see, for example, Isard et al (1960); Bahl, et al (1971); Dixon and Thirlwall (1975); Gibbs and Postan (1975); Kruger (2006); Palan (2010). These include the index of regional specialisation (Dixon and Thirlwall, 1975, Krugman; 1993), Shannon's Entropy Index (for example, Aiginger and Davies, 2004; Aiginger and Pfaffermayr, 2004), the Index of Inequality in Production Structure (see Cuadrado-Roura et al., 1999; Haaland et al., 1999; Landesmann, 2000; Percoco et al., 2005), the Theil Index (Brülhart and Traeger, 2005; Ezcurra and Pascual, 2007), and the Hirschman-Herfindahl Index (for example, Sapir, 1996; Davis, 1998; Storper et al, 2002; Aiginger and Pfaffermayr, 2004; Beine and Coulombe, 2007).

[77] If the national economy is taken as the reference norm, then the maximum is 2[(N-1)]/N, since by definition the national economy must share at least one sector in common with at least one of its cities (regions).

an equi-proportion distribution of shares, that is a state of complete diversity or balanced structure. The Hirschman-Herfindahl index is probably the most commonly used measure for this sort of analysis. This is defined as the sum of the squared sectoral shares,

$$HHI_{jt} = \sum_{i=1}^{N} s_{ijt}^2 \qquad (2)$$

where, as in Equation (1), the shares $s_{ijt}$ are expressed as proportions of a city's (or region's) total employment (or output). The index ranges from a minimum of 1/*N*, when all sectoral shares are equal (maximum diversity) to an upper bound of 1, in which case a city would be mono-specialised, that is all of its activity is in just one industry. Because the sectoral shares are squared, the index gives more weight to large sectors.[78]

Both the CRS (Krugman) Index and the Hirschman-Herfindahl Index can be used for identifying and tracking structural change in individual cities and regions by comparing values of the indices at different points in time.[79] In the case of the CRS, by using the national economy as the reference economy, the index can illuminate whether, how far, and how fast, city economic structures are converging (declining values of the index), or diverging (increasing values of the index).[80] With respect to the *HHI*, if there is proportional growth across sectors, and hence no structural change, the index would remain constant over time (Metcalfe et al, 2006). Changes in the index thus indicate structural change: successive values that moved towards 1/*N* over time would indicate increasing equality (diversity) in economic structure, whereas a trend towards 1.0 would indicate increasing specialisation.

Table 5.3 shows the calculated CRS (Krugman) indices of structural specialisation (dissimilarity) by employment across 82 sectors for selected cities (most and least initially specialised, and including London and other major cities) for 1971, 1991 and 2014 (the

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[78] For this reason, the square root of the index is sometimes used (for example, Chisholm and Oeppen, 1973). We use the standard version in what follows.

[79] There are measures that are intended to capture the scale and speed of structural change in a region or city economy directly, for example the Lilien Index (Lilien, 1982; Ansari et al, 2013), but these do not of themselves tell us much about whether that change is leading to diversification or specialisation of a region's or city's structure. Other studies have sought to measure excess industrial churn' and its relationship to city growth (Duranton, 2007; Findeisen and Südekum, 2008).

[80] Note that the *CRS* can be also used to chart the changing economic structure of a city relative to its own 'starting' structure, at say *t=0*, by setting the reference 'norm' $s_{ijt}^*$ in (1) to $s_{ij0}$. In this instance, structural change would be indicated by rising values of the index over time, as the city increasingly diverged from its original mix of sectors.

results for all 85 cities are reported in Appendix B in the online version of the paper). For each city, the 'reference economy' in Equation (1) was defined as Great Britain minus the city in question, so as to avoid double counting (which would not be insignificant in the case of London, and to a lesser extent with Birmingham, Manchester, Sheffield, Liverpool, Glasgow and Edinburgh). Several key features stand out. First, in 1971 cities differed markedly in the degree of relative structural specialisation (dissimilarity). Second, the large cities (regional capitals) and London were less specialised than most other, smaller cities. Third, in the case of employment structure, all but one city (Slough) have experienced a decline in relative specialisation or structural dissimilarity since 1971. The trends in output structures are broadly similar, although some thirteen cities experienced a slight increase in relative specialisation, or divergence from the structure of the national economy (see Appendix B in the online version of the paper). Fourth, especially in the case of employment shares, in general the more specialised a city was in 1971, the greater the reduction in specialisation over the ensuing period.

**Table 5.3: Krugman Employment Structural Dissimilarity (Specialisation) Indices for Selected British Cities (82 sectors), 1971, 1991 and 2014**

|  | 1971 | 1991 | 2017 |  | 1971 | 1991 | 2017 |
|---|---|---|---|---|---|---|---|
| Sunderland | 0.717 | 0.417 | 0.385 | **Liverpool** | 0.447 | 0.265 | 0.234 |
| Mansfield | 0.711 | 0.440 | 0.296 | **Nottingham** | 0.445 | 0.255 | 0.269 |
| Halifax | 0.686 | 0.430 | 0.407 | **Edinburgh** | 0.434 | 0.316 | 0.314 |
| Swansea | 0.679 | 0.321 | 0.352 | Luton | 0.434 | 0.298 | 0.281 |
| Merthyr Tydfil | 0.677 | 0.409 | 0.380 | Chelmsford | 0.430 | 0.239 | 0.169 |
| Oxford | 0.664 | 0.325 | 0.301 | Southend | 0.423 | 0.393 | 0.224 |
| Kettering | 0.659 | 0.419 | 0.349 | Worcester | 0.418 | 0.309 | 0.264 |
| Wolverhampton | 0.656 | 0.419 | 0.269 | **London** | 0.411 | 0.387 | 0.387 |
| Blackpool | 0.647 | 0.518 | 0.399 | **Leeds** | 0.408 | 0.270 | 0.227 |
| Blackburn | 0.634 | 0.410 | 0.348 | **Newcastle** | 0.369 | 0.258 | 0.252 |
| Dudley | 0.624 | 0.403 | 0.357 | Southampton | 0.368 | 0.249 | 0.184 |
| **Birmingham** | 0.526 | 0.382 | 0.175 | Slough | 0.352 | 0.330 | 0.370 |
| **Bristol** | 0.480 | 0.325 | 0.220 | **Cardiff** | 0.340 | 0.213 | 0.233 |
| **Sheffield** | 0.479 | 0.252 | 0.278 | **Glasgow** | 0.328 | 0.209 | 0.224 |

**Notes:** London and major northern regional capitals in bold

Cities ranked in descending order of dissimilarity (specialisation) for 1971

The corresponding HH indices for employment for selected cities for 1971, 1991 and 2014 are given in Table 5.4 (with the full city results for employment and output in Tables B.3 and B.4 in Appendix B in the online version of the paper). These show several interesting features.

In general, cities tend to be more specialized in terms of output structures than in employment structures; this was especially the case in the 1970s and 1980s. With respect to employment structures, nearly two-thirds of the cities experienced a decline in specialization over the period 1971-2014. Those cities that were more specialized initially underwent the largest declines. The HH structural indices for output shares show that almost all most cities became less specialized over the four decades. As in the case of the Krugman indices, it would appear that the decline in specialisation was most evident in the 1971-1991 subperiod, and that structural change since then has been slower.

**Table 5.4: Herfindahl-Hirschman Employment Specialisation Indices for Selected British Cities (82 sectors), 1971, 1991 and 2014**

|  | 1971 | 1991 | 2017 |  | 1971 | 1991 | 2017 |
|---|---|---|---|---|---|---|---|
| Oxford | 0.081 | 0.052 | 0.054 | **Birmingham** | 0.042 | 0.037 | 0.042 |
| Sunderland | 0.077 | 0.043 | 0.045 | **Liverpool** | 0.041 | 0.047 | 0.048 |
| Huddersfield | 0.072 | 0.041 | 0.046 | **Newcastle** | 0.040 | 0.043 | 0.049 |
| Stoke-on-Trent | 0.071 | 0.050 | 0.044 | **Cardiff** | 0.039 | 0.040 | 0.047 |
| Halifax | 0.071 | 0.037 | 0.045 | **Glasgow** | 0.039 | 0.042 | 0.044 |
| Dudley | 0.067 | 0.043 | 0.045 | Shrewsbury | 0.038 | 0.040 | 0.044 |
| Trowbridge | 0.066 | 0.050 | 0.041 | Southampton | 0.038 | 0.042 | 0.045 |
| Bradford | 0.060 | 0.045 | 0.045 | Warrington | 0.038 | 0.039 | 0.039 |
| Middlesbrough | 0.060 | 0.045 | 0.050 | **Leeds** | 0.038 | 0.039 | 0.039 |
| Reading | 0.060 | 0.043 | 0.048 | **Manchester** | 0.037 | 0.040 | 0.039 |
| Exeter | 0.060 | 0.044 | 0.047 | **London** | 0.037 | 0.038 | 0.039 |
| **Sheffield** | 0.050 | 0.042 | 0.048 | Blackpool | 0.037 | 0.047 | 0.045 |
| **Bristol** | 0.047 | 0.040 | 0.042 | Slough | 0.035 | 0.034 | 0.037 |
| **Edinburgh** | 0.045 | 0.043 | 0.043 | Crawley | 0.034 | 0.034 | 0.033 |

**Notes:** London and major northern regional capitals in bold

Cities ranked in descending order of specialisation for 1971

Thus, what these analyses show, at the level of 82 sectors, is a dual tendency for *sectoral structural convergence* and an *overall decline in (relative) specialisation* across the British city system over the past forty years or so.[81] A key question, then is what these structural trends have implied for the city patterns of productivity growth identified in Section 5.2.

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[81] We have a more detailed sectoral breakdown, for some 249 industries, for each of the 85 cities for the subperiod 1991-2014. Analysis of these data also indicated structural convergence and a decline in specialisation across the cities of a comparable scale to that found for the 82-sector series for this same subperiod.

## 5.5    Structural Change and Productivity Growth Across British Cities

To provide background for the city analysis, Table 5.5 summarises the relationship between structural shifts in employment and labour productivity for selected sectors for the British economy as a whole.

**Table 5:  Change in Employment Share and Average Annual Productivity Growth of Major Sectors of the British Economy, 1971-1991 and 1991-2014**

| | Change in Employment Share (Percent point) | | | Average Annual Rate of Change in Labour Productivity | | |
|---|---|---|---|---|---|---|
| | 1971-1991 | 1991-2014 | 1971-2014 | 1971-1991 | 1991-2014 | 1971-2014 |
| Metals and Related | -2.71 | -1.24 | -3.95 | 3.75 | 2.03 | 3.65 |
| Textiles and Related | -2.50 | -1.36 | -3.86 | 4.30 | 3.46 | 4.51 |
| Light Manufacturing | -3.41 | -2.89 | -6.30 | 3.56 | 2.47 | 3.93 |
| High Tech Manufacturing | -4.41 | -2.58 | -6.99 | 5.90 | 4.98 | 7.96 |
| Utilities | -0.57 | -0.17 | -0.74 | 6.58 | 1.65 | 5.11 |
| Construction | 0.67 | -1.23 | -0.56 | 0.43 | 0.84 | 0.69 |
| Transport and Logistics | -1.05 | -1.20 | -2.25 | 2.32 | 2.42 | 2.98 |
| Retail and Personal Services | 5.06 | 2.09 | 7.16 | 0.92 | 2.06 | 1.74 |
| Knowledge Intensive Business Services | 6.19 | 6.53 | 12.72 | 2.53 | 2.34 | 3.06 |
| Public services | 4.21 | 2.96 | 7.17 | 0.87 | 0.47 | 0.29 |
| All Industries (Great Britain) | - | - | - | 2.08 | 1.69 | 2.25 |

**Source:** Authors' own data

**Note:** Employment shares are of the Great Britain total. For definitions of these broad sectors, see Table A1 in Appendix A.

These show that productivity growth has tended to be higher in the production and manufacturing industries – precisely those that have seen their employment shares fall – than in various services, precisely the sectors that have experienced the highest increases in employment share. This would seem to support the argument, alluded to earlier, that a contributing factor behind the national productivity slowdown may well be the structural shift of the economy from manufacturing to private and public services, since the latter would appear to have achieved lower rates of productivity growth than the former. However, at the same time, and importantly, Table 5.5 also indicates that productivity growth fell in most sectors between the two periods, including in both high-tech manufacturing and knowledge intensive business services, often regarded as two key sources of dynamism in the

contemporary economy. Retail and personal services were the main exception to this widespread slowdown. Thus, while the structural reorientation of the economy would seem likely to have contributed to the slowdown of national productivity growth, it would also seem that part of that slowdown has been due to 'within-sector' factors that have reduced the rate of productivity advance across most sectors, regardless of structural change.

To explore the relative contribution of these two main 'sources' of productivity growth across Britain's cities, we use a well-established decomposition technique that has been employed to analyse the relative contribution of 'between' and 'within' sector effects to aggregate national productivity growth of individual countries and across sets of countries (Foster, et al, 1998; Fagerberg, 2000; Pieper, 2000; Disney et al, 2003; Peneder, 2003; Kruger, 2006; Ocampo et al, 2009; Timmer and de Vries, 2009; McMillan and Rodrik, 2011; and Kucera and Roncolato, 2012; Roncolato and Kucera, 2014). [82] Although the results of these studies vary according to time period, data frequency, whether structure is measured by employment shares or output shares, the choice of labour productivity or total factor productivity, and the particular variant of the decomposition technique used, somewhat surprisingly the balance of the findings is that the 'within-sector' effect dominates the 'between-sector' effect, ie. the effect due to structural change. In discussing these national studies, Haltiwanger (2000) has argued that structural change is much more intense within industries than between industries, *even at detailed levels of sectoral disaggregation*. At the same time, a number of studies have used the same sort of 'within' and 'between' firm decomposition to investigate productivity growth of a given sector (Baily et al, 1992, 2001; Foster et al, 1998; Bartlesman and Doms, 2000; Disney at el, 2003, Cantner and Kruger, 2006). In a similar way, these tend to find the 'within-firm' effect is greater than the 'between-firm' effect.

Following Kruger (2006, 2008), we can decompose a city's productivity growth rate over a given period *t* to *t+k* into three components:

$$\frac{\Delta Y_{jt+k}}{Y_{jt}} = \frac{\sum_{i=1}^{n} s_{ijt}\Delta y_{ijt+k}}{Y_{jt}} + \frac{\sum_{i=1}^{n} \Delta s_{ijt+k}(y_{ijt}-Y_{jt})}{Y_{jt}} + \frac{\sum_{i=1}^{n} \Delta s_{ijt+k}\Delta y_{ijt+k}}{Y_{jt}}$$

(3)

---

[82] Several extensions and further disaggregations of Equation (3) have been proposed (Baily et al, 1992; Griliches and Regev, 1995; Olley and Pakes, 1995; Foster et al, 1998; Fagerberg, 2000; Disney et al, 2003). For example, Baily et al (1992) and Foster et al (1998) derive versions with additional terms that represent the contributions of entering and exiting establishments to aggregate productivity growth. These effects cannot be investigated here for the time period that is of interest

where $Y_{jt}$ and $y_{ijt}$ refer, in our case, to total and sector-specific labour productivity levels (real GVA per employed worker) in city $j$ at time $t$.   Note that $Y_{jt} = \sum_{i=1}^{n} s_{ijt} y_{ijt}$, where $s_{ijt}$ is sector $i$'s share of city $j$'s total employment. The $\Delta$ denotes the change in productivity and in employment shares between $t$ and $t+k$. The first term on the right-hand side of (3) is interpreted as the 'within-sector' effect, which is the share-weighted average productivity growth of the individual industries in city $j$ (the sectoral shares are held constant at their values at time $t$).   The second term represents the contribution of shifts in sectoral structure, holding initial sectoral productivity differentials constant (as measured by differences from the city average productivity level). It is positive if sectors initially with above average productivity levels experience increasing shares between period $t$ and $t+k$ on average, and industries with below-average productivity levels experience falling shares of total city employment, on average.  It will be negative if sectors with above (below)-average initial productivity levels experience falling (rising) shares of total city employment. The third term measures the combined effect of structural change and sectoral productivity growth rates over the period. It is positive if industries with positive rates of productivity growth tend to gain in terms of their shares (or more generally, if share change and productivity growth tend to have the same sign), and negative if sectors with positive productivity growth experience a decline in their share of city employment.  The second and third terms in equation (3) together represent the role of 'structural change' or 'between-sector' shifts in city productivity growth.

The results are shown in Figure 5.6 and Table 5.6.  Figure 5.6 plots the within-sector and between-sector contributions to total percentage productivity change in Equation (3) against the total percentage productivity change, for each of the 85 cities, for the two subperiods 1971-1991 and 1991-2014. As is clear, in both subperiods the overwhelming contribution to total productivity change across the cities was from 'within-sector' improvements (which are positive in all bar one case).

**Figure 5.6.  Decomposition of City Productivity Growth, 1971-2014, into Structural-Change (Between-Sector) and Within-Sector Components**
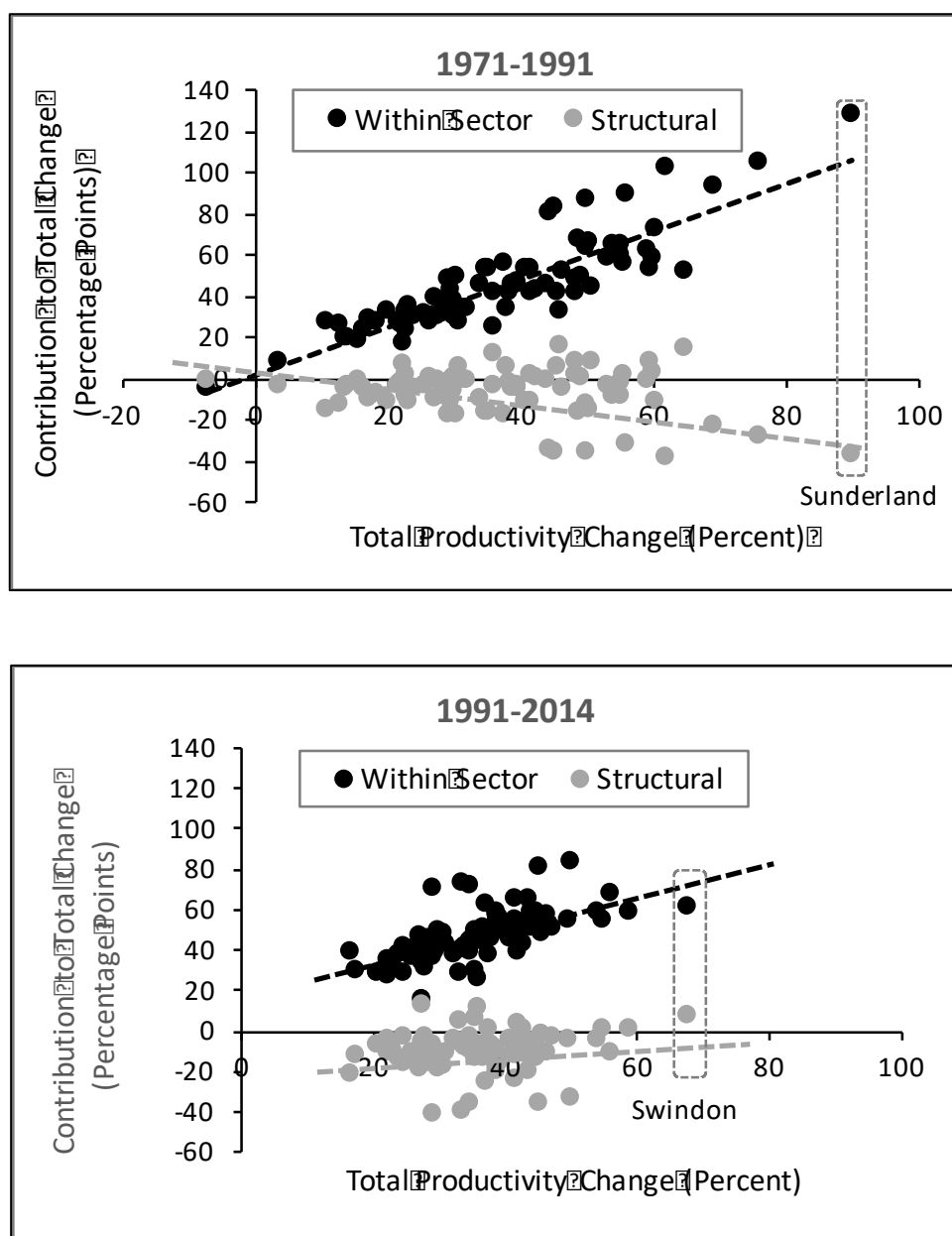


**Note:** The graphs should be read vertically, so that the sum of the within-sector and corresponding structural-change components for a given city equal the total productivity change for that city, given on the horizontal axis, as shown for the examples of Sunderland and Swindon.

This finding is in line with most of the decomposition studies of national and international productivity growth mentioned above, and indicates that the primary determinant of city productivity growth has come from improvements in performance within individual sectors of activity rather than from shifts in city economic structure.

**Table 5.6: Decomposition of City Productivity Growth: Structural Change and Within-Sector Components, Selected Cities. Growth in Percentage points over period indicated**

| 1971-1991 | | | | | | |
|---|---|---|---|---|---|---|
| Top Ten Cities | | | | Bottom Ten Cities | | |
| Total | Within | Structural | | Total | Within | Structural |
| Sunderland 89.8 | 127.7 | -37.9 | Blackpool | 17.6 | 26.4 | -8.8 |
| Blyth 75.9 | 104.5 | -28.6 | Basingtoke | 17.1 | 28.2 | -11.1 |
| Mansfied 69.3 | 92.4 | -23.1 | Plymouth | 16.5 | 22.2 | -5.7 |
| York 64.9 | 51.2 | 13.7 | Colchester | 15.4 | 17.4 | -2.0 |
| Merthyr Tydfil 62.0 | 101.0 | -39.0 | Eastbourne | 13.8 | 18.3 | -4.5 |
| Derby 60.5 | 71.9 | -11.4 | Hull | 13.4 | 19.2 | -5.8 |
| London 59.7 | 57.2 | 2.5 | Oxford | 12.7 | 25.7 | -13.0 |
| Halifax 59.6 | 52.1 | 7.5 | Medway | 10.8 | 26.5 | -15.7 |
| Middlesbrough 59.1 | 61.2 | -2.1 | High Wycombe | 3.7 | 7.4 | -3.7 |
| Doncaster 56.1 | 89.0 | -32.9 | Leamington | -7.1 | -6.0 | -1.1 |

| 1991-2014 | | | | | | |
|---|---|---|---|---|---|---|
| Top Ten Cities | | | | Bottom Ten Cities | | |
| Total | Within | Structural | | Total | Within | Structural |
| Swindon 67.8 | 61.1 | 6.7 | Chelmsford | 25.9 | 38.0 | -12.1 |
| Reading 59.1 | 58.2 | 0.9 | Bedford | 25.0 | 41.3 | -16.3 |
| Basingstoke 56.4 | 67.9 | -11.5 | Cardiff | 24.8 | 27.8 | -3.0 |
| Leamington 55.2 | 54.4 | 0.8 | Doncaster | 23.8 | 37.6 | -13.8 |
| Crewe 54.2 | 58.3 | -4.1 | Colchester | 23.4 | 33.7 | -10.3 |
| Eastbourne 50.4 | 83.8 | -33.4 | Plymouth | 22.6 | 34.2 | -11.6 |
| Derby 49.9 | 54.6 | -4.7 | Hull | 22.5 | 26.9 | -4.4 |
| Bradford 47.5 | 51.0 | -3.5 | Swansea | 20.6 | 28.1 | -7.5 |
| Milton Keynes 46.5 | 57.6 | -11.1 | Preston | 17.5 | 29.7 | -12.2 |
| Tunbridge Wells 45.9 | 48.0 | -2.1 | York | 16.9 | 39.2 | -22.3 |

The 'between-sector' or structural-change contribution (the second plus third terms on the right-hand side of Equation 3), is not only generally less important, but moreover in most cases is *negative*, indicating that cities have shifted structurally from higher productivity growth sectors into lower growth ones. This effect appears to have been greater in the 1971-1991 period, and reflects the falling employment shares of higher productivity growth sectors - mainly manufacturing – in cities over these years. In the 1991-2014 period, there is also some slight tendency for this negative shift to be less in those cities that recorded the highest rates of total productivity growth.

Overall, however, the evidence in Figure 5.6 suggests that first, for almost all cities, structural change has in fact had a negative effect on productivity growth (most cities have shifted from higher productivity growth activities into lower productivity growth ones), so that this accounts for part of the slowdown in productivity growth observed in most cities, but especially northern cities; second, productivity growth in British cities has been largely due to within-sector productivity developments, but that this component of productivity growth has also slowed over the study period, compounding the negative effect of structural change. Significant firm heterogeneity in productivity, product quality, and management practice, even with narrowly defined industrial sectors, has been well documented (Melitz, 2003; Melitz and Redding, 2012). In this sense, our results confirm the findings of earlier studies that emphasise that in mature industrialised economies there are persistent and large productivity differentials *within* individual industries and sectors which tend to dominate productivity growth (Bartelsman and Doms, 2000; Haltiwanger, 2000; Krüger, 2006).

## 5.6     Between-City Differences in Within-Sector Productivity Growth

At a broad level, there are two key causes of within-sector productivity change. The first is a 'recomposition or reallocation effect' and involves the entry and exit of firms and the re-allocation of market shares between incumbent firms. In general, a higher rate of firm and plant entry leads to faster productivity growth as new entrants tend to have higher productivity than those that exit or are closed.[83] If large, efficient and well-organized firms and plants gain market share this will also of course push up productivity growth. Thus, varied entrepreneurial dynamics and large firm investments in new plants across cities will strongly shape their productivity growth. The second major set of (within-sector) processes centres on technological and organizational change among surviving firms which includes both the adoption of innovations as well as improved management, organizational practices and formats. Typically, these are shaped by the intensity of competition faced by firms, and by their regulatory and institutional context, and in the UK they are often proxied by the amount of capital employed per worker and linked to foreign ownership of the firm (see Webber et al, 2009). Existing industry research implies that both of these two processes are likely to be responsible for the intra-industry urban variations in productivity that we have found (Disney et al, 2003), although the relative importance of these two processes may change in different periods (see, for example, Riley and Bondibene, 2016). It is highly likely that the two sets of

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[83] Harris and Moffat (2015) argue that firm entry and closure have been the most important cause of change to total factor productivity differentials across Local Enterprise Partnership areas in the UK, but struggle to link this to the economic characteristics of these areas.

processes are combined in cities in mutually reinforcing ways, especially through the growth of the highest-productivity firms. In many industries, market share is dominated by a small minority of firms (Hottman et al, 2016). Not only do these leading 'frontier' firms tend to be exporters but they also have high productivity, complex organisation, and better product quality and scope, and their growth reallocates market share away from weaker, less productive competitors (Melitz and Redding, 2012; Andrews et al, 2015). Micro-evidence indicates that the distribution of firms by productivity levels is more right-skewed and stretched in some British city-regions (Oguz, 2017), which suggests that some cities are likely to have a greater prevalence of these 'frontier' and exporting firms. It is highly probable, then, that city productivity levels and trends depend considerably on the degree to which cities manage to host and encourage the emergence and growth of these efficient, exporting firms. The processes causing the emergence and growth of such firms in particular cities require much more attention. We hope to explore this issue in a future paper.

Further, greater exposure of a city's economy to global markets and competitors tends to produce a divergence in the performance of its higher and lower productivity firms (Ottaviano, 2011). In several ways, the uneven diffusion of globalisation has widened differences amongst firms within industries. In addition, ICT and digitisation are bound up with firm entry and exit, are changing firm activities, and leading to the emergence of digital activities that blur industry boundaries (including, in some instances, between what constitutes 'manufacturing' and 'services'). In this context, revisions to industry classifications are lagging well behind the growth of new activities and reorganisation of older ones. What this may imply is that the geography of 'structural change' is no longer well measured by changes in industrial classes and categories but needs to be analysed in a more fine-grained way within particular industries, for example in terms of firm capabilities, or occupational or task 'bundles'.

There is thus a growing recognition that industry classifications may not capture those forms of activity change and restructuring that are widening differences *within* particular industries. Many industries now include firms that vary significantly in terms of the occupations they involve, the markets they reach, and the tasks and functions that they perform (see Baldwin, 2016). Partly, of course, this is due to the new divisions of labour emerging from supply chain re-organisation and the specialisations of areas and cities in specific tasks, stages and occupations rather than in particular sectors. In fact, some 30 years ago, Massey (1984) argued that the spatial organization of the British economy was shifting from a pattern based on urban and regional sectoral specialization — the pattern that had underpinned the industrial era of national economic growth during the 19th century and first half of the 20th — to one based on urban and regional functional specialisation, a new spatial division of labour

in which shifts in technology and corporate organisation were leading to the spatial separation of the different stages and functions involved in an activity, with, say, head office functions in one location, research and development in another, and production in yet another (possibly even overseas). More recently, certain urban economists have argued that cities have been undergoing just this process, and have become less distinguished by their industrial structures than by their functional specialisms and roles (Acemoglu and Autor, 2011; Duranton and Puga, 2005). As Duranton and Puga put it:

Cities shift from specialising by sector—with integrated headquarters and plants — to specializing mainly by function —with headquarters and business services clustered in larger cities, and plants clustered in smaller cities (p. 343).

Allied closely with this process has been the trend towards the outsourcing of certain functions, and the emergence of spatially distributed production networks, often global in nature. Baldwin and Everett (2014) refer to this spatial fragmentation of production and 'slicing up of the value chain' amongst often numerous suppliers and intermediate producers, as the 'second unbundling' (the 'first unbundling' being the geographical separation of production and consumption enabled by the transport revolution of the 19th century). In effect, the vertical disintegration of many production processes (not only in manufacturing but also in some services) has been accompanied by spatial fragmentation and dispersal of the component activities that make up that process. Thus, it is perhaps not so much what *sectors* a city specialises in that matters for growth, but its comparative advantage to host particular *stages or functions* in a spatially distributed—even globally organised—production network (value chain) (Brakman et al., 2014 ). These sorts of processes and trends towards the increasing importance of 'function' over 'sector' may be another reason for the significance of the 'within-sector' component of city productivity growth.

Unfortunately, we do not have data on the functional composition of sectors by city. In any case, the issue still remains why certain functions are likely to locate in some cities and other functions in others. Duranton and Puga, in the quote above, argue that 'higher-order', and presumably higher-value-added, functions tend to locate in larger cities, and 'lower-order' functions in smaller cities. This is in line with those authors who argue that productivity is higher in large cities, because agglomeration gives rise to various external economies or increasing returns effects (such as knowledge spillovers, inter-firm linkages, market size, and a large labour pool) which confer particular advantages to  firms there.  These agglomeration externalities are all assumed to increase with city size, or city density. It has been estimated, for example, that a doubling of city size increases a city's productivity *level* by between 4-8 percent (see Rosenthal and Strange, 2003).  But not only are such estimates modest, they

are based on cross-city regressions of city size and productivity *levels* at a particular point in time, and do not consider how long-run productivity *growth* is related to changes in city size, nor how agglomeration externalities themselves may change over time.[84] In many ways, the notion of 'agglomeration' has become something of a conceptual chimera, a portmanteau notion that has become overworked as an explanatory device. In fact, the empirical evidence for the importance of agglomeration externalities in shaping the economic performance of cities is far from unequivocal (for a detailed survey of the field, see Beaudry and Schiffauerova, 2009).[85]

Further, both the nature and impact of agglomeration economies can be expected to vary over time with as a city's developmental path evolves. As a city's industries follow their own life cycles over time, so too may the scale and influence of the agglomeration effects associated with those industries: in short, agglomeration economies may also trace out evolutionary life cycles (Potter and Watts, 2011). In addition, it is by no means inevitable that the benefits to a city's firms of the various positive externalities that are believed to accrue from agglomeration increase linearly with increases in city size (or density). Various negative externalities or diseconomies - such as congestion, pollution, and high land and housing cost inflation - may set in as a city increases in size (or density), all of which may limit the productivity growth of the city's firms. We know relatively little empirically about such possibilities, although Baldwin et al (2002, pp. 436-441) use a theoretical NEG framework to show how "the agglomeration process, if pushed too far, can also be detrimental to growth" (p. 437) precisely because of congestion and related negative externalities. What might be as, if not more, important than city-size related agglomeration economies per se is a city's access to and connectivity to other cities, as markets and pools of (commuter) labour, that is a city's economic or market 'potential'. Cities that are close to a major centre, or that are part of a dense and well-connected regional network of other cities, may be able to benefit from market-size, supply-chain opportunities and workforce availability in ways that are denied to cities not so favourably located, connected and networked.

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[84] It would hardly be feasible - or environmentally desirable - for a city to continue to double in size repeatedly over time as a way to raise its productivity.

[85] Empirical findings vary according to how agglomeration itself is measured or proxied, what other (conditioning) variables are included in regression models testing for the impact of agglomeration, and the type and scale of geographical units used. Such is the variation in findings that it is somewhat puzzling that the claims made for agglomeration have assumed the prominence they have: it might be argued that it is often a case of theory over evidence.

One important place-based influence on firm productivity singled out by recent research is the presence in a city of a high-skilled workforce. Other things being equal, a well-qualified and highly skilled workforce is assumed to confer particular advantages to the firms located there by enabling them more easily to develop new processes, products and services, in short to be more productive and hence competitive. Having a high proportion of professional, technical and highly skilled workers and occupations may therefore attract firms that carry out high-order functions in a given sector of activity. The presence of such firms in turn will attract these sections of the labour force. There is evidence, for example in the United States, that cities are becoming increasingly differentiated one from another by their relative human capital endowments, especially in terms of educational qualifications and skills (see, for example, Moretti, 2013). So cities that have traditionally attracted skilled workers, or which have succeeded in upskilling their workforce over time, might be expected to achieve a higher trend rate of productivity growth across their activities than cities which have inherited a low-skilled labour force from a previous phase of economic development, or which may have lost skills as a result of structural change and not been able to rebuild their labour forces around the new skills needed by today's growth industries.

Another key influence on a firm's productivity is its capability for innovation. There has long been a debate over whether local sectoral specialisation or diversity is the more conducive to innovation amongst a city's or region's firms. Some of the most compelling evidence suggests that a diversity of complementary activities may provide the most favourable local environment for innovation (a key contribution being Feldman and Audretsch, 1999). But much will depend on how far innovation and technical advances diffuse across a city's firms, and also between cities. Concern has emerged in recent years that even within a given sector, innovation and productivity advance are driven by just a few leading firms and that diffusion through the local population of firms is in fact limited, giving rise to a long tail of low innovation and lower productivity firms (World Bank, 2008; OECD, 2015; Haldane, 2017).

It is not possible to model the influence of these and other potential 'local' determinants of productivity growth in our 85 cities in detail because of severe data limitations. However, exploratory analysis of some plausible correlates is possible using some data series we have also constructed for British cities, in addition to the output, employment and productivity variables used above (see Table 5.7). Reliable data on the share of skilled employment in a city's total employment and on the number of patents per employee could not be constructed back to 1971, but only from 1981 and 1991 respectively.

**Table 5.7:  Correlates of City Productivity Growth**

| Variable | Description and data |
|---|---|
| PROD71 (PROD91) | City productivity level in 1971 (1991) – gross value added per employed worker. Source: data constructed as described in Appendix A. |
| MANSH71 (MANSH91) | Share of Manufacturing employment as percent of city total employment in 1971(1991). Source: data constructed as described in Appendix A. |
| KIBSSH71 (KIBSSH 91) | Share of Knowledge-based Business Services IBS employment as percent of city total employment in 1971 (1991). Source: data constructed as described in Appendix A. KIBS defined as SIC categories 58-66, 68-78 |
| PUBSH71 (PUBSH91) | Share of public sector employment in 1971(1991). Source: Source: data constructed as described in Appendix A. SIC 84-86,91 |
| KSI71 (KSI91) | Krugman Specialisation index (82 sectors). Calculated using sectoral employment shares (82 sectors), as in Equation (1). Source of data: as in Appendix A. |
| AGGLOM71 (AGGLOM91) | Total city employment 1971 (1991) per square km in relevant TTWA. |
| ATEM71 (ATEM91) | Access to economic mass (sum of GVA in all other TTWAs each inversely weighted by distance from reference city) 1971 (1991). City distances refer to straight line distances between city centres. |
| PATENTS91 | Number of patents per inhabitant. (1991) Patent data from, the European Patent Office (EPO) by the 8 patent sections defined by the International Patent Classification. The EPO data are based on the European Commission's NUTS3 areas, and were scaled to the 85 city TTWAs by an iterative sectoral employment allocation process, iterated across both geographical areas and patent classifications until the data reached convergence across both dimensions. Further details available are from the authors. |
| SKILLSSH81 (SKILLSSH91) | Employment in high skilled occupations as percent of city total employment in 1981 (1991). Source: data constructed by combining sectoral employment data (see Appendix A). data for employment by occupation in each TTWA in 2014 from the Annual Population Survey, and matrices of employment by sector and occupation (SIC-SOC matrices) for the nations and regions of the UK, for 1981-2014, as prepared by the Warwick Institute for Employment Research (IER). High-skilled occupations are defined as those belonging to Level 4 (Managers, Directors and Senior Officials, plus Professional Occupations).  Further details available are from the authors. |

Apart from employment density and employment size variables, intended to capture city agglomeration-type influences, we also include a measure of each city's 'market potential', that is its distance-weighted access to the economic mass (GVA) of all other cities and also non-city travel-to-work areas. This is included to allow for the possible advantages associated with a city's spatial proximity to market opportunities and supply linkages across the national economy, and possible regional scale multi-city agglomeration type effects. Simple correlations were calculated for the whole period, 1971-2014, and also for the two main subperiods, 1971-91 and 1991-2014, to allow for the change in dynamics identified earlier in the paper.

The results are given in Table 5.8. The correlations for productivity growth over the whole period show a significant negative association with base year productivity levels, a positive association with the base year share of city employment in manufacturing and a negative association with the base year share of city employment in KIBS.

**Table 8: Correlations by Sub Periods**

| Correlation *Probability* | PRODGR 1971-2014 | | PRODGR 1971-1991 | | PRODGR 1991-2014 |
|---|---|---|---|---|---|
| PROD71 | -0.648 *0.000* | PROD71 | -0.792 *0.000* | PROD91 | 0.011 *0.916* |
| MANSH7 | 0.432 *0.000* | MANSH71 | 0.453 *0.000* | MANSH91 | -0.029 *0.790* |
| KIBSSH71 | -0.315 *0.034* | KIBSSH71 | -0.374 *0.005* | KIBSSH91 | 0.232 *0.033* |
| PUBSH71 | -0.262 *0.015* | PUBSH71 | -0.240 0.027 | PUBSH91 | -0.203 *0.063* |
| KSI71 | 0.174 *0.118* | KSI71 | 0.149 0.174 | KSI91 | 0.162 *0.139* |
| AGGLOM71 | 0.224 *0.039* | AGGLOM71 | 0.233 0.032 | AGGLOM91 | 0.077 *0.482* |
| SIZE71 | 0.207 *0.058* | SIZE71 | 0.237 0.029 | SIZE91 | 0.054 *0.620* |
| ATEM71 | 0.078 *0.477* | ATEM71 | 0.076 0.491 | ATEM91 | 0.069 *0.584* |
| PATENTS91 | -0.187 *0.087* | PATENTS91 | -0.301 0.005 | PATENTS91 | 0.175 *0.118* |
| SKILLSSH81 | -0.253 *0.019* | SKILLSSH81 | -0.452 *0.000* | SKILLSSH91 | 0.263 *0.015* |

Both the correlation with the base year proxy for agglomeration (employment density) and that with city size ae both positive; while the correlations of productivity growth with the share of skilled occupations in total city employment (in 1981) and with patent intensity (at 1991) are negative. Increasing shares of public employment also appear to be negatively related to city productivity growth.

Again, of particular interest are the correlations when we compare the two main subperiods, 1971-1991 and 1991-2014. The change in the correlation between city productivity growth and initial productivity level, from -0.792 to 0.011 is in line with the shifting relationship illustrated in Figure 5.3. Equally marked is the change in sign of the correlations of city productivity with starting year shares of manufacturing and KIBS employment: whereas in the first subperiod, cities with larger share of manufacturing employment had higher subsequent rates of productivity growth, in the second subperiod it is cities with higher initial shares of KIBS employment that have higher growth. Higher shares of public sector employment are negatively associated with city productivity growth in both subperiods. What is also noteworthy is that the positive association with both the agglomeration proxy and city population size falls away in the second subperiod. Equally, the correlations with the share of high skilled occupations and patenting intensity both change from negative to positive, in line with arguments that these two factors have assumed increasing importance in driving city economic performance. The shift to a positive association between productivity growth and the proportion of employment in skilled occupations is consistent with the growing importance of function as against sectoral structure. Perhaps surprisingly, access to market mass (economic potential) is insignificant in both subperiods.

Clearly, more formal modelling would help to isolate the effect of both the structural and city-specific 'within-sector' variables in Table 5.8, taking into account the interrelationships among the correlates themselves. We do not attempt that here, however, in part because two of the key variables in Table 8 are not measured on the same timeframe as productivity growth, and in part – and crucially - because we lack the sort of firm-level data that would give us more insight into 'within-sector' business dynamics and ecosystems in individual cities. Even though these results do not directly confirm the suggestion that the 'second unbundling' is an important factor regarding the change in productivity growth dynamics, the significant, positive correlations of productivity growth with the share of KIBS and share of high-skilled labour in the period for 1991 onwards, would be consistent with this thesis. Moreover, the simple correlations in Table 8 at least confirm the basic finding of the paper, namely that a major change in city productivity growth dynamics occurred around the end of 1980s-early

1990s, with the geographical locus of productivity growth shifting from northern industrial cities to southern, more service-orientated cities. This shift has contributed to the overall long-run slowdown of national productivity growth over the past forty years or so in two ways: through the shrinkage of the industrial (manufacturing) base of northern cities and through the corresponding growth of a service-based economy across all cities (but led by southern cities) in which (the scope for and pace of) productivity growth appears to be more limited.

## 5.7 Conclusions and Implications

There is much concern and debate surrounding the causes of the productivity slowdown or 'puzzle' that confronts the UK and other OECD economies. This paper has identified an urban dimension to add to the numerous other aspects that make up this puzzle. In Britain, the shift from manufacturing, in which productivity growth was generally high, to a service economy in much of which productivity growth appears to be lower (Table 5), has had a distinct geographical dimension. The deindustrialisation of northern cities seems to have seriously slowed down their productivity advance, while the shift to services does not seem to have offset this loss, and even in southern cities, which have led the growth of services, productivity growth has slowed (Figure 4). Admittedly, productivity within the service industries is open to measurement problems, and variations across different service activities are also large (Baily and Solow, 2001). But the negative impact on productivity growth of the shift to services across almost all of the cities studied here suggests this ongoing structural change may be far from unproblematic.

It also raises issues for the long, but still ongoing, debate about whether and to what extent sectoral specialisation drives city growth. Perhaps unlike their American counterparts, British cities have become less sectorally specialised, and have converged in terms of the sectoral structures. Given that at the same time, productivity growth has slowed across Britain's cities, it might be argued that this is precisely in line with the specialisation thesis, because by becoming less specialised British cities have lost the localisation economies that specialisation is believed to foster.

However, the results of our decomposition analysis of city productivity growth also show that within-industry developments have in fact dominated productivity growth trends across cities, suggesting that it is now much less of a question of sectoral structure per se that determines a city's productivity growth – especially since cities have steadily converged in their sectoral structures (Section 3) – and that instead what matters, and requires in-depth investigation, is how productivity growth varies according to the intra-sectoral functions and stages of production or service provision found in cities. That is functional structure and specialisation

147

may be more important for productivity growth than sectoral structure and specialisation. The positive association between productivity growth and the share of high-skill occupations in a city's employment base (Table 8) lends some support to this idea, since higher-order occupations tend to be associated with higher-order functions and tasks within a given sector of activity. Other research that we are conducting involving a detailed analysis of the evolution of the occupational-skill profiles of British cities since 1981, indicates a significant and persistent divide between higher skill southern cities and lower skilled northern ones. This in part reflects the different economic histories of these two city groups.

Nevertheless, the findings from our analysis have some relevant implications for policy. There is currently keen interest by the UK Government in its new industrial strategy capable (Department of Business, Energy, Innovation and Skills, 2017) of achieving two main, interrelated objectives: improving the productivity growth rate of the national economy, and achieving a more geographically even pattern of that growth (Department of Business, Energy and Industrial Strategy, 2017). The declared recognition is that to achieve these goals a 'place-based' approach is necessary. While it is arguable whether, as it stands at the time of writing, the Government's strategy is actually sufficiently place-based, our findings in this paper certainly support the need for such a perspective. Despite the phase of 'catch-up' over the 1970s and 1980s, productivity in most northern cities remains below that of most southern cities (Figure 3). Thus, while there is a need to raise productivity growth across the whole economy – and this will require, among other things, increases in investment by firms, improvements in the skills of the workforce, a high rate of innovation by firms, and improvements in public infrastructures (physical and digital), both north and south - the task is more pressing in northern cities. Restoring the tradable base of Northern cities and upgrading their role in international supply chains in key sectors, will need explicit attention. The more so, given the UK's imminent withdrawal from the European Union. Depending on the eventual terms of that withdrawal, British cities may lose their preferential access to the European market and face added competitive pressures from global competitors, making a high rate of productivity growth all the more crucial. Our analysis in this paper has undoubtedly raised more questions than it has answered. But one thing it has demonstrated is that discussions around – and indeed policy actions directed at – the 'productivity puzzle' facing the UK need to take explicit account of the geographical bases and consequences of the problem.

Further, although the findings in this paper relate to the British context, they have a wider empirical and theoretical relevance. As was shown in Section 2. Several major advanced economies have also experienced a slowdown in their trend rate of productivity growth. And as Muro and Parilla (2017) argue in the case of the United States, the city dimension may

well have a major bearing on understanding the dynamics and possible contributing causes of this slowdown in other advanced economies. The finding of our British analysis points to the validity of this argument. The specifics may well differ from country to country, but it could well be that the geographies of productivity growth (and slowdown) are not simply by product of national trends but constitutive of them. At the same time, our findings for British cities raise some questions for the literatures that argue for the significance of specialisation and economic structure for city economic performance. Much more research is needed, directed at changing structures and dynamics over quite long periods of time, rather than static cross section analyses at a particular point in time. One thing does seem clear, however: improving productivity is more than a 'macro-economic' issue. After all, as Jane Jacobs (1984) argued strenuously more than thirty years ago, it is in cities and city-regions where the wealth of nations is created, with nations becoming wealthy as their cities become more productive, and subsiding into low standards of living if their cities lose economic vitality.

# 6 In Search of the Skilled City

## 6.1 Introduction

The accumulation of skills and human capital are central to the process of urban economic growth (Chinitz 1961). Moreover, the significance of skilled occupations is said to have increased dramatically in recent decades and become crucial to post-industrial city growth and the main priority for urban economic policy (Cheshire et al. 2014, HM Government, 2011). According to Parkinson (2016, p. 632), for example, "A skilled workforce is a critical feature of competitive cities. Modern economies increasingly depend upon knowledge-intensive sectors, even within manufacturing. Policymakers and businesses typically rate this as the most significant single factor".

Despite the broad consensus on the importance of skills, much less agreement exists on exactly how skills and skilled occupations are changing across cities. Instead, there are several influential narratives about how skills are shaping the dynamism of city economies. One argues that there is an increasing divergence between high and low-skill cities which is producing a 'winner takes all' geography in which skilled people are drawn to successful cities (Moretti, 2013). Another envisages the consolidation of skills-equilibria in different urban economies with labour supply and demand for skilled occupations at different skill levels becoming matched at low, medium or high positions (Green, et al., 2016). A further interpretation, popular in the UK, is that economic growth has been held back by education failures, shortages in skills supply, insufficient connection with employer needs, and limited devolution over skills policy (Brown et al. 2018, CBI, 2016).

Despite these debates, there has been a relative lack of research on the geography of skilled occupations and their changes through time, especially outside of the US[86]. Furthermore, skills, and their use and application in particular jobs, are notoriously difficult to measure directly (Bacolod et al., 2009). This paper aims to begin to remedy this lack of research. It starts by examining research on the rise of the 'skilled city' and identifies its three main propositions about the relations between city characteristics and skilled jobs. The first is that the proportion of the workforce in high-skilled occupations has driven stronger employment

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[86] Indeed, much of the most influential literature on skills, education and city growth is based on analyses for the United States, especially the writings of Glaeser and co-authors (see, for example, Glaeser and Saiz, 2003; Glaeser and Berry, 2006) and Moretti, (2013). Peck (2016) argues that Glaeser's significant policy influence represents the construction of a neoliberal urban orthodoxy.

growth across cities. The second is that initially high skilled cities have seen faster growth in high-skilled occupations, thereby widening the gap with less skilled cities. The third is that larger and denser cities have generated higher growth rates in higher-skilled occupations. Using a detailed and comprehensive dataset for occupational change in 85 cities between 1981 and 2015, the paper assesses whether these propositions help to explain the economic performance of cities in Britain. Addressing a further neglected area in the skilled city work, it then briefly examines the pattern of occupational polarisation seen in British cities over this period and identifies important regional differences.  The results confirm the close interactive relationship between growth and high-skilled occupations. However, some of the other 'skilled city' arguments, such as 'smart cities becoming smarter' and a positive relationship between agglomeration and high skilled employment growth, have only limited applicability in Britain.

## 6.2    The Rise of the 'Skilled City'

It has long been recognised that human capital is a key constituent of endogenous urban development and long-run city growth (Martin and Sunley, 1998; Simon and Nardinelli, 2002; 1996). Glaeser and Saiz (2003) find that, for more than a century, better educated cities in the US have grown faster than comparable cities with less human capital (see also Glaeser et al. 2014; Simon, 1998).  Many authors have since gone further to argue that the significance of human capital has increased and become *the* key engine of city growth. Indeed, this research has been a principal contribution in the resurgence of urban economics and its strong influence on city policy since the 1990s (Cheshire et al., 2014). Glaeser (2009, 49) writes, "In the twenty-first century, idea production appears to have become the major business of many metropolitan areas, and skilled workers seem to be the most important element in the production of ideas". Thus, "the key to urban success or failure in today's economy is simple: high-skill cities prosper; low-skill ones stagnate or decline" (Glaeser 1996, p. 3; see also Glaeser et al., 1995; Glaeser and Gottlieb, 2009). Moretti (2013), referring to the US experience, describes a 'Great Divergence' beginning in the 1980s between 'innovation-hub' cities with high educational levels, generating abundant knowledge spill-overs, and cities with poorly educated workforces and outdated industries.

The key argument here is that that the geographical concentration of skilled and educated people in cities raises productivity growth, underpinned by the stronger external economies of agglomeration in skilled cities (Glaeser and Resseger, 2010). Furthermore, globalisation has increased the economic returns from knowledge creation and dissemination, and raised the rewards for face-to-face knowledge sharing (Glaeser and Gottlieb, 2009; Glaeser, 2012).

In global North economies, cities have flourished as amenity and consumption nodes rather than production centres, and as magnets and generators of creative talent (*ibid.*).

Several main and stylised propositions can be distilled from this literature for closer investigation in Britain's cities. While there is varying support for, and interpretations of the causes of, these propositions, they have become recurrent and core themes echoed in many policy reports. The first is that *more skills and human capital generate stronger economic growth through positive externalities that raise productivity and innovation*. These externalities and spill-overs are evidenced by the wage premium paid to skilled workers in cities (Glaeser and Maré, 2001; Gabe, 2009). In a post-industrial economy, occupations that require cognitive and social intelligence skills and assets are growing, whereas those that require physical skills are declining (Scott, 2009)[87]. Hence, it is argued that cities with greater shares of cognitive and social types of skill are most likely to grow fastest (Bacolod et al., 2009), and to better absorb knowledge and prove more adaptable. Differences in the kinds of skilled labour concentrated in cities explain their divergent economic performance (Markusen and Schrock 2006), highlighted and popularised by claims about the 'creative class' in urban economic growth (Florida et al., 2012).

The second proposition is that *skilled cities are becoming more skilled*. As Glaeser and Berry (2006) put it, 'smart places are getting smarter'. More initially highly skilled and educated cities are attracting more skilled labour (Berry and Glaeser, 2005). In Moretti's (2013, p. 5) terms, "The success of a city fosters more success, as communities that can attract skilled workers and good jobs tend to attract even more. Communities that fail to attract skilled workers lose further ground". Although high-skill cities have higher factor costs, skilled workers are more productive, earn higher wages and move to these cities to get on career 'escalators and elevators' and benefit from externalities and networks that boost their experiences, earnings and careers (Gordon et al., 2015). The causes of this divergence have been debated vigorously. A people-focused approach has argued that it is driven by the location decisions of skilled individuals. This claims that skilled people choose to live close to other skilled people to again access to valuable knowledge 'windfalls' and to enjoy amenity values and higher quality consumption facilities in larger urban centres (Glaeser et al., 2001). Florida's creative class is a version of this approach, albeit with a somewhat different and wider understanding of amenities and pull-factors that are assumed to operate. An alternative production-based approach sees the uneven growth of industries, firm and innovation systems as the principal underlying cause of skill divergence (Moretti, 2013; Storper and

[87] Although in the UK it should be noted that there is evidence that the growth in skills demand and particularly demand for numeracy and literacy skills has faltered since 2012 (Henseke et al, 2018 )

Scott, 2009). Skilled cities are attracting industries that require more skills (Simon, 2004). However, both approaches see cumulative skill divergence as a key pattern.

A third stylised proposition is the positive relationship between city size and skills. Here, it is argued that *larger cities tend to have stronger concentrations of the high-skilled occupations and capabilities and generate faster growth in these occupations*. A strong complementarity between city size, skills and learning is found in studies in the US and some other countries, reflected in the positive relationship between city size and productivity. Puga (2017) concludes that bigger cities have a disproportionate share of high skilled occupations and these size differences are growing (see also Florida et al., 2012). The literature acknowledges some qualifications and complications, and in some accounts city size is not sufficient for high skilled growth. Large and dense cities act as magnets for educated people only when they offer amenities that are attractive to discerning residents (Glaeser et al., 2001; Glaeser, 2012; Glaeser and Resseger, 2010). Markusen and Schrock (2006) report that some high skill, higher order occupations have grown fast in second-order metropolitan areas, but note that these may be part of world city conurbations because the largest cities exert a gravitational force on high order jobs. According to Scott (2009, p. 224), cognitive skills bear a distinct relationship to the urban hierarchy such that:

large metropolitan areas in the USA are marked by especially dense concentrations of cognitive human capital, or, in other terms, mental, behavioural and cultural assets embodied in the labour force. Small metropolitan areas, in contrast, have a much greater proclivity to harbour human capital assets that entail more physical aptitudes such as strength, stamina, manual dexterity and mechanical skills.

As Storper and Manville (2006) cautioned, this proposition about size can obscure different types of agglomeration because it includes the 'emergence' of sprawling newer cities as well as the 'resurgence' of older large and industrial cities.

The growth of high skilled occupations, of course, tells only part of the story about recent occupational change. While the 'skilled city' work has focused on the top of the occupational hierarchy, the growth at the bottom and a decline in middling wage and medium skill jobs has been relatively neglected. The resulting occupational polarisation has been found in many mature industrialised and especially urban economies (Goos et al. 2014; Oesch and Rodriguez Menes, 2011; Michaels and Van Reenen, 2010). This 'hollowing-out' is explained primarily in terms of the impacts of computer and information technology raising demand for educated labour and eliminating routine and semi-skilled work (Autor et al., 2003; Autor,

2015). It is has also been increased by the global outsourcing of routine manufacturing employment (Hijzen et al., 2005; Gagliardi et al., 2015). The geography of this 'hollowing-out' has received relatively less attention, however, and its impacts across cities remain under-studied. Moretti (2013) argues that traditional manufacturing cities have suffered most from 'hollowing-out' and that this underlies their divergence from 'innovation hubs'. The implication, then, is that there is a negative relationship between high skilled growth and the 'hollowing-out' of middle-skill occupations across cities.

Most of the empirical evidence in the 'skilled city' literature pertains to US cities (Dijkstra et al, 2013). There has been much less work on other countries, where the lack of detailed data has constrained analysis. It is unclear whether, how and when differences and path dependencies in other national and urban contexts continue to matter (Christopherson, 2002). To begin remedying this gap, this paper aims to explore these main 'skilled city' propositions in the British context. Human capital in Britain has certainly been subject to divergent spatial trajectories (Duranton and Monastiriotis, 2000; Champion et al., 2014; Green, A., 2016; Cheshire et al., 2017), although there is some debate on their significance (McCann, 2016). The UK has moved strongly to a service economy within a relatively de-regulated, although not highly geographically mobile, labour market, and its cities have experienced divergent economic trajectories since the early 1990s, if not before (Martin et al., 2016; Martin et al., 2017). Given that human capital is endogenous to economic growth, we would expect to find strong relations between skills and city divergence. Here, we test whether and how far the skilled city propositions explain the experience of British cities. Beforehand, a note on data issues is in order.

## 6.3    Measuring Skills and Defining Occupations

Measuring and tracking human capital and skills present substantive methodological challenges. It is difficult directly to assess the combinations of skills that workers are using in their work in different occupations at different times, and there are only a limited number of often partial skill surveys. Most studies are forced use some kind of proxies of skills. The skilled city literature discussed above often uses percentage of population educated to degree level. However, this educational measure has been widely criticised as some types of skill are acquired through experience and interactions with others rather than through formal education, and a college education is not a prerequisite for all high knowledge occupations (Florida et al., 2012; Gabe, 2009; Florida and Mellander, 2018). Occupation profiles are a more direct proxy of skill levels and can show more detailed types of skill differentiation (Bacolod et al., 2009). Occupations are themselves, of course, made up of a bundle of tasks and activities that may change over time. In the UK, skill surveys indicate that

skills, and especially literacy and inter-personal or influencing skills, in the same occupation have been increasing (Green, F. 2016). Nevertheless, it is still useful to classify occupations by the bundles of tasks and skills that they involve in order to distinguish occupations that involve mainly cognitive and social intelligence skills from those using mainly physical and manual skills.

Unfortunately, no official, regularly collected and detailed time series data on occupations or skills are produced for the various cities in the UK[88]. Thus, a major step in the analysis involved the construction of as accurate and consistent a data set as possible from the few data sources on occupations and skills that do exist. Here, the method uses the division of standard occupational groups into four skill levels used by the UK Commission for Employment and Skills (Table 6.1). Jobs are classified in groups according to the concept of 'skill level' and 'skill specialisation'. For the UK, the four levels are distinguished by the duration of training and/or work experience as well as the qualification level required. Table 6.2 shows the allocation of occupational groups to the four skill levels. Focusing on the skilled city propositions, discussed above, the Level 4 group is of specific interest because its members have well above average levels of 'data' and 'people' skills (Dickerson and Wilson, 2012). A degree level qualification is normally required for jobs at Level 4 whereas Level 3 occupations typically require technical qualifications. However, Skill Level 4 usefully excludes those graduates who are not working in high-skilled jobs and includes non-graduates who have risen to senior management corporate positions.

**Table 6.1: A Summary of Skill Levels based on SOC10 groups**

| A Summary of Skill Levels | |
|---|---|
| 1 | Equates with general education, short periods of work-related training, includes postal workers, hotel porters, cleaners and catering assistants |
| 2 | Occupations require a good general education plus a longer period of work-related training or work experience. These include machine operation, driving, caring occupations, retailing, and clerical and secretarial occupations. |
| 3 | Requires a period of post-compulsory education, e.g. technical occupations, trades occupations and small businesses. Educational qualifications at sub-degree level and/or a significant period of work experience are typical. |

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[88] While th Labour Force Survey collects such data, the robustness of the data at smaller spatial scales is poor.

| 4 | Includes 'professional' occupations and high level managerial positions in corporate enterprises or national/local government. Require a degree or equivalent period of relevant work experience. |
|---|---|

Source: Dickerson et al. (2012, p.72-75)

## Table 6.2: Allocation of Occupational Groups to Skill Levels

| | Major Group | | Sub-major Groups | Skill Level |
|---|---|---|---|---|
| 1 | Managers, directors and senior officials | 11 | Corporate managers and directors | 4 |
| | | 12 | Other managers and proprietors | 3 |
| 2 | Professional occupations | 21 | Science, research, engineering and technology professionals | 4 |
| | | 22 | Health professionals | 4 |
| | | 23 | Teaching and educational professionals | 4 |
| | | 24 | Business, media and public service professionals | 4 |
| 3 | Associate professional and technical occupations | 31 | Science, engineering and technology associate professionals | 3 |
| | | 32 | Health and social care associate professionals | 3 |
| | | 33 | Protective service occupations | 3 |
| | | 34 | Culture, media and sports occupations | 3 |
| | | 35 | Business and public service associate professionals | 3 |
| 4 | Administrative and secretarial occupations | 41 | Administrative occupations | 2 |
| | | 42 | Secretarial and related occupations | 2 |
| 5 | Skilled trades occupations | 51 | Skilled agricultural and related trades | 3 |
| | | 52 | Skilled metal, electrical and electronic trades | 3 |
| | | 53 | Skilled construction and building trades | 3 |
| | | 54 | Textiles, printing and other skilled trades | 3 |
| 6 | Caring, leisure and other service occupations | 61 | Caring personal service occupations | 2 |
| | | 62 | Leisure, travel and related personal service occupations | 2 |
| 7 | Sales and customer service occupations | 71 | Sales occupations | 2 |
| | | 72 | Customer service occupations | 2 |
| 8 | Process, plants and machine operatives | 81 | Process, plant and machine operatives | 2 |
| | | 82 | Transport and mobile machine operatives | 2 |
| 9 | Elementary occupations | 91 | Elementary trades and related occupations | 1 |
| | | 92 | Elementary administration and service occupations | 1 |

Source: Dickerson et al (20120 page 75).

Using these definitions, in what follows, we focus on 85 cities in Britain between 1981 and 2015[89]. The cities are defined geographically by Travel to Work Areas (TTWAs) using 2011 boundaries. The key criterion is that 75% of the total workforce both lives and resides in this area. On this basis we identified 85 cities with populations above 200,000[90]. This dataset construction involved three main stages: i) estimating Standard Industrial Classifcation – Standard Occupational Classification (SIC-SOC) matrices of employment by sector and occupation for each TTWA drawing upon the Working Futures 2014-24 matrices. Working Futures is a quantitative assessment of employment trends based on a detailed and comprehensive mnodel of the UK labour market, produced by the Warwick Insitute for Employment Research. We then calculated SIC-SOC data for local authority districts and converted these to TTWAs; ii) adjusting and scaling the first estimates of TTWA SIC-SOC matrices to ensure consistency with employment by occupation data and TTWA employment by sector data for 1981-2014; and, iii) extending the 2014 SIC-SOC matrices backwards to produce consistent series for 1981-2014 which involved calculating the growth rates of TTWA occupation shares of employment over the period, and applying these to employment data by sector for each year to produce TTWA employment by occupation for 1981-2014. A final data review ensured the results were internally consistent with the input data and the data calculation processes, and credible (e.g. not unusually volatile or showing other unusual patterns).

The dataset is based on rigorous estimations and utilises the most detailed information available. However, it is not free of some inconsistences and breaks over time, for example as new job classifications appear and data collection methods alter. In many TTWAs there are data disjunctures around 1991-1992. This is because all historical time series on the growth of occupational employment in the UK, including those estimated by the Warwick Institute for Employment Research's (IER) for 'Working Futures 2014-24', have to rely upon the Labour Force Survey (see Briscoe and Wilson, 2003). While this allows the construction of a broadly consistent time series from the late 1970s, over the period 1979-2012 the LFS

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[89] These are the cities that are the basis of the larger Economic and Social Research Council (ESRC) project on the economic performance of British cities over 1971-2015, of which this paper forms a part (see https://www.cityevolutions.org.uk). The 85 cities concerned accounted for 84 percent of UK employment in 2015.

[90] This self-containment figure is based on the total workforce and produces 228 Travel To Work Areass. However, TTWAs for different occupational groups vary in size and the degree of containment in these areas will be lower for the highest skilled workers. The Office for National Statistics (ONS, 2016) estimates that there are 153 TTWAs for the highest qualified employees and 461 for the lowest qualified. Our cities therefore represent amalgamations of smaller, lower skilled TTWAs and have significant external commuting flows for the highest skilled. On the whole, however, using TTWAs to define our cities results in urban areas that have greater meaning as functional labour markets than cities defined as, say, administrative units or as contiguous physically built-up spaces.

changed occupational coding three times and each has to be bridged. However, the significance of changes to occupational coding have been thoroughly explored and found not to drive changes to top occupations (Salvatori, 2015). The discontinuity in 1991 is likely to be due to changes in the LFS sampling frame when it became quarterly in 1992. In this paper, therefore, the analysis focuses upon relative change over the whole period and compares cities against the national average.

## 6.4    High Skilled Occupations and Urban Economic Growth

The first 'skilled city' proposition is that the growth of higher skills and human capital in a city generate stronger economic growth through various externalities that raise productivity, wages and innovation. We assess this by examining the relationship between total employment growth in a city over our period and the percentage of its employment in high skill Group 4 occupations in 1981, controlling for several other city-specific determinants pertinent to city economic dynamism[91]. For the latter, we examine the associations and relationships by including a number of variables highlighted in recent urban growth theories, namely: the log of employment as an indicator of city size (EMP81); the density of employment as an indicator of agglomeration (AGGLOM81); the shares of employment in manufacturing (MANSH81) and in knowledge intensive business services (KIBSSH81) (as indicators of economic structure); the level of productivity (PROD81); and, the degree of specialisation (or dissimilarity from the national industrial structure) measured by the Krugman Specialization Index (KSI81)[92]. Size, agglomeration and specialisation in high human capital sectors are typically argued to have positive effects (see Duranton and Puga 2014), although there is much debate about whether specialisation or diversity are in better for fostering long-run city employment growth (Storper,2013; Martin et al, 2016).

The simple correlations between city employment growth and these city-specific variables are shown in Table 6.3). As expected, there is clearly a strong positive relationship between the share of high skills and employment growth: cities that initially had a high proportion of their employment in high skill occupations were also those that experienced the fastest rates of employment growth over the subsequent period. This finding is thus in line with the proposition that skilled cities tend to grow faster than less skilled one. However, the

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[91] In this paper we examine employment growth but in an accompanying paper we focus in detail on the determinants of city productivity growth in the UK (see Martin et al, 2018).

[92] This is defined as

$$KSI_{jt} = \sum_{i=1}^{N} |s_{ijt} - s_{it}^*|$$

where $s_{ijt}$ is industry $i$'s share of city $j$'s total employment, and $s_{it}^*$ is that industry's share of total national employment.

relationships between employment growth and the indicators of city size and density are negative which does not support the interpretation that agglomeration has driven employment growth. As expected, the

**Table 6.3: Correlation Analysis**

Included observations: 85

| Probability | EMPLG 1981-2015 | HSKILLSH 1981 | EMPL81 | AGGLOM81 | MANSH81 | KIBSSH81 | PROD81 | KSI1 |
|---|---|---|---|---|---|---|---|---|
| **EMPLG 1981-2015** | 1.000 | | | | | | | |
| | ----- | | | | | | | |
| **HSKILLSH81** | 0.412 | 1.000 | | | | | | |
| | 0.000 | ----- | | | | | | |
| **EMPL81** | -0.301 | 0.198 | 1.000 | | | | | |
| | 0.005 | 0.069 | ----- | | | | | |
| **AGGLOM81** | -0.410 | -0.034 | 0.687 | 1.000 | | | | |
| | 0.000 | 0.759 | 0.000 | ----- | | | | |
| **MANSH81** | -0.290 | -0.332 | -0.098 | 0.181 | 1.000 | | | |
| | 0.007 | 0.002 | 0.373 | 0.097 | ----- | | | |
| **KIBSSH81** | 0.180 | 0.566 | 0.411 | 0.242 | -0.639 | 1.000 | | |
| | 0.099 | 0.000 | 0.000 | 0.026 | 0.000 | ----- | | |
| **PROD81** | 0.434 | 0.419 | 0.139 | -0.095 | -0.524 | 0.351 | 1.000 | |
| | 0.000 | 0.001 | 0.206 | 0.386 | 0.000 | 0.001 | ----- | |
| **KSI81** | -0.258 | -0.440 | -0.361 | -0.077 | 0.470 | -0.432 | -0.355 | 1.000 |
| | 0.017 | 0.000 | 0.001 | 0.485 | 0.000 | 0.000 | 0.001 | ----- |

relationship between employment growth and manufacturing share is negative. The first two decades of our period, 1981-2001, saw sustained deindustrialization in many cities, while the correlation with KIBs share is positive given the transition to service-based urban economies. Cities with initially high productivity levels saw faster employment growth over the period which is likely caused by their stronger firm dynamics and by more productive firms expanding their market shares. Interestingly, the specialization index is not strongly associated with employment growth. Specialization and the high skill share show a negative

159

relationship, suggesting that to the extent that cities are specialised, it is in less skilled sectors.

In order to gauge whether the 'skilled city' findings can be replicated for our data we used an employment growth regression. In fact, empirical verification of the skilled city hypothesis has typically relied primarily on regression results, and regression has been the main method used by the influential work on urban growth. Crucially, it has been used to isolate the effects of human capital on economic growth relative to other 'control' factors that are often hypothesised as influencing economic performance (see for example, Glaeser and Saiz 2003; Glaeser and Maré, 2006). Much of this work has focused on US cities, a characteristic study being that by Simon and Nardinelli (2002) who sought to assess the impact of skilled human capital on the employment growth across US cities over the course of the twentieth century.  In line with this body of work, we try here, in effect, to test and replicate these results for our British cities. Table 6.4 shows the results of a least squares regression for employment growth using these variables. In this regression, we add selected other variables potentially significant to urban growth in contemporary Britain. First, after Simon and Nardinelli (2002), we have used regional dummies (SE, SW, etc.) to assess whether regional location has an effect upon employment growth over and above the other characteristics of cities. Second, we include a capital city dummy (CAPCIT) to test whether London, Edinburgh and Cardiff have benefited from a discernible devolution and political decision-making centre effect. Finally, we include a New Town dummy (NWDUM) to assess whether the New Towns in our set of cities have benefited from this status and its associated institutional capabilities, resources and growth opportunities. Table 6.4 shows our final regression with only significant results (p-value at 0.1 or lower).   The full regression is given in Appendix A.

The regression confirms that a city's employment growth has been strongly and positively affected by its relative share of high skilled workers. Indeed, this effect is stronger here than in other comparable studies (e.g. Simon and Nardinelli 2002).  However, the results do not support the claim that this is due to the agglomeration of high-skilled workers in large and dense cities. In fact, the results indicate that smaller and lower density labour market areas grew employment faster than larger and higher density ones.

**Table 6.4: Regression Analysis**

Dependent Variable: EMPLGR1981-2015
Method: Least Squares

Included observations: 85

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C | 2.291 | 0.905 | 2.531 | 0.014 |
| HSKILLSSH81 | 0.023 | 0.008 | 2.920 | 0.005 |
| EMPL81 | -0.128 | 0.076 | -1.672 | 0.100 |
| AGGLOM81 | -0.209 | 0.059 | -3.538 | 0.001 |
| KSI81 | -0.758 | 0.466 | -1.628 | 0.108 |
| PROD81 | 0.034 | 0.015 | 2.209 | 0.030 |
| NEDUM | -0.424 | 0.162 | -2.622 | 0.011 |
| NWDUM | -0.208 | 0.116 | -1.801 | 0.076 |
| SCDUM | -0.654 | 0.129 | -5.077 | 0.000 |
| WADUM | -0.457 | 0.169 | -2.707 | 0.008 |
| CAPCIT | 0.386 | 0.211 | 1.833 | 0.071 |
| NEWTOWN | 0.571 | 0.119 | 4.803 | 0.000 |

| | | | |
|---|---|---|---|
| R-squared | 0.707 | Mean dependent var | 0.757 |
| Adjusted R-squared | 0.662 | S.D. dependent var | 0.509 |
| S.E. of regression | 0.296 | Akaike info criterion | 0.530 |
| Sum squared resid | 6.377 | Schwarz criterion | 0.875 |
| Log likelihood | -10.538 | Hannan-Quinn criter. | 0.669 |
| F-statistic | 15.984 | Durbin-Watson stat | 2.132 |
| Prob(F-statistic) | 0.000 | | |

The more productive areas in 1981 also grew most strongly in employment over the 1981-2015 period. While its significance is marginal, there is an indication that employment growth was negatively affected by economic specialization for the reasons suggested above. The regional dummies show a strong disadvantage for some northern and western regions. Cities in the North East, North West, Wales and Scotland on average had less employment growth than in the other areas, even when taking other factors such as skills and productivity differences into account. In contrast, there was a strong positive effect from New Town status. This may be because New Towns offered local conditions more conducive to employment growth than elsewhere, such as more permissive and streamlined planning, cheaper land and better infrastructure. However, we should be cautious as our set of cities include only five of the largest and most successful New Towns, with strong locational

advantages. In the following section, we investigate whether these results are underlain by a divergence in skill levels across British cities.

## 6.5    Occupational Divergence across Cities?

As we have seen, the skilled cities research suggests that cities with more skilled employment profiles are growing fastest in terms of the accumulation of skilled labour. Figure 6.1 shows the relationship between share of total employment in high skill (Level 4) occupations in 1981 and the growth of this occupation group between 1981 and 2015. If 'smart places are becoming smarter', then we would expect to see a strong positive relationship.  The results clearly do not support the proposition and raise doubts about how far it applies in the case of Britain. In fact, it appears that there is only a very weak positive relationship, which is not statistically significant.  There are quite a number of cities that had relatively low levels of highly skilled occupations in 1981 but which have seen strong growth in these skilled jobs, and conversely, there are others which were already skilled but have seen only slow growth. However, there do appear to be differences between cities in the north and south of the country.[93] There is a group of northern cities that have both a weak starting point and low rates of high skill growth.  In contrast, there is a group of predominantly Southern cities with well above average starting levels but with a very large range of growth. Some of these cities have benefited from the strongest rates of growth while others have experienced only average high-skill growth.  Figure 6.1 shows the generally stronger outcomes in the south.[94]

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[93] Here we follow a conventional definition, and define Northern cities as those located in Scotland, Wales, the North East, North West, Yorkshire- Humberside and West Midlands.

[94] There are two clear outliers: Leamington Spa, which is highly skilled, and Mansfield which is very low-skilled.

**Figure 6.1: Growth in high skill occupations (Level 4) 1981-2015 against share of employment in these occupations in 1981, for 85 British cities**
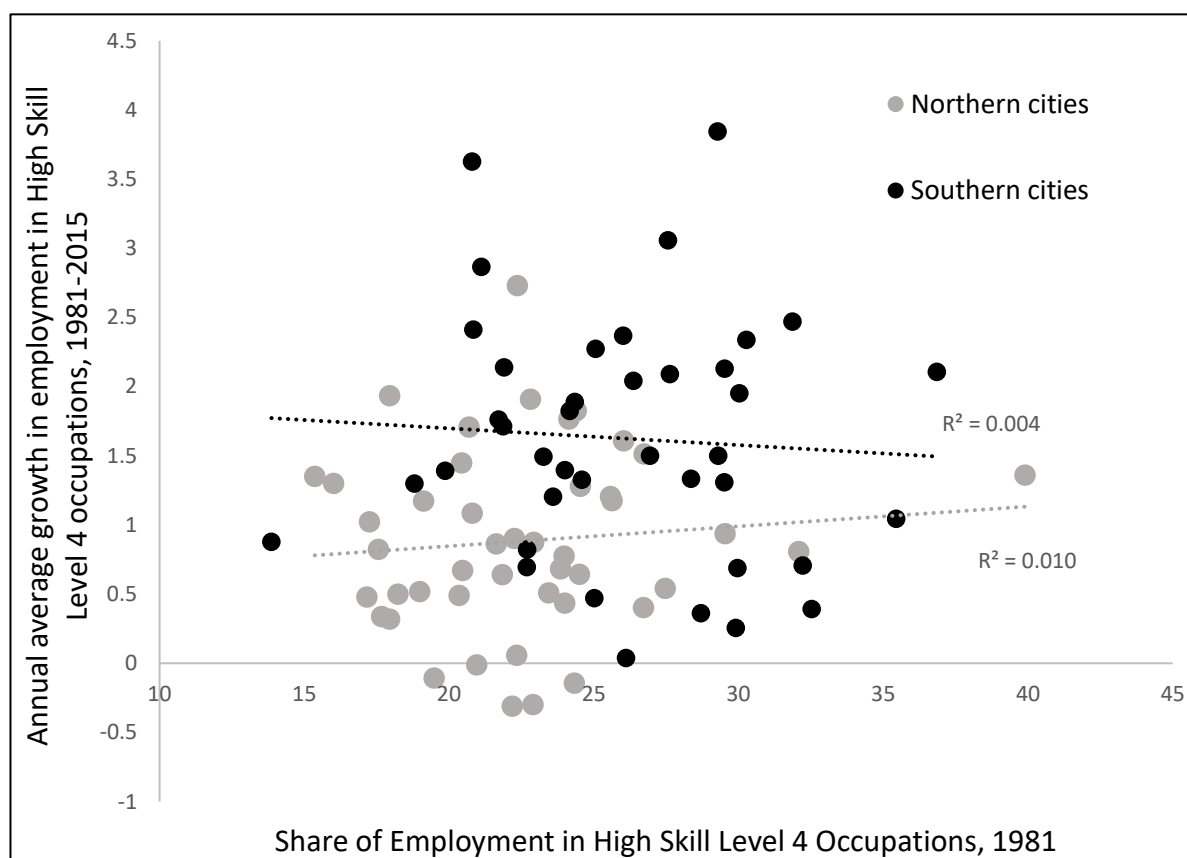


**Note:** $R^2$ values refer to regression of High Skill Employment growth 1981-2015, on High Skill Employment levels in 1981, for Northern and Southern cities as separate groups

There does not appear to be a simple divergent pattern between high and low skill cities. While the national share of employment in our high skill occupations has increased from 24 to 26.8 percent, over 1981-2015, striking differences in the nature of urban labour markets have been highly persistent. Indeed, the most cities have high-skill rates that are around twice (near 140% of the national average) those of the least skilled cities (around 70% of the national average) (Figure 6.2). What is clear is that, unlike in the US, there is little evidence of any new 'great divergence'. Indeed, if anything, there is a very slight trend towards convergence.

**Figure 6.2: Relative Share of Employment in High Skill Level 4 Occupations in Most and Least Skilled Cities, 1981-2015, GB=100**
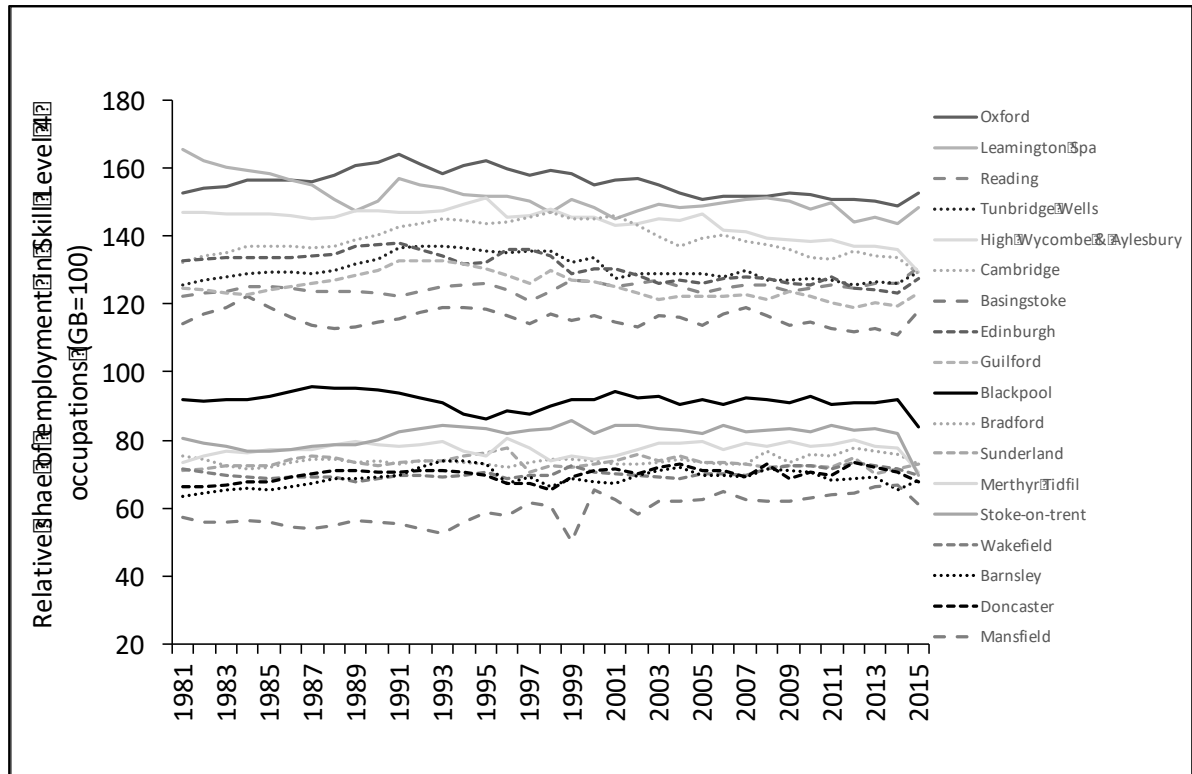


Addressing its relative neglect, at the bottom end of the skills distribution Figure 6.3 shows the relationship between the percentage of employment in low skill group (1) and change over the period for both northern and southern cities. For both groups of cities, there is evidence of a negative relationship: TTWAs with low levels of low skill employment have tended to see a faster increase in these types of jobs. There has been a greater range of growth in southern cities, but in general there has been a convergence as low-skilled employment has grown. Once again, this is at odds with the idea of a US-style 'great divergence' in skills.

The third stylised proposition is the claim that larger cities have larger concentrations of high-skill occupations, and have seen faster growth in these occupations. We assess this by looking at relationships between city population size and change in the high-skilled and cognitive skills groups. Figure 6.4 shows that there is no evidence that the largest cities have seen faster growth in high-skilled occupations. Instead, there is only a very weak negative relationship which indicates that the larger cities in Britain (with the exception of London) have tended to see slower growth in high skilled occupations.

**Figure 6.3:   City Employment Growth in Low Skill (Level 1) Occupations against Low Skill Employment Share, 1981**
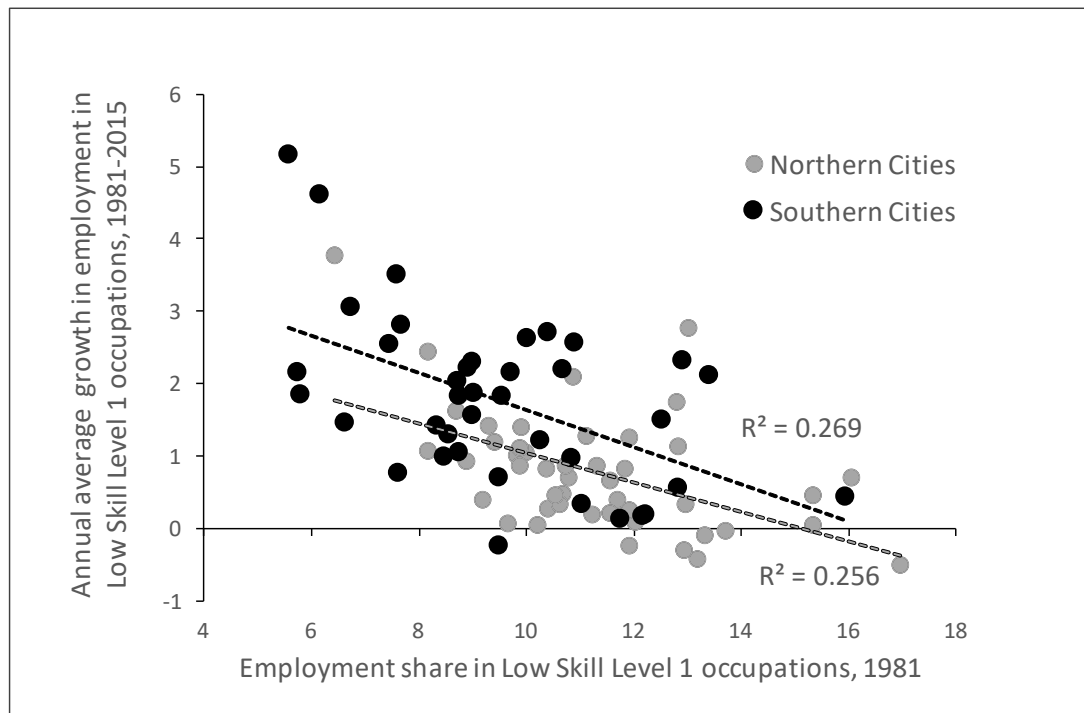


At the same time, agglomeration, proxied here by employment density (employment per km squared), has not been a key driver of high-skill growth (Figure 6.5). The range of performance for low-density cities has been much wider than the range of performance of higher density cities. Thus, the fastest growth in employment in high skilled occupations has evidently been in some relatively low density cities, which raises profound questions about the stylised relationships between agglomeration and the growth of high skilled industries and occupations claimed in several studies.

Partly as a result of these trends, at the end of our period there is virtually no relationship across cities between their population size and the level of employment in high skill group level 4.  Any positive relationship disappears when London is excluded. We can conclude that size of city alone tells us little about the prevalence of skilled occupations across British cities. However, when we examine distance to London there does appear to be a modest negative relationship. Growth has been faster in high skill occupations in cities closer to London (Figure 6.6), and, in fact, a very similar relationship exists for the lowest skilled occupations.

**Figure 6.4: City Employment Growth in High Skill (Level 4) Occupations, against City Population size 1981**
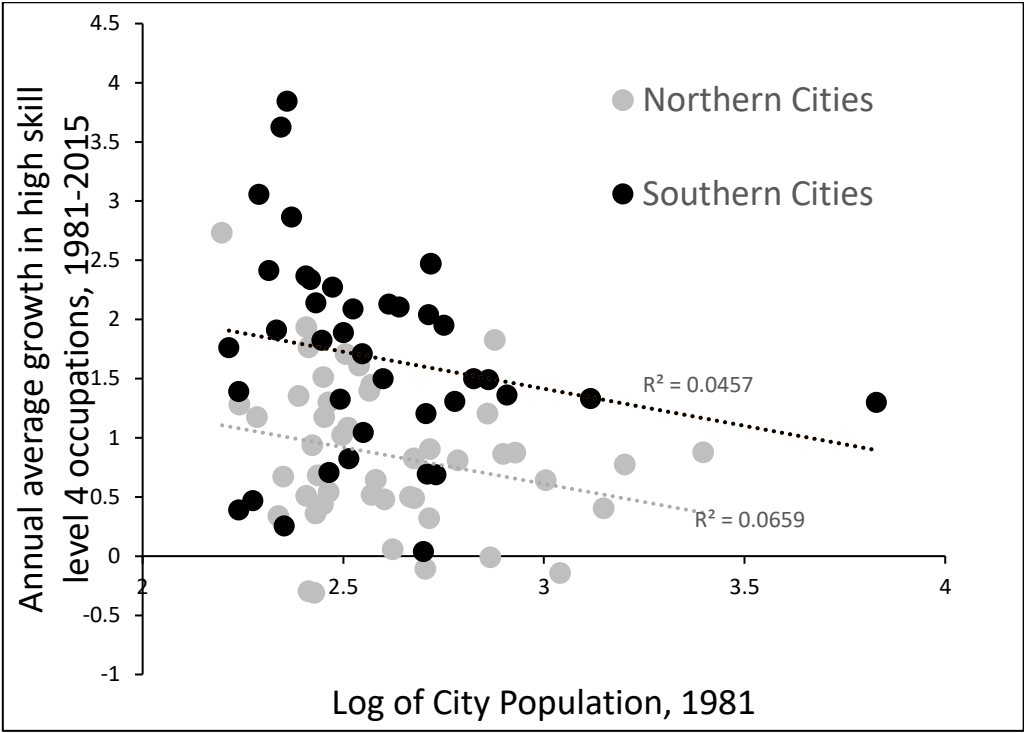


**Figure 6.5:  City High Skill Employment (Level4) growth against City Employment Density in 1981**

It may well be of course that faster high skill growth raises low skill growth through demand linkages. The vibrancy of the regional labour market appears to be a much more significant factor than size or density of a city. The weight of evidence suggests that the north-south divide appears to be much more significant than either size of city, or its initial starting point, in terms of effects on changes to skill levels.

## 6.6    Occupational Polarisation in British Cities

Job polarisation has been evident in the UK's labour market over recent decades as the effects of technological change and offshoring have increased high-skilled employment but hollowed-out medium skill level jobs and occupations. To date, however, there have been few investigations of the geography of this process. To start to examine this geography, a conventional assessment of job quality has been undertaken and the nine major occupational groups ranked by the median hourly wages level in 1998 (Table 6.5).

**Table 6.5:   Wage-based Ranking of Nine Occupational Groups**

| Median Wage Ranking | Occupational Group (by Skill Level) | Median Hourly Wage £ 1998 | Median Hourly Wage £ 2016 |
|---|---|---|---|
| 1 | 2. Professionals | 13.81 | 19.75 |
| 2 | 1. Managers and senior officials | 12.07 | 19.73 |
| 3 | 3 Associate professional and technical | 9.89 | 15.00 |
| 4 | 5. Skilled trades | 7.48 | 11.50 |
| 5 | Process, plant and machine operatives | )4 | .20 |
| 6 | 4. Administrative and secretarial | 6.28 | 10.54 |
| 7 | 6. Caring, leisure and other services | 5.14 | 8.87 |
| 8 | 7. Sales and customer service | 4.78 | 8.12 |
| 9 | 9. Elementary occupations | 4.59 | 7.84 |

**Source: ONS Annual Surveys of Hours and Earnings 1998 and 2016 Tables 2.5**

These wages are based on SOC 1990 groups, whereas our analysis is based on SOC 2010, so there may be some small discrepancies between the make-up of the major occupational groups. To address these, we have therefore compared the rankings of the occupational groups in 1998 with those in 2016. The only change is the administrative and secretarial group has jumped over process, plant and machine operatives in terms of hourly wage. With this exception, the rankings shown are stable and the relative position in 1998 provides a useful indication of the rewards from work in each group. In the figures in this section the

numbers of occupational groups refer to their wage rankings and not to the conventional numbers of the SOC Major Groups.

Figure 6.7 shows the share of employment in these occupational groups in northern and southern cities in 1981.

**Figure 6.7: Share of employment in Major Occupational Group (ranked according to 1998 Median Hourly Wages), in Northern and Southern Cities in 1981**
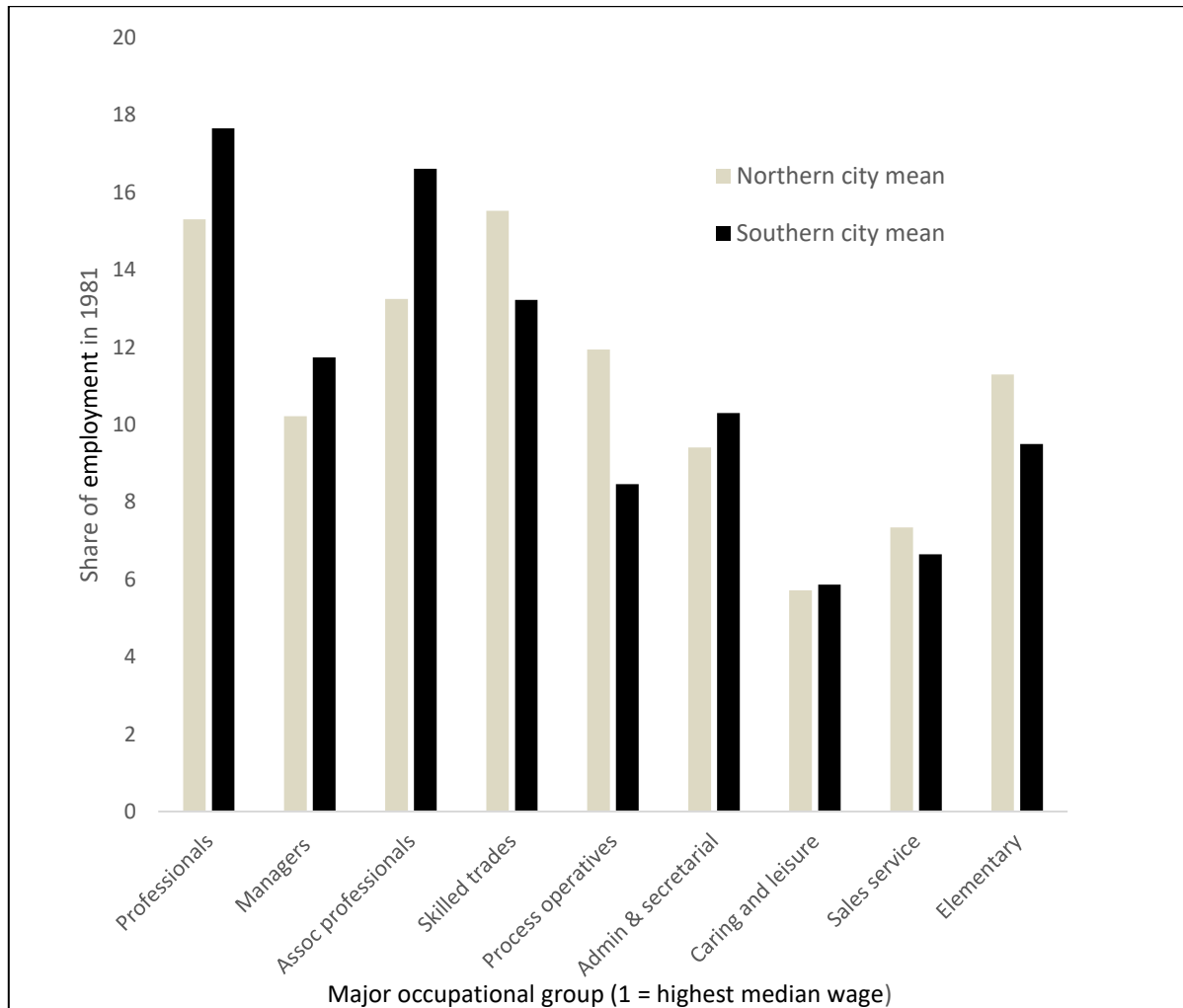


At that time northern cities had a higher share in occupational groups associated with manufacturing such as skilled trades (4), and plant and process operatives (5), while southern cities already had higher shares in the skilled and professional occupations (1 to 3).  Figure 6.8 displays the changes in shares over the period and suggests there has been a trend towards a convergence in occupational structure. Such shifts have been stronger in northern cities where the shares at the top and bottom of the scale have been higher, and the middling occupation groups in these cities have fallen to a much greater degree.  On these measures,

polarisation has been stronger and more disruptive in northern cities. We can investigate some of the causes further by looking at the absolute rates of change in these same occupation groups.

**Figure 6.8: Change in Share of Employment in Major Occupational Groups in Northern and Southern Cities, 1981-2015**
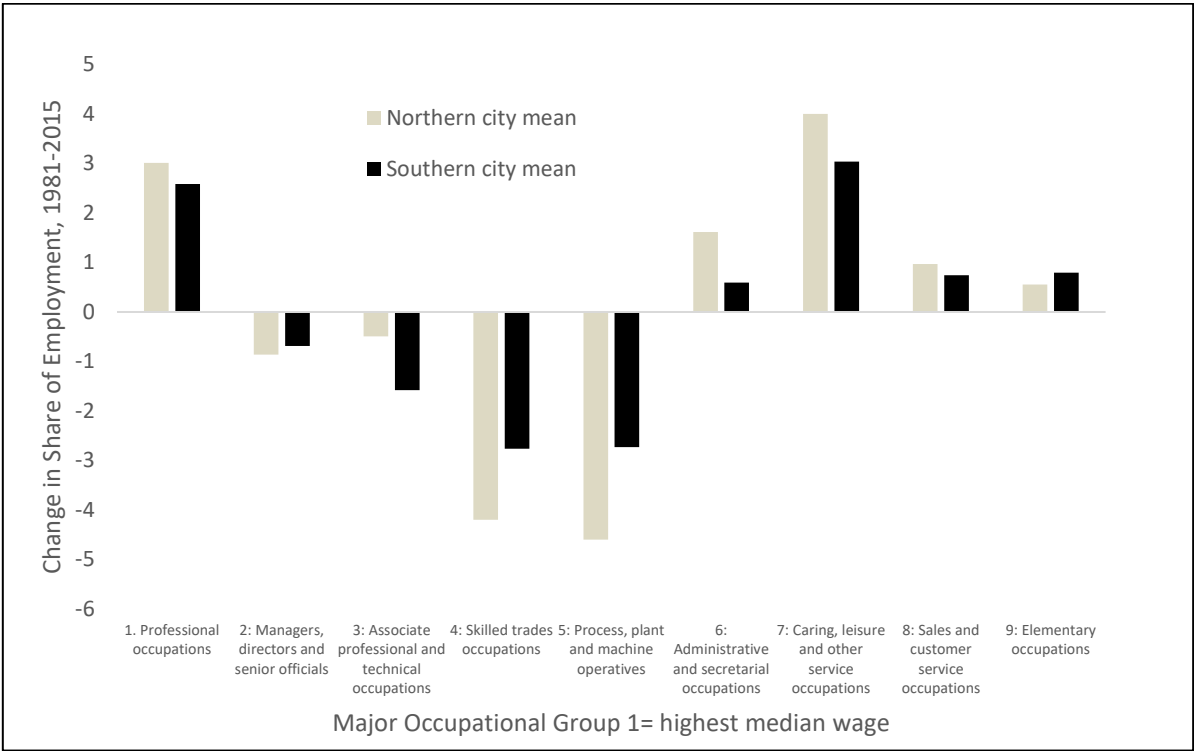


Figure 6.9 shows the annual average change in each of the major occupational groups (ranked according to wages). It shows that the fastest employment growth has been in the Group ranked 7 (caring, leisure and other service occupations) followed by highest ranked professional occupation group. Nationally, the middle-wage occupation groups ranked 4 (skill trades) and 5 (process, plant and machine operatives) have either stagnated or declined. Overall, the findings confirm that the UK has seen a huge growth in relatively low skilled and low-wage jobs which is indicative of a shift in growth away from higher productivity toward lower productivity service industries. Again, there are significant differences between northern and southern cities. It is notable that in both sets of cities employment growth has been strong in Groups 6 (administrative and secretarial), 7 (care and leisure), and 8 (sales and customer service). Southern cities have seen marginally faster growth in elementary low-skilled occupations. For the professional group, growth in northern cities has been slightly lower than in southern cities, and much lower in the manager and senior officials group,

which, given the growth in public sector employment over the period, is an indication of a much less dynamic private sector in these cities. The most significant contrast is in the middle of the distribution; while employment growth in middle wage occupations in southern cities has been low, in northern cities it has been negative. Job polarisation, then, appears more pronounced in northern cities.

**Figure 6.9: Change in employment in occupational groups ranked by median wages in northern and southern cities, 1981-2015**
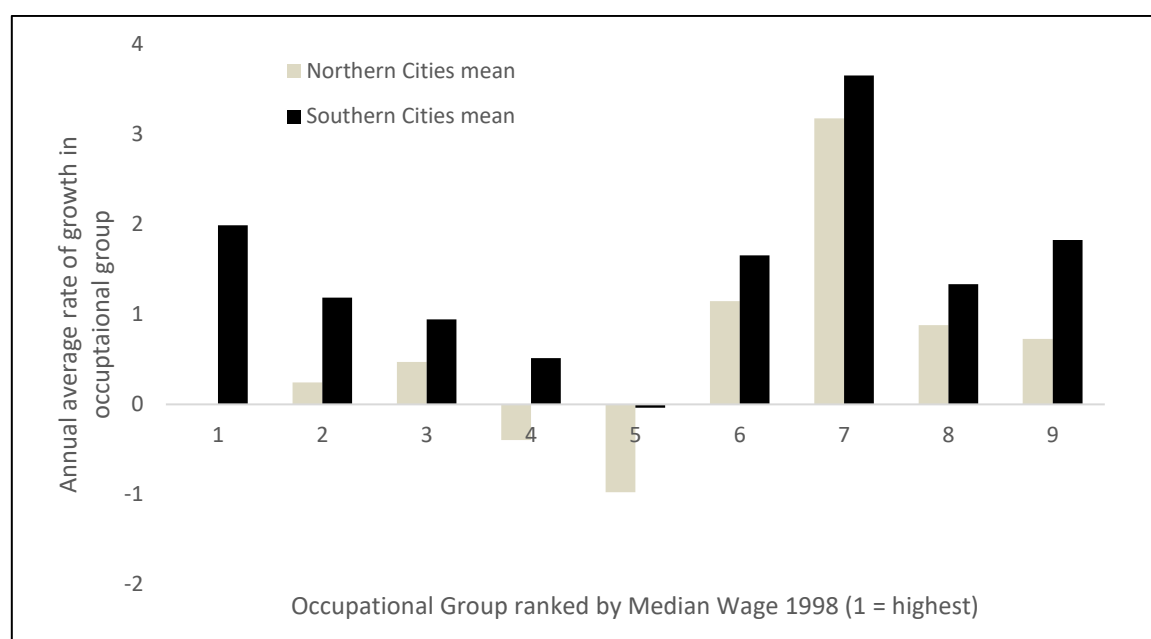


Smaller, traditionally industrial northern cities, such as Stoke, Sunderland and Middlesbrough have tended to see only very weak growth in higher-paying occupations and have benefited to only a small degree from the rise of professional and managerial employment. In contrast, the fastest growing smaller cities such as Milton Keynes, Basingstoke and Oxford have not only benefitted strongly from the growth of professional and managerial classes but they have also retained some growth in a range of medium-wage occupations. Figure 10 shows the relationships between high and medium wage occupations. In northern cities there is little evidence of any relationship between Groups 1 and 5, while in southern cities there is a small positive relationship. This may be due to the demand externalities in local labour markets generated by high-skilled jobs (Moretti, 2013).

How, then, could we explain the strength of this geographical polarisation? It is unlikely that regional differences in the growth in graduate labour are primarily responsible given southern regions have higher concentrations (ONS, 2013). Instead, it appears that the impacts of

information technology, automation, trade and outsourcing have had uneven spatial effects and that their negative effects on routine work have been felt more in cities that have experienced more severe deindustrialisation. While professional employment and the demand for high skills have grown in most cities, the reduction in middle-skill occupations appears more spatially uneven. In conclusion, we turn to some of the implications of these under-researched skill geographies.

**Figure 6.10: Change in high and medium wage occupational groups in cities, 1981-2015**
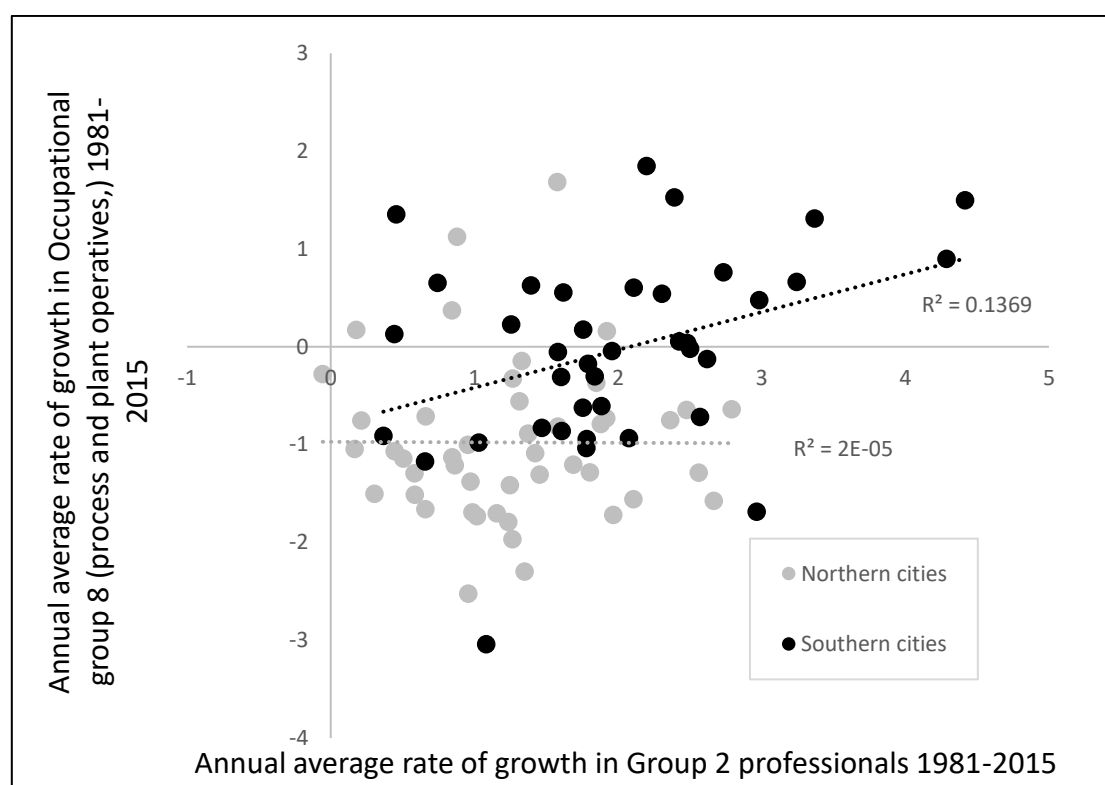


## 6.7 Conclusions

In sum, the 'skilled city' view is only partially applicable to the economic evolution of cities in Britain since the early 1980s. There is a clear and strong relationship between the growth of more highly skilled occupations and total employment across these cities, reinforcing accounts of the recursive relationship between skilled labour accumulations and city economic growth (Storper and Scott, 2009). The presence of firms with more skilled employment is associated with faster employment growth, confirming the 'skilled city' arguments concerning the quality of firms and the mutually reinforcing combination of productivity, externalities, spill-over and innovation effects. But what our results also reveal is that more skilled cities do not always continue automatically to increase their advantage

over other cities in a cumulative way. Instead, it appears that the growth of skilled occupations waxes and wanes through time, shaped by firm and industry dynamics in particular cities. While the 'skilled city' narrative contains some recognition of these processes, many of its main and stylised propositions are too simplistic and are not fully supported by this analysis in the British context. In terms of occupational change, there is no evidence of a new 'great divergence' in skills between cities in Britain. Instead, our results show a substantial and persistent gap between the most and least skilled cities, a gap that has a clear north-south dimension. Further, there is little evidence that agglomeration has been a key driver of the growth in skilled occupations. While London has seen strong high-skilled growth for part of our period, in general the smaller and lower density labour market areas, most of which are in the south of England, have grown skilled employment faster than larger and higher density ones. This analysis therefore questions and at least qualifies the claim that agglomeration is the *only* guaranteed way of building skilled employment and developing new and dynamic knowledge-based urban economies. Regional economic differences between northern and southern regions have been more important than the size or density of cities.

Such regional variations are important to considerations of the relatively neglected issue of job polarisation. Given our data, we have not been able to measure skill polarisation directly. Our analysis examined relative occupational polarisation and the comparative performance of cities. It revealed that occupational polarisation has been more marked in northern cites. While these cities have had faster growth in their share of employment in high skill occupations, their relative, and in many cases absolute, decline in medium-wage jobs has been stronger. This finding is consistent with studies of the impact of global trade, technological change and restructuring on these former manufacturing-based economies (Beatty and Fothergill, 2016). This uneven geography of occupational change has contributed to a decline in economic and political cohesion in Britain and is likely to further exacerbate regional and urban unevenness (O'Connor, 2017).

# 7　The Resilience of Cities to Economic Shocks

## 7.1　Introduction

Over the past two decades, the study of cities has expanded apace.  The recognition that in most countries – whether advanced or developing – cities account for the bulk of a country's population, its economic production and its wealth creation, has understandably thrust them to the forefront of academic research and policy attention. One key finding is that not all cities have enjoyed prosperous growth.  Indeed, the existence of marked – and persistent – economic growth differences amongst cities appears to be a widespread phenomenon, even in advanced countries (see, for example, Markusen and Schrock, 2006; Storper et al, 2015; Martin, 2016; Dijkstra et al, 2017; Tyler et al, 2017).  Considerable attention has thus focused on what makes for a 'successful' city in economic terms, and why some cities have been growing faster than others.  Several factors have been put forward to explain successful cities, including agglomeration economies, specialisation, the attraction of skilled and educated labour, and the presence of purposive and strategic governance arrangements.

By comparison, less attention has been directed to the question of how cities react to and recover from major economic shocks. In urban economics, for example, the preoccupation with equilibrium economic outcomes and patterns has perhaps encouraged a view that city economic growth and development is a smooth and incremental process. In reality, of course, economies are inherently shock prone. Such shocks can take various forms, in terms of origin, nature, scale, duration and scope.  For example, at one level, the closure of a major local company may have serious negative impacts on that locality's labour market and economic prosperity and prospects, even though at the national scale such a closure may be 'lost in the noise' of everyday economic activity and flux. At a more macro-scale, a shock might be national in origin or causes and with impacts on most or all localities, cities and regions in the economy, though very possibly unequally and unevenly. Or it might be a shock that is more global in origin, reach and impact, though again possibly with spatially differentiated effects across countries, regions and cities.  This is not to say that economists do not study shocks: the analysis of business cycles and related fluctuations has long been a topic of theoretical and econometric enquiry. In the 1970s and 1980s, the empirics of regional business cycles attracted attention. And in the 'new economic geography models' that have been developed in recent years, a major change (shock) to trade costs, for example, can alter the equilibrium geographical distribution of economic activity. But, overall,

in the 'new urban economics' and 'new economic geography' of the past three decades, how cities and regions react to shocks to their growth paths has not been a major concern.

In economic geography and regional studies, however, the geographical impact of shocks has recently become a prominent subject of enquiry. And much of this interest has utilised the notion of 'resilience' as a way of conceptualising and analyzing how regions and cities react to and recover from disturbances and disruptions (see, for example, *Cambridge Journal of Regions, Economy and Society*, 2010; Bristow, 2010; Hassink, 2010; Hudson, 2010; Pike et al, 2010; Simmie and Martin, 2010; Martin, 2012; Martin and Sunley, 2015, Fingleton, Garretsen and Martin, 2012, 2015; Boschma, 2015; Modica and Reggiani, 2015; Sensier, Bristow and Healey, 2016; Angulo et al, 2018; Bristow and Healy, 2018; Martin, 2018; Webber, Healey and Bristow, 2018).[95] This is not to suggest there is yet an agreed coherent 'theory' of regional or urban economic resilience, nor that the concept is unproblematic;[96] but the notion has helped to focus attention on the fact that regional and urban development is not some smooth process, but one that is frequently subject to various shocks originating at various spatial scales (Martin, 2018).

In part this use of the notion of resilience in economic geography and regional studies mirrors a similar rise of 'resilience thinking' across a wide range of disciplines, and the literature on the topic is now extensive, including several key books (for example, Walker and Salt, 2006, 2012; Lewis and Conaty, 2012; Zolli and Healy, 2012; Rodin, 2015; Sheffi, 2015; Caniglia et al 2017) and even a multidisciplinary journal *Resilience* devoted to the concept.[97] Reflecting this diffusion of the idea, there are also numerous definitions of the term, both general and domain-specific. Notwithstanding this variation in definition across different fields, the common idea is that the notion of resilience refers to the capacity of an entity or system to resist, absorb, adjust to, and recover successfully from shocks or disturbances that disrupt that entity's or system's pre-shock state or development path. The usual assumption is that such shocks are negative in nature, but even 'positive' shocks (such as a new technological breakthrough) can be disruptive and set in motion adjustments of a 'destructive' as well as 'creative' nature. According to two key contributions (Zolli and Healy, 2012; Rodin, 2015),

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[95] It is not our intention here to survey or assess the growing literature on the application of resilience ideas to analyse regional economic shocks: for detailed discussions, see, for example, Martin and Sunley (2015), and Modica and Reggiani (2015).

[96] For example, some have questioned the 'value added' of the concept, and argued that it offers no additional insight over other concepts such as competitiveness or sustainable development; others have complained that it reifies 'the market' and the belief in self-correcting market forces. Both sorts of critique can easily be countered (see Martin and Sunley, 2015).

[97] If we consider just the subject fields of environmental studies, business and management studies, planning, urban studies, economics and economic geography, then according to the Web of Science in 2000 some 60 works were published with the term 'resilience' in the title; in 2007 some 230 were published; and in 2017 more than 1200.

resilience is precisely the sort of analytical tool we need in order to understand and confront what they argue is an increasingly uncertain, risk-prone and volatile world.

Several questions arise from such a perspective. How far do localities, regions, cities, or indeed whole national economies, actually differ in their resilience to shocks, that is in their *resistance to* and *recovery from* such disruptions? What causes such differences in resilience? Do shocks merely have transient or temporary effects, notwithstanding that recovery may take a while? Or do shocks, especially severe disruptions, have hysteretic effects, permanently altering the structure and trajectory of the affected economy in some way?

Against this background and such questions, our aim in this paper is to examine the economic resilience of British cities to major recessionary shocks. Since the early-1970s, there have been four significant recessionary shocks to the British economy. How individual cities have been impacted by these common, nation-wide, disruptions is not only of intrinsic interest in its own right, but more especially because of the possible implications these shocks have had for the relative long-run growth paths of the cities. The past five decades have witnessed an historical shift in the structure and growth dynamics of the British economy, and our previous work has shown that these shifts have operated unevenly as between one city and another (Tyler, et al, 2017; Martin et al, 2018). The extent to which this uneven transformation and development has both influenced and itself been shaped by the geographical impact of major recessions over the period is thus a relevant issue for investigation. How far and in what ways has the pattern of resilience to recessionary shocks across British cities evolved since the early-1970s? Can any changes that have occurred be linked to changes in economic structure across cities? Have differences in resilience between cities influenced their relative growth paths? Insights to these issues may in turn have implications for what is almost certain to be another major historic economic shock about to impact the British economy, namely 'Brexit', the nation's withdrawal from membership of the European Union. The analysis of the resilience of Britain's cities to previous major shocks may provide at least some insight into how they will react to Brexit.

The paper begins in Section 7.2 with a brief discussion of the last four major recessionary shocks to have disrupted the UK economy, and which are the focus of study here. This is then followed (in Section 7.3) by a brief resumé of the idea of resilience and its relevance for the study of how cities and regions react to recessionary shocks. More detailed expositions can be found in Martin and Sunley (2015), Martin (2018) and Modica and Reggiani (2015). Section 7.4 then presents an analysis of the resilience of 85 British cities to the last four recessions and reveals how the geography of resilience has been characterized by both

change and continuity over time, from one recessionary shock to the next. This leads to a discussion and exploration of some of the possible factors that might account for these patterns. Section 7.5 then takes up the issue of the resilience of the 85 cities to the 'Brexit shock', both in terms of what the evidence from previous recessionary shocks might imply, and by means of tentative estimates of what might be expected under different scenarios, using sectoral estimates derived from a national macroeconomic trade model.

## 7.2    A Tale of Four Recessions

During the early-2000s a number of observers argued that western economies had become more stable, in the sense that fluctuations in economic growth had become less pronounced (Stock and Watson, 2003; Arias, Hansen and Ohanian, 2007; Labonte, 2008). Several reasons were advanced for what some called the 'Great Moderation': a structural shift away from cycle-prone manufacturing activity towards less cyclical services; better macro- and micro-economic management; and even a 'fortunate' absence of the sort of 'exogenous' shocks that had afflicted economies in the 1970s and 1980s. Others, however, have taken a quite different view, arguing that economic growth within the OCED countries has actually been on a systemic crisis trajectory since the beginning of the 1970s, with one major shock following another, culminating in the Global Financial Crisis of 2007-2008, and the 'Great Recession' this triggered. Thus, according to Streeck (2016)

Looking back, the crash of 2008 was only the latest in a long sequence of political and economic disorders that began at the end of the post-war prosperity in the mid-1970s. Successive crises have proved to be ever more severe, spreading more widely and rapidly through an increasingly interconnected global economy (p. 47).

In fact, since the beginning of the 1970s, four main economic downturns have disrupted economic growth among the OECD nations: the mid-1970s, the early-1980s, the early-1990s, and the recent Great Recession itself.[98]   Figure 1 shows the anatomy of these four recessionary shocks, as measured in terms of output (GDP) for the specific case of the United Kingdom, with the Great Depression of the early-1930s included for comparison.

Each of these recessionary shocks has varied in terms of both causes and severity. The recession of 1973-76, a classic 'double-dip' downturn, was sparked in part by the historic hike in OPEC oil-prices in 1973, and marked the end of the so-called 'golden age' of (relatively

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[98] These cyclical shocks have obviously varied in intensity and precise timing from country to country, but the overall pattern is broadly common to all of the advanced economies.

176

'recession-free') post-war expansion. The recession of the early-1980s was caused by the combination of an over-valued sterling currency, which reduced demand for the country's exports, high interest rates, and a major tightening of monetary and fiscal policy designed to reduce inflation, which was then running at over 15 percent per annum. It was a shock that particularly hit manufacturing, which had in any case been undergoing deindustrialization since the late-1960s (Martin and Rowthorn, 1986).   It turned out to be the most severe UK recession of the post-war period up to that time, and was almost on a par with the Great Depression of 1930-34 in terms of the depth of the downturn in GDP and certainly in terms of the time taken for output to recover (see Figure 7.1). [99] The recession of 1990-1993, which followed the so-called tax-cut driven 'Lawson Boom' of the 1980s, is generally considered to have been caused by an increase in interest rates to reduce inflation, and the entry in 1990 of the UK into the European Exchange Rate Mechanism (ERM), which also required an increase in interest rates to maintain a high value of the pound.[100]   Although this recession once again hit manufacturing, it had a major depressive impact on the service economy, including finance. The origins of the 2008-2010 downturn, widely termed the Great Recession, involving a proportionate drop in GDP similar to that in the Great Depression of the early-1930s, was the direct result of a major credit squeeze following the banking meltdown that originated mainly in the United States, but which quickly spread through the global financial system to the UK and beyond (see Tooze, 2018).   In the view of many observers, the recovery from the financial crisis was then delayed by the introduction of fiscal consolidation (austerity) policies by the UK Government in 2010 (see, for example, Krugman, 2015; Coppola, 2017).  As Figure 7.1 shows, as far as output is concerned, the recent Great Recession turned out to be the longest on record, with GDP not returning to its pre-crisis level until six years after the downturn began.

Recessionary shocks are not just about falls in output, of course, but also impact on the labour market, as employers lay off workers, stop hiring, put workers on short time, and even delete jobs altogether. In general, recessionary downturns in employment tend to lag the drop in output and then take longer to recover. However, the decline in employment in the 2008-2010 recession was much less than would be expected given the scale and duration of the contraction in output.  This has been the subject of some debate, with explanations ranging from the idea that many workers were willing to bear real wage cuts in return for keeping their jobs; to the argument that because firms were in good financial shape when the crisis broke,

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[99] Many have argued that the Thatcher Government's tightening of monetary and fiscal policy in the early-1980s recession served to intensify the depth of the downturn.

[100] The UK was forced to leave the ERM in 1992 after the Government was unable to keep the pound sterling above its agreed lower limit against the Deutsche Mark.

they were able to hoard labour; to the argument that while full-time employee jobs declined sharply this was in fact largely offset by actual growth in part-time and self-employed jobs (Gregg and Wadsworth, 2010; Coulter, 2016).  In the empirical part of this paper, however, we focus on output. But whether we measure a recessionary shock in terms of its impact on an economy's output or employment, or indeed some other key indicator, there are obviously two main phases involved: the downturn, or the economy's *resistance* to the shock, and the upturn, or the economy's *recoverability* from it. Both are central to the idea of resilience (see Martin and Sunley, 2015; Martin, 2018).

**Figure 7.1: The Last Four Recessionary Shocks to the UK Economy (With the Great Depression for Comparison)**
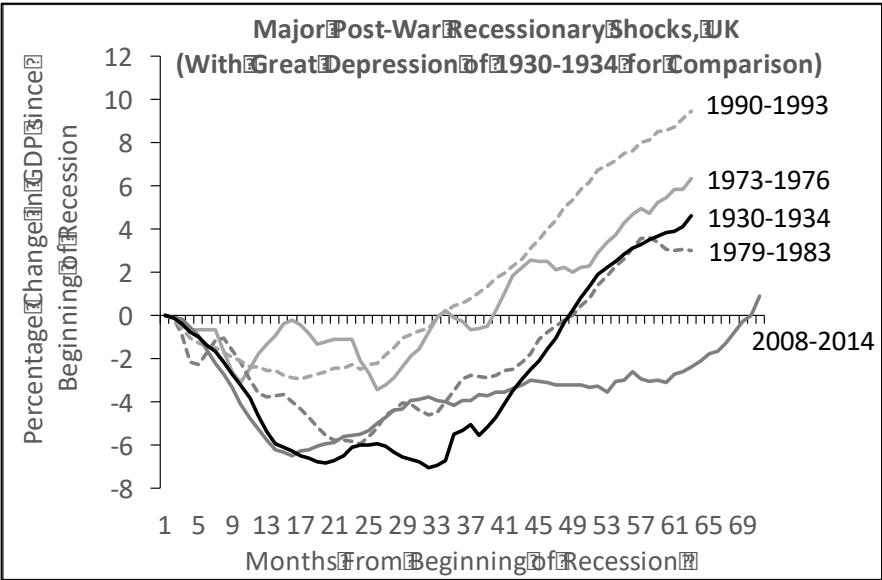


**Source of data:** Office for National Statistics

**Note:** The dates refer to the interval between the year of the onset of the recession and the year in which national output (GDP) returned to its pre-recession level.

## 7.3    A Resilience Perspective on Recessionary Shocks

As the notion of resilience has spread across various social sciences in recent years, so it has acquired a variety of interpretations and specifications (Martin and Sunley, 2015; Modica and Reggiani, 2015; Martin, 2018).  There are in fact several definitions, and indeed some ambiguity of terminology.  In the overview by Walker et al (2004), for example, resilience is defined as "the capacity of a system to absorb disturbance and reorganize while undergoing change so as to still retain essentially the same function, structure, identity, and feedbacks" (p. 4).  Even in this much-quoted definition there is room for ambiguity, between the idea of system 'reorganization and change' on the one hand, and the 'retention of the same function, structure and identity' on the other.  Much depends on the level of analysis, of course, but it

seems unlikely, in an economic system, for reorganization not to involve some change, possibly considerable change, in both structure and identity.

In one version of resilience – so-called 'engineering resilience' – the focus is on how quickly a system, once disturbed, returns to its pre-shock state. The latter is often assumed to be an equilibrium state. However, strictly speaking, such an equilibrist perspective is not necessary: all that is required is that the system returns to its pre-shock state or path, whether that state or path was an equilibrium one or not.  This essentially 'bounce back' definition or type of resilience resonates most closely with the conventional view of shocks (including recessions) in the economics literature.  In the Friedman (1968, 1993) 'plucking model', for example, shocks such as recessions are likened to temporary downward 'plucks' of output from an upward-sloping trend 'full employment growth path', or 'maximum feasible output path', and in recovery output springs back to this original trend (see also Claeys and Walsh, 2015). According to his schema, recessionary shocks thus have a characteristic 'V-shape' (b-c-d in Figure 7.2), with reversion back to the (upward sloping) full employment growth path (a-b-d-e):

The cycles are symmetrical about their troughs: each contraction is of the same amplitude as the succeeding expansion [recovery]. But there is no necessary connection between the amplitude of an expansion [recovery] and the amplitude of the succeeding contraction ... Expansions [recoveries] would be uncorrelated with succeeding contractions, but contractions would be correlated with succeeding expansions [recoveries]… (Friedman 1968, p. 3).

Implicit in this statement is the idea that, to use our terminology, recoverability from a recessionary shock should be positively correlated with resistance to it. Friedman also assumes that recessions have no permanent impact on the long-run growth path of an economy.

A second definition of resilience, often labelled as 'ecological resilience', and the one seemingly preferred by Walker et al (op cit; see also Folke et al, 2010), is more concerned with the absorptive capacity of a system in the face of a shock. Drawing on panarchy theory and ideas from the theory of complex adaptive systems, the assumption is that many systems have multiple alternative states (or 'attractors'), that is different possible combinations of components and resources. This implies that a shock or perturbation can bring the system over an absorptive threshold that marks the limit of the 'basin of attraction' or stability domain of the original state, causing the system to be attracted to a contrasting or alternative stable state. This is qualitatively different from returning to the original state, and involves adaptation of components, structures, functions and resource use. Provided such adaptation is successful, in the sense that the system moves to a favourable alternative state, then its

resilience can be described as 'bounce forward', rather than bounce back. If, however, the system loses key resources and components it could be pushed to a new state that is less favourable than its original state, in which case it would be deemed to have negative resilience.

**Figure 7.2: Stylised Types of Recoveries from Recession**
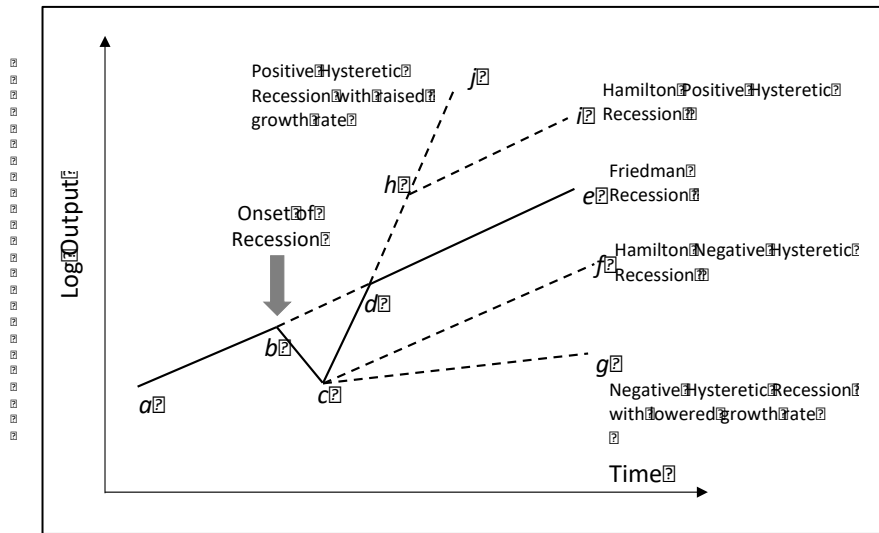


This type of resilience also has its counterpart in economics, specifically those models of shocks and perturbations that allow for the possibility that a recession or similar disturbance can have permanent (especially) negative effects on an economy's growth path.   Such a possibility is usually referred to as hysteresis (see for example, Romer, 2001), or remanence (Cross, 1993; Setterfield, 2010). In such a case, output does not revert to its pre-shock trend, and instead the trend itself is shifted, typically downwards. In Hamilton's (1989) exposition of this phenomenon, the economy undergoes a regime shift, in which it resumes its pre-shock growth rate coming out of recession, but remains on a path (c-f in Figure 7.2) that is parallel to but below the original trend (a-b-d-e): what we might call a 'Hamilton negative hysteretic recession'.  A more pathological instance of negative hysteresis would be where a recession is so deep it destroys so much of an economy's productive base that it shifts the economy onto a new growth path that is both lower and less steep (c-g), that is to a lower growth rate, than the original. Such an economy may take a very long time for its output to recover to its pre-recession level (b). On the other hand, it is not inconceivable that a recession sets off various 'creative destruction' processes which gives the economy a phase of rapid recovery out of recession before settling down at a growth path parallel to and above its pre-recession path (c-d-h-i), or what could be termed a 'Hamilton positive hysteretic recession'. If the reorientation of the economy towards new growth sectors, technologies, products, markets and skills is sufficiently transformative, the rapid recovery from recession may possibly be

maintained as a new growth path, a trend rate of growth greater than the pre-recession trend rate (c-d-h-j).[101]

These are of course stylized examples, and in practice actual responses to recessions and similar shocks may be much more complex and variable. However, interestingly, in their analysis of national-level shocks among no less than 192 countries over the period 1960 to the early-2000s, Cerra and Saxena (2005) find very few countries that exhibit the simple Friedman type of response to recessionary and other shocks. Rather, in the vast majority of countries, recessions have followed the negative Hamilton type of pattern (b-c-f in Figure 7.2), and some the more pathological pattern (b-c-g). In other words, recessionary and other contractions would seem to have permanent negative effects on a country's level of output. Very few countries were found to experience positive hysteretic responses, where shocks are followed by rates of output growth higher than the pre-shock average rate, that is post shock growth paths of the sort b-c-h-i, or b-c-j in Figure 7.2. An important consequence of these findings is that depending on the depth of contraction experienced by countries in a recession, and the speed of recovery, such downturn events can be a significant cause of long-run divergence among national economies. Indeed, Cerra and Saxena (op cit) find that poorer countries (as measured in terms of per capita GDP) tend to be less resistant to major recessions than are richer countries, and while the recoverability of poor countries tends to be greater than that of rich countries, it is not sufficiently higher to offset the divergence that occurs during the recessionary downturns. In other words, there would appear to be a relationship between a nation's resilience to economic shocks and its long-run growth path. At the same time, it might be conjectured that an economy with an inferior growth path will as a consequence be more vulnerable to shocks. Resilience and long-term growth and development may thus be inextricably and recursively interwoven, and perhaps should be theorized as such.

These are findings that have obvious relevance for the analysis of the reaction of cities and regions to economic shocks, and for the evolution of spatial disparities in economic prosperity and performance over time. Figure 7.3, for example, shows a hypothetical case where three cities have differential resistance to and recoverability from shocks, and where the rate of recoverability is positively correlated with resistance to downturn. The effect of these differences in resilience in this instance is to cause a progressive widening of economic disparities between the three cities over time. The key point is that economic cycles are not merely exogenous transient disturbances to an economy's growth path, but an integral dynamic that shapes how that path evolves over time. In a spatial – inter-city or inter-regional

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[101] Indeed, some writers have started using the term 'transformational resilience' to depict.

– context, recessionary shocks are not autonomous to, but part of, the very the process of geographically uneven development.

**Figure 7.3: Differential Resilience and Long Run City Divergence**
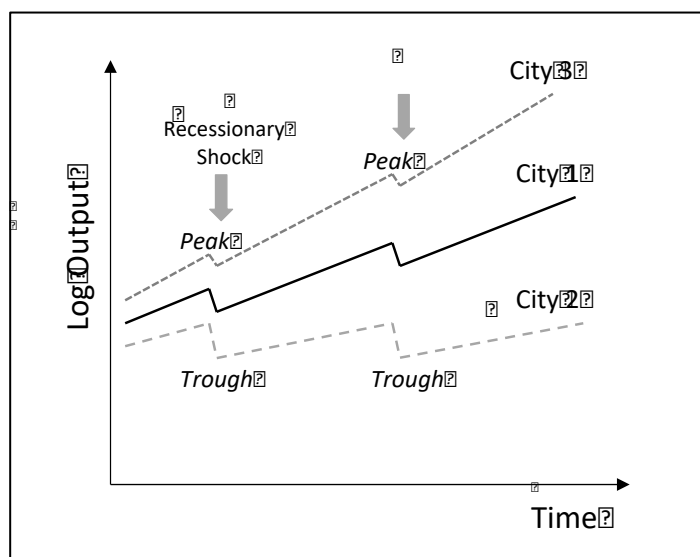


## 7.4    The Resilience of British Cities to Four Recessions

Although there is a growing literature on regional and city resilience, there is as yet no single, generally agreed methodology for how it should be measured. Several different approaches can be distinguished (see Table 7.1, which also contains examples of the various methods that have been used). As even the stylized anatomies in Figure 7.2 highlight, the notion of resilience necessarily involves the specification of a counterfactual or expected position, that is some reference point against which to measure both resistance and recoverability.  There are several possible approaches to this issue.  One would be to project the pre-shock growth path forward using, for example, statistical time series models or some appropriate structural model, to derive an estimate (counterfactual) of where the economy would have been had a shock not occurred.  This does depend, however, on a sufficiently long pre-shock period from which to fit a model reliable enough to generate the predicted counterfactual position or path. If the pre-shock period is not long enough, an alternative would be to use a number of previous pre-shock or recovery periods to estimate such a model.  However, this would require the assumption that the dynamics of those successive recovery periods remains unchanged over long periods of time, from one economic cycle to the next, an assumption that, as we shall see below, may not be at all valid.

If the focus is on comparing cities or regions directly one with another, a simpler method is to use the national resistance to and recovery from a shock as the benchmark. This is the approach adopted here. Given that a major national recession is an economy-wide event, a logical counterfactual or expectation is that each city (or region) making up that economy should react in the same way as the macro-aggregate. The national reaction is thus the benchmark or reference against which all cities (or regions) can be compared. Differences from this benchmark are therefore an indicator of each city's (or region's) *relative* resilience. More specifically, our two measures of resilience for a given city, *c,* are

$$RESIS_c^{t,t-k} = \frac{\Delta Y_c^{Contraction} - \Delta \mathbb{E}( Y_c^{Contraction})}{\left| \Delta \mathbb{E}( Y_c^{Contraction}) \right|}$$

$$RECOV_c^{t,t-k} = \frac{\Delta Y_c^{Expansion} - \Delta \mathbb{E}( Y_c^{Expansion})}{\Delta \mathbb{E}( Y_c^{Expansion})}$$

where $\Delta \mathbb{E}( Y_c )$ is the 'expected' change of output in city *c* during a recession or recovery of length *k* years, given as

$$\Delta \mathbb{E}( Y_c^{t,t-k}) = \left( \frac{Y_{GB}^t - Y_{GB}^{t-k}}{Y_{GB}^{t-k}} \right) * Y_c^{t-k}$$

and $Y_{GB}^t$ is the national (Great Britain) level of output in year t.

By definition, both measures are centred on zero, in which case a city would have the same resistance and recoverability as the national economy. One possible criticism of this approach is that this type of counterfactual ignores local context and conditions, that is geography, in its construction (in contrast to, say, city-specific counterfactuals calculated using each city's own pre-shock performance history as captured by a statistical time series model or structural model of some sort). However, a counter-argument in defence of the method used here is that the measures defined above are 'cause free', and that the task then becomes one of seeking to account for the observed differences between each city's resilience and that of the national economy precisely in terms of local factors and conditions.

The focus here is on the resilience of the 85 British largest cities to the four major recessions discussed in Section 7.2 above. These cities account for 82 percent of national (Great

Britain) output.[102] The recessionary shocks are defined as the peak to trough contraction in national output (Gross Value Added, GVA). The recoveries are taken to be the periods between each trough and the next cyclical peak (that is, before the onset of the next recessionary shock). The cities are defined in terms of travel to work areas (using the latest, 2011, definition).[103] These have a reasonably high level of 'self-containment' as functioning labour market areas. The data consist of annual GVA series from 1971 to 2015, measured in constant 2013 prices.[104]

**Table 7.1: Methods of Measuring City and Regional Resilience**

| Method | Focus | Examples |
| --- | --- | --- |
| **Descriptive case studies** | Mainly narrative based, using simple descriptive data, interviews with key actors, interrogation of policies, etc. May be comparative (eg two cities or regions) | Simmie and Martin (2010, Cambridge and Swansea), Treado (2010; Pittsburgh); Wolfe (2010; Ottawa and Waterloo), Hill et al (2012. Seattle), Cowell (2013, Cleveland), Enelow (2013, Detroit), Evans and Karecha (2013, Munich), Hu and Hassink (2015, Chinese regions) |
| **Resilience indices** | Singular or composite measures, often relative to some 'reference position. May involve 'dashboards', using key economic indicators. Often comparative (several cities, regions), to produce 'resilience rankings' of cities and regions | Martin (2012, UK regions), Augustine et al (2013), Han and Goetz (2015, US counties), Rockefeller Foundation (2015, World cities), Martin et al (2016, UK regions), Salvati et al (2016, Italian cities), Angulo et al (Spanish regions), Ibl et al (2018, EU regions), Sensier (2018, EU regions), Spencer (2018, US cities) |
| **Statistical time series models** | ARIMA type models (with dummy ies for shock and recovery periods) used to generate counterfactual or expected positions of city or region assuming no shock, against which actual outcomes | Fingleton, Garretsen and Martin, (2012, UK regions), D'Lima and Medda (2015, London) |

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[102] Our data do not include Belfast; hence we use the Great Britain output series as the reference benchmark, rather than the UK equivalent.

[103] Travel to work areas are defined as those spatial units in which typically at least 75 percent of local workers also live.

[104] The data derive from a larger ESRC-funded project on city economic evolutions in the UK (ESRC (ES/N006135/1). A description of the data and their construction can be found for example in Martin et al (2018). Other annual data series for these cities, for example on employment, productivity, occupations, skills, and wages, have also been constructed for the same cities over the same period.

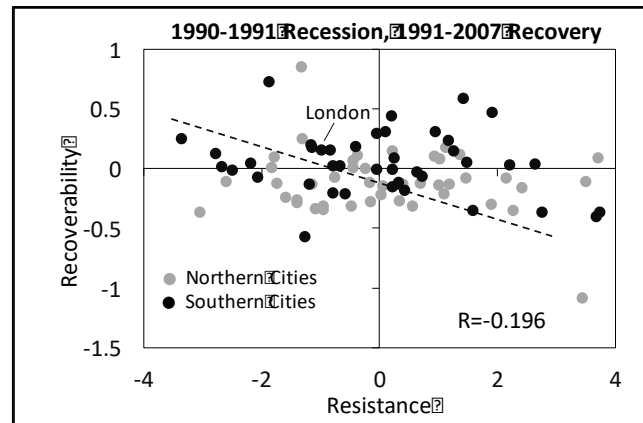| Causal and structural models | Used either to estimate counterfactual positions or which include dummies for shocks among regressors. Used to generate impulse responses or error corrections type measures of dissipation of shock. Also includes models that regress resilience indices on selected 'causal' variables | Doran and Fingleton (2013, US cities), Fingleton and Palombi (2013, British towns), Fingleton, Garretsen and Martin (2015, EU regions, Salvati et al (2016; Italian regions), Pudelko et al (2018, German regions), Kitsos and Bishop (2018, Britain's local authority districts), Sprague (2018, US counties) |

The resilience results for these 85 cities for the four recessions studied here are shown in Figure 7.4, in which the cities have also been divided into 'northern' and 'southern' groups.[105] Several key features stand out. First, in the first two

Figure 7.4: Resilience of British Cities to Four Recessions
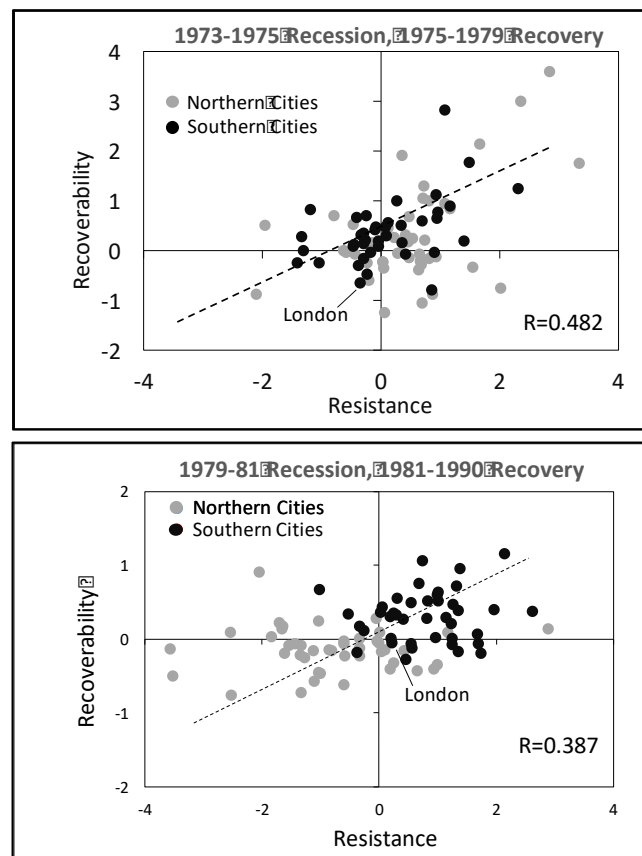
[105] We follow the conventional division of Britain into 'north' and 'south'. Thus, Southern cities are those in the following regions: London, the South East, South West, East of England and East Midlands. Northern cities are those in the remaining regions of the West Midlands, Yorkshire Humberside, North East, North West, Wales and Scotland.

**1990-1991 Recession, 1991-2007 Recovery**

(Scatter plot with y-axis labeled "Recoverability" ranging from -1.5 to 1, and x-axis labeled "Resistance" ranging from -4 to 4. Legend: Northern Cities, Southern Cities. London labeled. R=-0.196)



**2008-2010 Recession, 2010-2015 Recovery**

(Scatter plot with y-axis labeled "Recoverability" ranging from -2 to 1.5, and x-axis labeled "Resistance" ranging from -3 to 3. Legend: Northern Cities, Southern Cities. London labeled. R=-0.269)

**Source:** Calculations using authors' data

recessions of 1973-1975 and 1979-1981, there was a positive relationship across cities between resistance to recessionary shock and recoverability from it: those cities that were most resistant to the national downturn also tended to recover faster from it, and vice versa. However, in the second two recessions of 1990-91 and 2008-2010, the relationship had become negative, the more so in the most recent of these two recessions: those cities least resistant to the national downturn tended to recover faster from it than those cities that were less impacted by recessionary contraction.  There has likewise been a steady change over the course of the last four economic cycles in the relationship across cities between the speed of recovery from one recession and the scale of downturn in the next (see Table 7.2): those cities that experienced greater recoverability from the recession of 1973-75 also proved on average to be the most resistant to the next recession of 1979-81. But the correlation between recovery from the 1979-81 recession and resistance to that of 1990-91, though positive, was much reduced, and between recovery from the downturn of 1990-91 and resistance to the Great Recession of 2008-2010 was negative.

The evidence thus points to a clear shift or change in the resilience of cities over time. This finding mirrors a similar change in dynamics identified in our other work on the economic

growth and productivity performance of these cities over the past 45 years (see Tyler at el, 2017; Martin et al, 2018). Clearly, economic resilience need not be a fixed attribute of cities (or regions), but can evolve and change from one shock to the next. This is not surprising, given that the causes of recessions and other shocks varies, one to another, as noted above, and that city economies themselves evolve and change over time, thus altering their vulnerability and reaction to successive disturbances when these occur.

**Table 7.2: Relationships across British Cities between Resistance and Recoverability for Four Recessions**

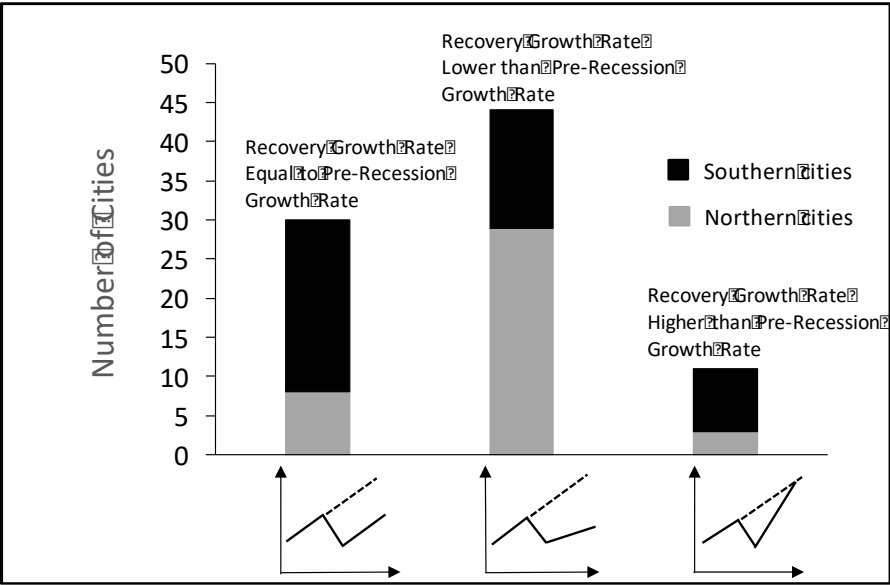| | | Resistance to Recession | | | |
|---|---|---|---|---|---|
| | | 1973-1975 | 1979-1981 | 1990-1991 | 2007-2009 |
| Recovery from Recession | **1975-1979** | 0.482** | 0.682** | | |
| | **1981-1990** | | 0.387** | 0.149 | |
| | **1991-2007** | | | -0.196 | -0.241* |
| | **2009-2015** | | | | -0.269* |

**Source:** Calculations using authors' data

**Note:** *=significant at p=0.05, **significant at p=0.01

A second feature of Figure 7.4 is the comparison between northern cities and southern ones. In the recession of the mid-1970s, differences in resilience between the two groups of cities were relatively small, with most cities not deviating markedly from the national response to downturn and recovery, and with both groups containing a small number of highly resilient cities (in the top right hand quadrant of the plot). In the deep recession of the early-1980s, however, a clear distinction is evident between less resilient northern cities and more resilient southern ones. There is also a greater spread in relative resilience across the 85 cities, compared to the preceding recession: more specifically, cities varied much more in their resistance to the recession than in their recovery from it. This dispersion in resistance increased further in the shock of the early-1990s, though the tendency for southern cities to be more resilient than their northern counterparts is still partially evident. With respect to the recent deep recession of 2008-2010, not only was there less dispersion in resistance across cities, but the distinction between more resilient southern cities and less resilient northern ones reappears more clearly. This distinction is most evident in terms of recoverability. The majority of southern cities that had below average resistance to the downturn nevertheless had above average recoverability from it (upper left quadrant of plot), whereas those northern cities that were badly impacted also had below average recoverability (lower left quadrant).

Testing for the similarity between average growth rates across the cities during the recovery period 2010-2015 and their pre-recession growth rates (1991-2008) yields the three patterns shown in Figure 7.5, and reveals how most northern cities emerged on a lowered growth path of the sort *a-b-c-g* in Figure 7.2.  In contrast, the majority of southern cities recovered with a growth rate equal to or greater than their pre-recession growth rate (*a-b-c-f* or *a-b-c-h* in Figure 7.2).

**Figure 7.5:  City Recovery from the Great Recession of 2008-2010**

Thirdly, the resilience of London across these four recessions is also noteworthy.  In the 1973-75 recession both its resistance and its recoverability were below that of the national economy as a whole. Then one of the country's major centres of manufacturing, it behaved much like many of the country's northern industrial cities. Over subsequent recessions, London's resilience has improved, possibly because its economy shifted substantially away from manufacturing to services, and especially business and financial services, and, from the early-1990s onwards, because of its advantageous position arising from the creation of a European Single Market and its attraction of skilled EU migrant workers.  While many northern cities likewise deindustrialized over the 1970s and 1980s, they were much less successful in developing compensating service activity.  From the mid-1980s onwards, London consolidated its role as one of the world's leading financial centres, so that perhaps not surprisingly when the global financial crisis hit in 2008-2009 London was widely expected to be particularly badly hit. But such predictions proved mistaken: London turned out to be much more resilient than the economy as a whole (Figure 7.4; see also Overman, 2011).  Its current favourable position as one of Britain's most resilient cities represents the latest stage

in what appears to have been a process of steady improvement in resilience across the last four economic cycles.

Fourthly, taking this north-south pattern of resilience, particularly in recoverability, one stage further, Table 7.3 reports the correlation between a city's resilience and its distance from London (in km). What is striking is that while the relationship between city resistance and distance from London varies with the nature of each recession, city recoverability consistently declines with distance from London, especially in the last three recessions, even in those recessions in which southern cities proved less resistant to the downturn (as in 1979-81 and 2008-10).

**Table 7.3: Correlation between City Resilience (Resistance and Recoverability) across Recessionary Shocks, and Distance from London**

| | 1973-75 Downturn | 1975-79 Recovery | 1979-81 Downturn | 1981-90 Recovery | 1990-91 Downturn | 1991-08 Recovery | 2008-10 Downturn | 2010-15 Recovery |
|---|---|---|---|---|---|---|---|---|
| **RESIS** | 0.248* | | -0.162 | | 0.229* | | -0.044 | |
| **RECOV** | | -0.042 | | -0.417** | | -0.279** | | -0.468** |

**Source:** Calculations using authors' data

**Note:** The distance between London and any given city is simple straight line distance, measured in km.

*=significant at p=0.05, **significant at p=0.01

There is clear evidence that the closer, geographically, is a city to London, the greater its recoverability from a recessionary shock tends to be. This was notably the case with the recovery from the last deep recession. It would appear that the dynamism of the London economy extends out in a sort of 'sphere of influence' that tends to benefit those cities nearest to it.

Finally, it was mentioned in Section 7.3 that the resilience of cities (or regions, or indeed nations) to shocks may influence their long-run growth paths, and possibly contribute to observed patterns of convergence or divergence among cities (and regions and nations). This can be illustrated by comparing the growth paths of London and Liverpool (Figure 7.6). In each of the four last recessions, Liverpool's recovery of output to its pre-recession peak has taken longer, and the rate of recovery has been slower, than in the case of London. Indeed, in the recessions of 1973-5 and 1979-81 Liverpool's output actually failed to return

to its pre-recession peak before the next recessionary shock occurred. As a consequence, following each recession the growth paths of the two cities have diverged, with London pulling progressively ahead of Liverpool. London's greater resilience, both its resistance to recessionary downturns and its faster and stronger recovery from them, has contributed to its superior long-run growth performance.

**Figure** 7.**6: Differential Resilience to Recessions and Long-Run Growth: London and Liverpool Compared**
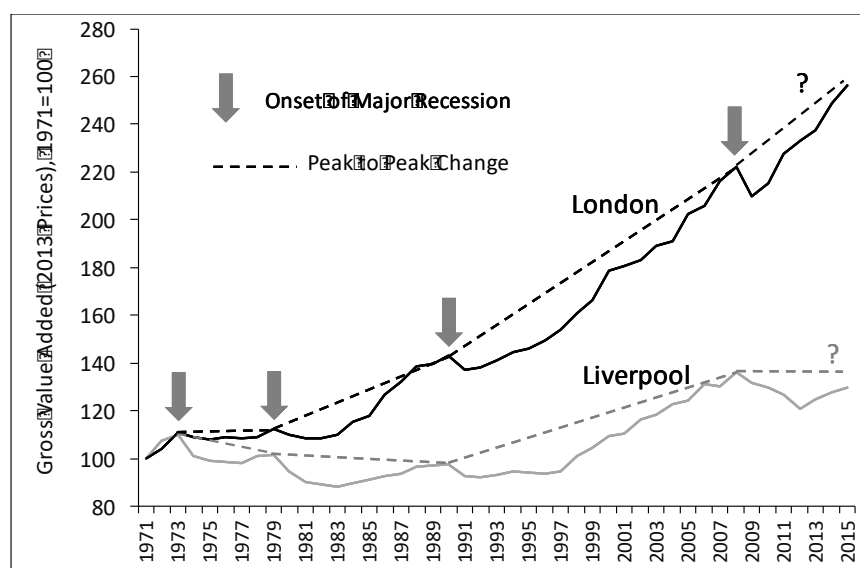


**Source:** Based on authors' data

The relationship between resilience and long-run growth is, of course, highly likely to be recursive. A buoyant long-run growth performance embues a city's firms, workforce and institutions with the confidence that if a shock occurs, the city is highly likely to recover quickly, and that same confidence is likely to shape behaviour (investment, workforce retention, and so on) in a positive way to bring about that very outcome. Conversely, for a city that has a sluggish or stagnant growth path. How long-run growth shapes resilience and how resilience shapes long-run growth is thus an issue that merits detailed research.

## 7.5    Why Might Cities Differ in Economic Resilience?

The brief reference above to the possible effect of changing economic structure on city resilience raises the obvious question of what determines the economic resilience of cities and regions. Given that our measure of city resilience uses the reaction of the national economy as a city's expected reaction, variations of each city's actual reaction from the national counterfactual point to the play of city-specific factors, to the role of geography, in

shaping resilience.   Like the measurement of resilience, however, there is no agreed theory of economic resilience, of what its determinants might be. Nevertheless, the literature on regional and city economic growth and development is suggestive of a number of factors or features that might influence, positively or negatively, a city's resistance to and recoverability from a major economic shock (see Table 4; also Martin and Sunley, 2015).  These include, for example, various aspects of a city's economic structure and specialisation, its export orientation, the composition, productivity and competitiveness of its firms, its skill base, access to business finance, city size and the extent of agglomeration economies, and a city's institutional set-up and economic governance arrangements.

Perhaps the most discussed factor thought to influence the economic performance of cities and regions, and thence possibly their resilience to economic shocks, is their sectoral structure.  There are several dimensions to this.  While many analysts argue that sectoral *specialisation* is the key driver of regional and city economic success (for example, Storper, et al, 2015), the evidence in support of this claim is far from persuasive. In fact, from a resilience point of view, it can be equally argued that a *diversified* industrial structure is more conducive to city resilience: as Davies and Tonts (2010) put it

The general contention is that those places with diverse economies are more
resilient in socio-economic terms than those with a narrow economic base (p. 232).

Given that different sectors of activity have different elasticities of demand, different labour and capital intensities, different exposures to overseas markets and competition, for example, they can be expected to respond to a given shock, say a recession, to different degrees. Thus, a varied or diverse structure should, ceteris paribus, provide better resistance to and recoverability from a shock than a highly specialized structure[106].

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[106] There is a direct parallel here with investment portfolio theory, wherein a diversified investment strategy is often argued to provide a better hedge against adverse market movements than a narrowly based portfolio. For an early discussion of the relevance of this idea for regional development see Conroy (1975).

**Table 7.4: Some Possible Influences on City Economic Resilience**

| Type of Influence | Possible Effects |
|---|---|
| **Economic structure and market orientation** | The more diversified (more specialized) the city's economic structure, the more (less) resilient it will be to shocks. |
| | The greater a city's dependence of manufacturing, the less resilient it will be to shocks, given this sector's traditionally higher elasticity of demand. |
| | The greater a city's dependence on services, the more resilient it will be to shocks, given this sector's lower elasticity of demand. |
| | The more localized (geographically dispersed) are city's industrial supply chains, the less (more) resilient it will be to shocks. |
| **The size of the public sector** | Given the traditional stability of public services over the economic cycle, the greater a city's dependence on public sector the more resilient it will be shocks. Conversely, large-scale cuts in local public services associated with fiscal consolidation policies may reduce the 'buffering' role of the public sector. |
| **Scale and nature of export base** | The impact on a city's resilience will depend on the nature of its export base: it may shield a city from internal (domestic) shocks, but may expose it to demand or other shocks originating in its overseas export markets. |
| **Competitiveness of local firms** | The more productive a city's firms, the more resilient they will be to shocks since they should have a competitive advantage over less productive cities. |
| | A high innovation rate, which helps drive firm competitiveness, should make for enhanced firm adaptability and greater city resilience. |
| **Skill base and labour market flexibility** | The presence of high-skilled, well-qualified workers is widely thought to influence a city's economic dynamism; thus, to the extent that such workers are more productive, and their skills more transferable or adaptive, the more resilient a city should be to shocks. |

| Type of Influence | Possible Effects |
| --- | --- |
| | Skilled workers are more likely to be able to move into the more dynamic parts of a city's economy and thus assist recovery from shocks. |
| | A steady in-migration of skilled workers may thus improve a city's economic resilience, while, conversely, the sustained outflow of skilled workers could well erode a city's resilience |
| **Size of city economy (agglomeration economies)** | Large cities are claimed to benefit from various agglomeration economies that help make local firms more productive and innovative, and that attract high-skilled workers. Large cities also tend to be more economically diverse. Together these features should make larger cities more resilient to shocks. |
| **Firms' access to finance and credit** | The availability and commitment of local sources of loan finance or capital, including low costs and favourable terms of credit, may help small local firms to weather downturns and maintain or re-orientate production and employment more easily than under conditions where finance is restricted. |
| **Governance and Policy Regime** | A city with a well-organised, consensual and strategic economic governance structure committed to short- and long-run policies aimed at supporting businesses and jobs may improve a city's resistance to and/or its recoverability from shocks. |

Likewise, a diversified structure may be more resilient than one characterised by 'related variety' (Frenken et al, 2007), since by definition, the latter indicates certain interdependencies and complementarities among sectors, while diversity is more likely to ensure a degree of sectoral modularity (independence or loose coupling) which provides an element of 'buffering' against shocks spreading from one local sector to another.[107]

Nonetheless, certain detailed aspects of structure may be important in shaping a city's economic resilience. It is a commonly observed fact that manufacturing activities (and construction industries) tend to be more sensitive to economic shocks and cyclical movements than are most services. This is often attributed to the greater elasticity of

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[107] The notion of modularity, used in the theory of complex systems theory, refers to the tightness of coupling or interdependence between a system's components. The greater the degree of modularity, the weaker the coupling, and the more flexible the system is to reconfiguration and adaptation (for a discussion, and a business application, see Schilling, 2000).

manufactured goods to changes in demand and prices, as compared to consumer and personal services. Thus, cities that have a greater dependence on manufacturing might be expected to be less resistant to recessionary shocks than those more orientated towards service activities. More particularly, knowledge intensive business services (KIBS) are now widely associated with economic success, although how resistant they are to recessionary shocks may depend on the precise nature and orientation of such activities, and how they relate to other sectors of activity, both local and non-local.

Recent discussions of industrial organization have argued that what matters more for the geographies of economic development in today's globalized world is not sectoral structure but functional structure, that is a city's or region's position and role in an industry's supply chains, production networks and supply-chain trade (Baldwin, 2018). The trend towards geographically dispersed and distributed supply chains - often on a global scale – has had several possible implications for the economic resilience of cities and regions. For one thing, it means that those cities and regions that host an industry's high-order functions and tasks – its corporate head offices, research and development functions, advanced manufacturing stages of production, and the like - will tend to be more robust in the face of recessionary type shocks than those cities that focus more on routine functions, and lower order positions in supply chains and value added networks, to which the brunt of instabilities in production will be 'exported'. Unfortunately, it is not possible to construct data on the functional economic structure of British cities, especially back to the 1970s and 1980s, and in the analysis below city economic structure is defined in sectoral terms.

In recent years, considerable attention has been directed to the role that innovation plays in local economic growth and development, and to the fact that both innovation (and patenting and R&D) and the capacity of firms to adopt and absorb new technological advances, appear to vary significantly between cities and regions. The typical argument is that places with high rates of product and process innovation not only exhibit faster economic growth, but are also more adaptable in the face of shifting markets and competition. Other things being equal, such places might then be expected to be more resilience to shocks, although much may depend on the particular sectors, products and technologies in which local firms are specialized. The success over time of innovative and high-tech places is not guaranteed of course. High-tech places and clusters may 'overheat', with high rates of inflation of housing and land, for example, or may even be prone to speculative investment and overvaluation of assets, as happened in the bursting of the global high-tech (NASDAQ) bubble in 2000.

Another aspect of a city's structure concerns the scale and role of public sector activities. Traditionally, public sector services (such as health, police, utilities, social services, and the

like), have tended to be relatively immune to recessionary shocks, since they are no less essential in (and indeed may become more necessary) in periods of economic downturn than they are during expansionary phases. The greater the dependence of a city on public sector activities and industries, the more resistant its economy might be expected to be to recessionary downturns. Until recently, the public sector had grown steadily in most advanced countries over the post-war period, so this might be expected to have acted to cushion cities and regions from recessionary downturns. However, in response to the global financial crisis and Great Recession of 2008-2010, some western states - and notably among them, the UK - introduced draconian fiscal consolidation (austerity) policies which have led to severe cuts in both central and local public services, so that the public sector may no longer provide the cushion against economic shocks it once did.

Much has been made in recent years of the importance of skilled and well educated workers for city prosperity and growth (for example, Glaeser and Saiz, 2004; Glaeser, et al, 2011; Moretti, 2013). Cities that attract and retain skilled labour in turn are argued to attract productive and innovative firms, which then attract yet more skilled workers, and so on. Other things being equal, a skilled workforce will tend to be more flexible and adaptable, more productive, and potentially more entrepreneurial, which should, again *ceteris paribus*, make firms themselves better able to adjust, adapt and reorient their production and markets if subjected to disruptive shocks and economic contractions. In recessions, skilled workers themselves are also more likely to be kept on by firms than are unskilled employees. Cities that contain large shares of skilled workers and large shares of jobs in higher level occupations might then be expected to display greater resilience to shocks than 'unskilled' cities. [108]

The role of migration may play a role in this context. To the extent that migration is selective, in that it is the more skilled and more enterprising workers who are more geographically mobile, then those cities that experience high rates of in-migration of such workers will not only be more successful economically, but as a consequence be more resilient to shocks. Conversely, less economically successful cities are likely to experience sustained out-migration of their more skilled workers, which will not only reduce their potential for long-run growth but also lower their resilience to shocks. The key point here is that the movement of skilled workers between cities, itself in part a response to the differences in economic performance and opportunities between cities, may not only serve to accentuate those very differences, but likewise reinforce differences in resilience among those same cities.

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[108] To the extent that higher skilled occupations tend to be concentrated in higher-order functions within sectors, the occupational/skill mix.

Unfortunately, severe data limitation on skilled migration for our city areas prevented the analysis of the role of this factor.

Another argument found in the urban economics literature is that larger cities benefit from a host of agglomeration economies which confer productivity advantages to the firms there. For example, it has been estimated that a doubling of city size results in an increase in the level of productivity of typically between 2-5 percent (OECD, 2015). Whether the scale of this 'productivity premium' associated with city size is considered significant might well be debated, but one implication is that, other things being equal, larger cities might be better positioned to weather recessions. Larger cities are also likely to have more diversified economies than smaller cities, and to contain major concentrations of skilled workers and higher order functions and occupations, including knowledge intensive business services. Yet further, large cities (especially national and regional capitals) might be expected to contain sizeable constellations of financial institutions, so that firms located there may have easier access to credit, venture funding and other finance to enable them to survive during major economic downturns and propel growth during subsequent recovery phases of the economic cycle.

One further factor that may influence a city's resilience to shocks has to do with the presence and effectiveness of a local economic governance system, including both public sector authorities and private sector organizations, that undertake coherent strategic policies to support local business development and employment. Typically, the scope for specific short-term countercyclical interventions is limited at the city scale, unless considerable local autonomy in such matters exists and significant resources are available. Rather, local economic governance arrangements and strategic policies have most potential impact over the longer term, through such interventions as infrastructure provision, urban regeneration schemes, training programmes and the like, which improve the local business environment and attractiveness of a city to firms and skilled workers; in other words, in helping to build a city's inherent long-run economic resilience. Research also suggests that this effect may be lessened if a city's governance structure is fragmented, with policy powers divided among several local authorities (Ahrend et al, 2017). Measuring the scale, intensity or 'quality' of local institutions, policies and economic governance structures is far from easy however, let alone isolating their specific impacts on city economic performance and resilience. Moreover, the UK has one of the most centralized fiscal and political systems of any advanced economy, and cities have limited autonomy of action and limited local resources to undertake major economic development programmes. In addition, most of the key institutional structures and policy programmes that have been imposed by central government to regenerate and develop urban areas over the decades have not only been top-down but characterized by

considerable churn over time, making long-term goals and impacts difficult to secure. Although a new central government initiative of devolving certain powers and finance to selected cities has recently been introduced, it is far too soon to judge how far and in what ways this policy will influence city resilience, and hence this development is of little relevance to the four recessionary shocks that are of interest here. For these reasons, it was not possible to devise a meaningful or consistent measure of city governance, and so this factor is omitted in the analysis below.

Many of the factors outlined above are obviously interrelated, and may themselves be influenced by how a city or region reacts to recessions: this is the issue of the potential interdependence between resilience to shocks and long-run development referred to above. Ascertaining the specific importance of individual 'causal' influences on the observed patterns of city resilience may not, therefore, be straightforward. City size, for example, is likely to be strongly correlated with economic diversity, productivity and high-order occupations and skills. Nor is the possible or predicted impact of certain factors necessarily unambiguous. Take, for example, a city's export base. A competitive export base, especially serving expanding overseas markets, can drive a city's output growth and in turn investment and productivity, making for a dynamic city economy that will be shielded to some extent from recessions originating in the national domestic economy. On the other hand, large-scale exposure to overseas markets may also make a city particularly vulnerable to disruptions originating in those markets. The loss of a major overseas market in a key sector in a city may seriously undermine that city's economy as a whole, regardless of the state of the national economy. A high dependence on public sector activities may also work in two ways, giving some buffer against the economic cycle (assuming an absence of public expenditure austerity programmes), but at the same time possibly 'crowding out' a thriving private sector economy capable of generating new firm formation, innovation and productivity advance on a scale necessary to drive dynamic and adaptive growth, and thence resilience.

The list of possible factors analysed here is given in Table 7.5. Very severe data limitations constrain the range of determinants of the sort discussed above that can be explored in the case of British cities, especially extending back to the 1970s and 1980s, and certain compromises have to be made. The analysis that follows must therefore be regarded as merely exploratory. All of the variables used in the regressions below, and described in Table 7.2, were constructed as part of the larger project referred to earlier. The index of specialisation is the so-called Krugman index, defined as

$$KSI_c^t = \sum_{j=1}^{82} \left| s_{c,j}^t - s_{GB,j}^t \right|$$

where $s_{c,j}^t$ and $s_{GB,j}^t$ are the shares of sector $j$ of total employment in city $c$ and the national (Great Britain) economy respectively, in year $t$, calculated for an 82-sector level of sectoral disaggregation. It is only possible to construct skilled occupational data for our cities back to 1981. However, perusal of the time series over 1981-2015 reveals that the occupational skill mix across cities changes only slowly over time, so that any errors in using the 1981 data in regression analyses of the recession of 1973-76 are not likely to be that large. The patent data are based on OECD data for local NUTS3 areas, and have been converted to our city travel to work areas.

**Table 7.5: Variables used in City Resilience Regressions**

| Variable | Abbreviation | Period for which data constructed |
|---|---|---|
| Share of city employment in Manufacturing industry | MANSH | 1971-2015, annually |
| Share of city employment in KIBS | KIBSSH | 1971-2015, annually |
| Krugman city specialisation index | KSI | 1971-2015, annually |
| Share of city employment in public sector activities | PUBSH | 1971-2015, annually |
| Share of city employment in export intensive sectors | EXPSH | 1971-2015, annually |
| City labor productivity (GVA per employed worker) | PROD | 1971-2015, annually |
| Share of city employment in high-skill (Level 4) occupations | SKILLSH | 1981-2015, annually |
| City innovation proxy (patents per million employed) | PAT | 1990-2012, annually |
| Size of city (population) | POPSIZE | 1971-2015, annually |
| City population density | POPDEN | 1971-2015, annually |
| Distance from London (km) | DISLOND | Constant |

Although the OECD data cover the period 1977-2015, the data prior to 1990 are not consistent or reliable, as many of the raw figures do not have a location identifier, so that it was not possible to allocate them to any particular city. Thus, only the regressions for the last two of the four recessions include this variable. Two variables are used to proxy for agglomeration effects, namely population size and population density. Distance from London is measured as straight line distance between city centroids.

The trends in a selection of these regressor variables over the study period are shown in Appendix C, and are worthy of comment. The degree of long-run structural and economic change that has occurred across British cities over the 1971-2015 period has been pronounced. The marked structural shift of employment out of manufacturing and the growth of employment in knowledge intensive business services (KIBS) is evident across almost all cities (Figures C.1 and C.2), as is the expansion of public sector employment (Figure C.3). In fact, overall, cities have become less specialised since the beginning of the 1970s, and have steadily converged in sectoral composition (Figure C.4). Perhaps reflecting this, the share of employment in export-intensive sectors has fallen across almost all cities, and likewise has become more similar from city to city (Figure C.5). The share of high-skilled occupations in total employment has increased across all of the cities, (Figure C.6), as has labour productivity, though unevenly (Figure C.7). Although the data on patenting activity is limited, it suggests a highly concentrated geography across cities (Figure C.8). Given these (ongoing) developments, it might be expected that the role of different factors will have evolved to some degree.

**Table 7.6: Resilience Regressions for Four Recessionary Downturns and Recoveries**

| RECESSION DOWNTURN PHASES | | | | |
|---|---|---|---|---|
| **With Resistance** | **1973-1975** | **1979-1981** | **1990-1991** | **2007-2009** |
| Constant | 8.6291** | 1.3553 | 3.4575 | -0.4701 |
| MANSH | -0.0302 | -0.0526* | -0.2202** | -0.0424 |
| KIBSSH | 0.0775 | -0.0532 | -0.2701* | -0.0943* |
| PUBSH | -0.1913** | 0.0603 | -0.1653* | 0.0080 |
| KSI | 0.7980 | 1.8944 | 3.2479 | 1.8047 |
| EXPSH | -0.0728* | -0.0337* | 0.1009 | 0.0360 |
| SKILLSH$^\#$ | -0.1260* | 0.0955 | -0.0162 | 0.0250 |
| PROD | -0.0063 | -0.1194** | 0.3314** | 0.0141 |
| POPSIZE | -0.0002 | 0.0001 | -0.0007 | 0.0011 |
| POPDEN | -0.0014* | -0.0003 | 0.0009 | 0.0009 |
| PAT | ND | ND | -0.0025 | 0.0010 |
| DISLOND | -0.0017 | -0.0016 | 0.0038 | -0.0018* |
| Adj. R-Squared | 0.1244 | 0.2182 | 0.1380 | 0.0950 |
| F-Statistic | 2.3265 | 3.6051 | 2.3452 | 0.9623 |
| No. Obs | 85 | 85 | 85 | 85 |

| | RECOVERY PHASES | | | |
|---|---|---|---|---|
| With Recoverability | 1975-79 | 1981-1990 | 1991-2007 | 2009-2015 |
| Constant | 6.9950** | 1.3756 | 1.9648** | 0.8032 |
| MANSH | -0.0911** | -0.0320** | -0.0097 | 0.0031 |
| KIBSSH | -0.1369** | -0.0334* | 0.0141 | 0.0155* |
| PUBSH | -0.1125** | -0.0574** | -0.0408** | -0.0201 |
| KSI | 2.0041 | 1.1272* | -0.3485 | 0.7110 |
| EXPSH | 0.1408 | -0.0060 | -0.0099 | -0.0316* |
| SKILLSH[#] | -0.0029 | 0.0467** | 0.0094 | 0.0038 |
| PROD | 0.0444 | 0.0127 | 0.0406** | -0.0244 |
| POPSIZE | -0.0001 | -0.0007 | -0.0009 | 0.0002* |
| POPDEN | -0.0002 | -0.0003 | -0.0001 | -0.0003 |
| PAT | ND | ND | 0.0003** | 0.0007 |
| DISLOND | -0.0015* | -0.0010** | -0.0008 | -0.0031** |
| Adj. R-Squared | 0.2519 | 0.3180 | 0.3367 | 0.2449 |
| F-Statistic | 4.1440 | 5.3527 | 5.3266 | 3.7253 |
| No. Obs | 85 | 85 | 85 | 85 |

**Source:** Authors' calculations

**Notes: \*** Significant at 0.10 level **\*\***Significant at 0.05 level. [#]Skills data series only begin in 1981, which is used as the start year in the regressions for the first two recessions, and have a discontinuity in 1991. ND - No reliable or consistent data for Patents (PAT) prior to 1990. N=85 cities.

To explore the influence of these structural and other characteristics on city resilience, the following model was estimated:

$$RESIS_c^{t,t-k} = \beta_0 + \beta_1 MANSH_c^{t-k} + \beta_2 KIBSSH_c^{t-k} + \beta_3 PUBSH_c^{t-k}$$
$$+\beta_4 KSI_c^{t-k} + \beta_5 EXPSH_c^{t-k} + \beta_6 SKILLSH_c^{t-k} + \beta_7 PROD_c^{t-k} +$$
$$+\beta_8 POPSIZE_c^{t-k} + \beta_9 POPDEN_c^{t-k} + \beta_{10} PAT_c^{t-k} + \beta_{11} DISLOND_c + \varepsilon_c^{t,t-k}$$

and similarly for $RECOV_c^{t,t-k}$, using the resistance and recoverability indices calculated in Section 7.4.

As discussed above, factors and characteristics shaping a city's resilience may themselves be influenced and changed over time by successive shocks, so that there is bound to be an element of endogeneity in th system. By measuring the regressor variables at the start year (*t-k*) of each recessionary downturn and each successive recovery, this effect should to some extent be minimised. The results are given in Table 7.6. As a city's export intensity was very highly correlated with its manufacturing employment share, the former was dropped from the regressions in favour of the latter.

A number of features are noteworthy despite the limitations of the data that can be assembled for British cities on a consistent basis back to 1971. At a broad level, it appears from the adjusted R-square values that the model fits the recovery phases better than the downturn (resistance) phases. This might be as expected, given that recessionary contractions differ in their specific causes and hence impacts, so that there need be no consistency between one recession and the next in the role of a city's economic structures and characteristics. Also, recessionary downturns are typically short-lived compared to their subsequent recoveries, so that the latter are more likely to depend on a city's economic make-up. Even in the recoveries, however, the level of fit is low.

What does emerge is the role of structure. The greater the share of a city's economy (in employment terms) is accounted for by manufacturing activity, the less resilient, both in resistance and recoverability, is that city to recessionary shocks, although the relation is not always significant. Correspondingly, a city's reliance on KIBS seems to have become a negative factor shaping its resilience to the second two recessions, no doubt reflecting the declining importance of manufacturing in city economies from the late-1980s onwards. Perhaps somewhat surprisingly a greater dependence on public sector activities does not appear to have acted as a buffer to recession, and has had a negative impact on city recoverability. The fact that British cities have become more similar in their more detailed sectoral structures over the study period probably accounts for the lack of impact accorded to the Krugman specialization index. Likewise, the role of skills does not appear to be a significant factor shaping city resilience to recessionary shocks. Export intensity appears to have been a significant factor in influencing resistance, in a negative way, only in the first two recessions, possibly reflecting the greater importance of manufacturing in city economies in the 1970s and early-1980s than in the period since. However, its influence on recoverability seems also to be negative, although this effect was only statistically significant in the last recession, in 2008-10.

The role played by a skilled workforce in shaping city resilience is neither consistent nor significant. It seems to have played a negative role in city resistence to the recessionary downturns of 1973-75 and 1979-81, but had no influence on the subsequent two recessions; it had a positive influence on city recoverability from the recession shock of 1979-81 and the most recent one of 2008-2010, but otherwise no significant influence. Base year productivity increased city resilience to the downturns of 1979-81 and 1990-91 and city recoverability from the latter (1991-2007), but otherwise is not a significant determinant of city resilience. The relationship between city resilience and city population size and city population density, the two proxies for agglomeration effects, is frequently negative, but only significant, in the case of density, in the recession of 1973-75, and only positive, in the case of size, in the

recovery of 2009-2015, possibly reflecting the particular performance of London, by far the largest city. In general, however, the regressions do not lend any statistical support to the notion that bigger cities should be more resilient to economic shocks.  The inclusion of a city patent variable, as a proxy for innovativeness, in the regressions for the last two recessions only produced any significant effect in the 1991-2007 recovery.

What is both significant and almost consistent across the four shocks is distance from London: the further is a city from London, the more likely it is to have a faster recoverability from recessionary shocks. This points to the importance of proximity and connectivity to the economy of London and its surrounding 'Greater South East' region, which together contain a third of national economic activity and output, the bulk of the nation's major economic, financial and political infrastructures, and much of the key policy decision-making that impacts on national and local economic life.  It possibly suggests the existence of a broad regional agglomeration 'dynamic' that declines away from the capital, which acts to confer a measure of resilience to cities the closer and more connected to and dependent on it they are.

While some of these findings are thus suggestive of the possible factors influencing city resilience across Britain, the low level of statistical fit of the regressions in Table 6 indicates that much more analysis is required to uncover the city-specific and the national processes at work. More sophisticated modelling might help in this respect, although, as stressed above, the lack of detailed data on many processes of city economic development that potentially shape how cities react to shocks hinders such a task.  Further, some of those processes and the structures that support and underpin them are likely to be long-standing and slow-changing, while others are likely to change more rapidly over time, including in response to major shocks.   It is this interdependence and recursiveness between resilience and development that is the real explanatory challenge.  These issues in relation to understanding the resilience of British cities to previous major recessions loom equally large when it comes to  assessing the impact of what is the next imminent shock, the UK's withdrawal from the European Union, or Brexit.

### 7.6    How Will Brexit Impact British Cities?

Estimates of the possible impact of Brexit on the national UK economy have varied widely and been the target of much heated debate (such as Ebell et al, 2016; HM Treasury, 2016; Economists for Brexit, 2016).  At one extreme are studies such as that by HM Treasury and the London School of Economics, which predict that a 'hard' Brexit – a withdrawal without any free trade deal with the EU, and a new relation based on WTO trade rules – will lead to a reduction in national GDP of as much as 8 or nearly 10 percent, respectively, by 2030.  At

the other extreme, according to Economists for Brexit, such an arrangement would increase national GDP by 4 percent by that date. According to Coutts, Gudgin and Buchanan (2018), in their highly critical essay on the subject, not only are all of these studies based on contestable assumptions, they differ in what potential effects they incorporate (on trade, migration, productivity, regulation, wages, financial markets, and the like), as well as in the types of models used (macro-economic, general equilibrium, partial equilibrium, gravity models, and so on). Coutts et al conclude that most estimates of the impact of Brexit in the UK, both short-term and long-term, have exaggerated the degree of potential damage to the national economy. However, their analysis has in turn been criticized for its selective use of data. In short, even deriving estimates of the impact of a 'hard' Brexit shock on the national economy has proved difficult and highly contentious.

The problems escalate when it comes to estimating the possible impacts on Britain's regions and cities. Predictions of the impact on the country's regions and cities have varied (see, among others, for example, Chen et al, 2017; Dhingra et al, 2017; McCombie and Spreafico, 2017;). Such variation is not in fact surprising. As in the national case, the predictions of the severity of the impact depend on the plausibility of the assumptions and models employed, on the type of Brexit deal eventually secured, and on the data used. One key issue is that the potential adverse effect of Brexit on Britain's cities and regions is not just a question of the proportion of exports of a city or region that goes to the European Union. It also involves their supply chains and production networks, and the extent to which these are located in other cities and regions. There are important industries, such as motor vehicles and aerospace, that not only have localised spatial distributions within the UK, but also complex supply chains of intermediate inputs that crisscross the EU border (HM Treasury, 2016). Then there are the likely spatially differential implications of what will be restrictions on the migration of labour from the EU into the UK. Further, the long-run impact across cities and regions will depend on how far and in what ways local firms are able to reconfigure their exports away from Europe to other markets, as well as under what trade arrangements. And we cannot know whether and to what extent UK-based firms (both manufacturing and services) would relocate their activities to other EU member states in the case of a 'hard' Brexit.[109]

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[109] Several companies have in fact threatened to move (or have already begun to move) operations to mainland Europe given the uncertainty surrounding Brexit, including Panasonic, Microsoft, Goldman Sachs, UBS, HSBC, Airbus, Deutsche Bank, and Sony. Some of these firms have supply chains across the UK, so that the indirect effects of such relocations could well exceed the direct effects.

To compound these problems and imponderables, analysis at the subnational scale, and especially for cities, is rendered particularly difficult because of the lack of the sort of data needed to quantify the effect of such factors. While certain trade data exist for the major regions of the UK, mainly for manufactured goods, there are no officially collected trade data for cities or other similar spatial units. Thus, studies have had to resort to other ways of estimating the regional and local trade impacts of Brexit. In their analysis, Dhingra, Machin and Overman (2017) use estimates of the impact of Brexit on national economic sectors derived from a computable general equilibrium trade model (Dhingra et al, 2016, 2017), to generate corresponding estimates at the local level by applying these national sectoral impacts to local sectoral employment structures and summing to get an overall local effect. Using this approach they find that the most affected local areas would be in the south of the UK, with London the most adversely impacted (mainly on account of the concentration of financial and related services there). In their study, Chen et al (2017) use estimated inter-regional extensions of the World Input-Output Data base (Chen et al, 2017) to predict the impact of Brexit across the subregions of the UK (and the EU as a whole). Their results are somewhat opposed to those of Dhingra, Machin and Overman (2017), in that they suggest that the main impact will be on northern subregions, with London amongst the least affected, primarily, the authors argue, because while much of northern Britain has increased its dependence on and integration with the European Union over recent years, London has become more globally orientated and less integrated with Europe.

Thus, just as predicting the impact of Brexit on the national economy is fraught with difficulties and debate, so estimating its impact across Britain's cities or regions is equally problematic. The analysis of Section 7.4 may possibly give some pointers as to what might be expected. As Table 7.6 shows, the more a city's economy is orientated towards manufacturing activity (as measured in terms of employment share), the less resilient it is to shocks, although this negative relationship has not always been statistically significant. Thus, to the extent that a Brexit deal restricts Britain's trade in goods with the EU, then this may possibly impact more on those cities that still have an above average manufacturing base. On the other hand, a greater dependence on KIBS, though certainly not isolating a city from a negative shock, seems to improve its recoverability. So, much will also depend on whether and in what ways the eventual Brexit deal will impact on tradable services such as finance. Perhaps the most pertinent possible implication of the analysis in Section 4 is that, if past evidence is any guide, regardless of the geography of the initial or short run negative impact of the Brexit shock across Britain's cities, those nearer London are likely to recover faster and more successfully from it. Indeed, the evidence from the regression analysis in Table 7.6 indicates that for past major recessionary shocks the recoverability of cities has tended to decline with distance

from London.   This a pattern that exhibits a notable degree of persistence or path dependence.  It might be hypothesised, then, that whatever form Brexit takes, most southern British cities are likely to weather the shock better than most of their northern counterparts. Most northern cities voted strongly for Brexit in the 2016 referendum, yet they could actually prove to be less resilient to the shock. Brexit, therefore, could well intensify existing prosperity gaps between northern cities southern cities.[110]

There is a limit, however, to how far such 'prognoses' can be read off from the analysis of past recessions, even the most recent and arguably most relevant one. And given the issue of lack of detailed trade and related data for our 85 cities, we are hesitant to present yet another estimate of the possible local impact of Brexit. Nevertheless, since existing estimates of the sort referred to above seem to give somewhat different results, we generated our own as follows.  We used the detailed national sector output and employment results produced by Cambridge Econometrics (2018) for three Brexit scenarios (Single Market, Customs Union, WTO rules) using their E3ME global macro-econometric model, based on assumptions about trade prices (tariff and non-tariff barriers), migration, and investment[111]. For each city, an estimated impact was derived by weighting the UK-sector results by each city's output and employment shares in 2015. The results are shown in Figure 7.7. As expected, the general finding of 'the harder the version of Brexit, the worse the impact' holds true across all cities, but there is a spread of effects under each scenario, a spread that increases the more comprehensive the nature of Britain's withdrawal from the EU.  Most notably, the disparity in the negative impact on output across cities is far more pronounced under the 'hard' Brexit scenario (WTO rules), from -2.4 percent to -4.2.  This compares with a range of -1.2 to -2.0 under the Customs Union scenario, and only from -0.8 to -1.3 under a Single Market outcome. The other key point is that under the 'hard' Brexit (WTO rules) case, there is no clear distinction in impact as between northern cities or southern ones. There is a mixture of northern and southern cities at both ends of the impact spectrum, whether estimated for GVA or employment. Nor is there any statistically significant relationship between impact and distance from London (see Figure 7.7; R2=0.014). However, what does

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[110] The fact that most of Britain's lagging northern cities and regions voted strongly for Brexit possibly had as much to do with the growing sense of neglect felt by their populations - of being economically 'left behind' and 'forgotten' by the London-based political, economic and financial establishment (Rodriguez-Pose, 2018) - as it did with anti-EU sentiments.

[111] E3ME is a global macro-sectoral econometric model developed over the past 20 years by Cambridge Econometrics through the European Commission's research framework programmes. It covers 69 sectors and 59 countries of the world. and is now widely used in Europe and beyond for policy assessment, for forecasting and for research purposes. Its econometric specification addresses concerns about conventional macroeconomic models and provides a strong empirical basis for analysis. It can fully assess both short and long-term impacts and is not limited by many of the restrictive assumptions common to Computable General Equilibrium (CGE) models (see www.e3me.com).

stand out is that London itself emerges as one of the least affected cities, a finding that is in line with London's resilience to the recession of 2008-2010.

**Figure 7.6: Estimated Impact of Brexit on British Cities: Percent by which Output and Employment would be lower in 2030 compared to Remaining in European Union – Three Scenarios**
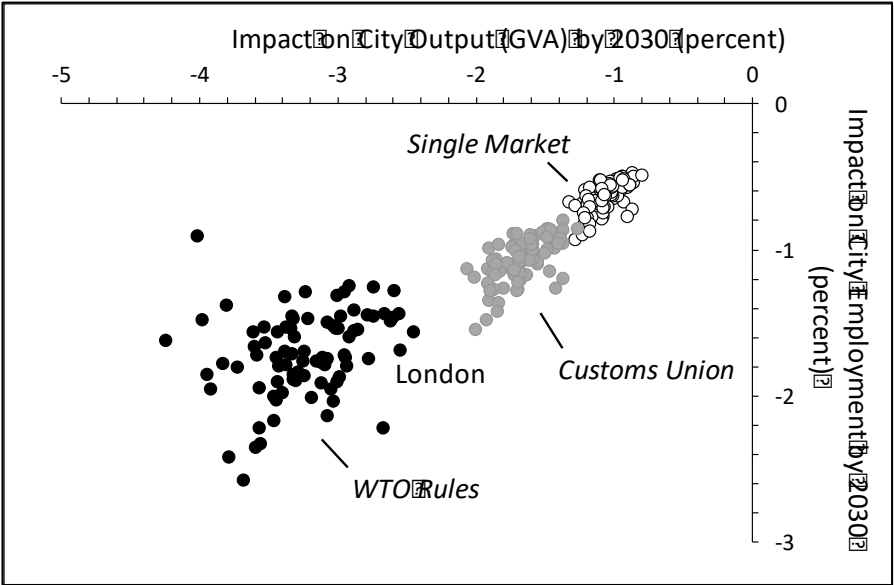


**Source:** Based on authors' data and calculations and the national sectoral impact estimates from Cambridge Econometrics' E3ME global macro-econometric model.

These estimates, like others that have been produced for British regions and localities, should be viewed with very considerable caution, and are only as valid as the assumptions and techniques they employ. In our case, a key assumption is that the reaction of a given sector to a particular Brexit scenario is the same regardless of location, so that differences among cities in the impact of Brexit simply reflect differences in the sectoral composition of those cities. Reality is likely to prove much more complex than that, and ultimately the true resilience of Britain's cities to Brexit will only be known ex post, once the actual Brexit deal has been implemented and its effects have worked through the economy, which could take several years.

**Figure 7.7: Relationship between the Impact of a Hard Brexit (WTO rules) on City Output and City Distance from London**
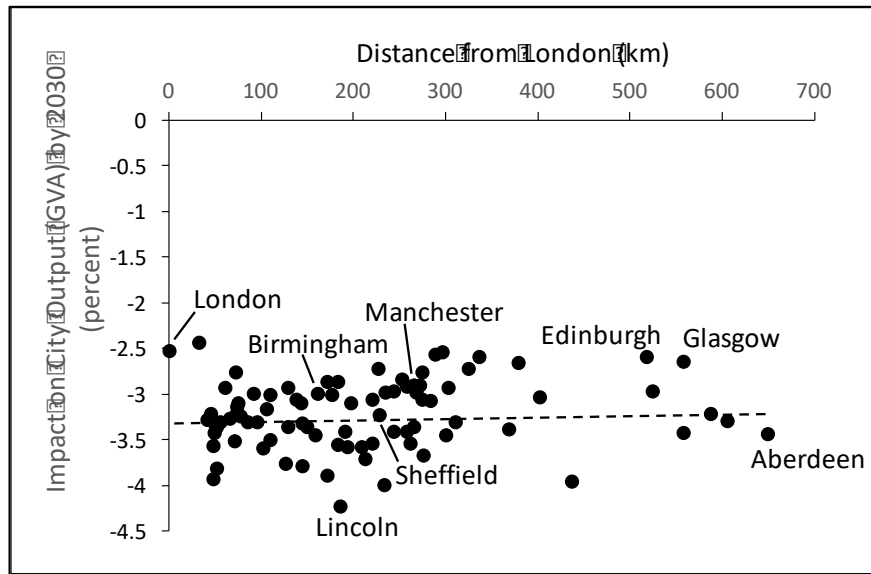


Source: As in Figure 7.6

## 7.7 Some Conclusions

In recent years, the concept of resilience has attracted increasing attention in urban and regional studies. At the same time, interest in the impact of major shocks on cities and regions has also increased, not least because of the uneven geographical impact of the Great Recession of 2008-2010. In this paper, a unique data set on British cities, constructed as part of a larger research project, and extending back some 45 years to the beginning of the 1970s, has been used to examine the resilience of some 85 such cities to the four major recessionary shocks that have disrupted the UK economy over this period. The same data was also used to explore the possible impacts across these cities of the Brexit shock, the UK's withdrawal from the European Union.

A number of key findings have emerged from this analysis. First, there has been significant variation across British cities in both their resistance to and recoverability from the four recessions. Second, the resilience of cities has itself varied over time, and especially as between the first two recessions (the downturns of 1973-75 and 1979-81), and the last two (1990-91 and 2008-10). More specifically, whereas in the first two recessions there was a positive relationship across cities between resistance and recoverability (the more resistant a city the faster its recovery), in the second two this relationship had disappeared, and if anything was replaced by a weak negative relationship (the less resistant a city the faster its recovery). Third, there has also been a notable geographical dimension to city resilience, in that northern cities have tended to have lower recoverability than southern cities in the last

three recessions, even though relative resistance of the two broad groups of cities has varied from one recession to the next. A further aspect is that London's relative recoverability has steadily improved over time. It would appear that, therefore, that there are both continuities and shifts in the dynamics of resilience to recessionary shocks across the urban system.

In an attempt to account for these continuities and changes in city resilience a range of possible factors was explored by means of a regression model of resistance and recovery for each of the four recessions studied. Considerable data restrictions limit the range of such factors that can be analysed on a consistent basis for all four recessions, so that the analysis can only be exploratory. In fact, levels of statistical fit are generally low, although better for the recovery (expansion) phases than for the downturn (resistance) phases. There is some evidence that economic structure has played a role in shaping differences in resilience across cities, with greater dependence on manufacturing reducing resilience and recovery, especially in the first two recessions, when manufacturing was more prominent across the economy, and greater dependence on KIBS becoming more of a negative factor in the last two recessions, when several cities had shifted substantially to a service based economy. Other variables, including skills, productivity, patents and city size and density, do not emerge as key determinants of city resilience. What is notable, however, is that city recoverability has tended to decline with distance from London.

These findings are clearly at best only suggestive and the estimates produced in Section 6 should, therefore, be interpreted with considerable caution, since like other such estimates in the literature, they are highly model- and assumption- dependent. Notwithstanding these caveats and limitations, the issue of city resilience to shocks does seem to be an issue worthy of investigation. Cities differ in their resistance to and recovery from major economic shocks. Those differences can influence the long-run growth paths of cities. This in many ways is the key issue, since the dynamics of recessionary shocks seems not to be that of fluctuations around some long-term growth path; rather, for many cities recessionary contractions lead to permanent reductions in the level of output. Shocks can thus lead to divergent growth paths among cities. This not only has implications for how we theorise city (and indeed regional) long-run growth, but also for discussions of policies aimed at reducing growth inequalities between cities (and regions).

# 8  Conclusions

## 8.1  Introduction

The concluding chapter to the thesis covers three main items:

(i)     Summarising the main findings of each of the papers

(ii)    Linking these with the stated thesis objectives.

(iii)   Identifying further lines for research, and unanswered questions.

(iv)    Drawing out the implications for policy.

## 8.2  Main Findings from the Papers

**Database**

Using a mix of official local data sources, I have shown how it is possible to construct a database to create functional areas which can approximate for city-regions. Together, these cities account for some 83 percent of British employment and 86 percent of British output (gross value added).  They thus make up the bulk of the national economy. The preliminary analysis undertaken with this database demonstrated London's turnaround and increased domination of national productivity performance. The database was also used to show how structural change (particularly KIBS growth versus manufacturing and mining sector decline) was partly responsible for employment performance across the 85 cities identified in the database.

The database acts as the springboard from which all the further empirical studies were launched, and without which it would have been impossible to undertaken the same depth and breadth of analysis. It thus represents a major achievement in its own right and should help to improve understanding about spatial development and imbalance in Great Britain in future work as well – the construction techniques can also be applied to update and extend the database when more official local data releases become available[112]. The three dimensions across which the database help to push the boundary of knowledge are:

(i)     Time

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[112] Currently local employment data are released annually in September, while GVA is released in December.

Long-run datasets do exist for the UK, but they tend to be at higher levels of aggregation and are often for administrative areas (e.g. NUTS1 regions). Meanwhile those based on functional definitions (such as the EC-OECD Functional Urban Areas) are good for cross-section analysis but extremely limited for investigating how they are evolving over time. A database covering almost 50 years is thus a very useful addition as it allows multiple cycles and shocks to be analysed, and also covers interesting periods of British economic development, from periods of de-industrialisation, privatisation and growth of services, globalisation, and the most recent impacts of the great recession.

(ii)     Space

The use of travel-to-work areas as the boundary definition for cities is something that makes the database useful for some areas of analysis and less for others. Travel-to-work-areas are one example of a wider set of Functional Economic Market Areas (FEMAs), where the boundary is dictated by the economic aspect being investigated – this can included labour markets and employment (as with TTWAs), housing markets, consumer markets, governance and policy space, or wider transport and infrastructure networks. This also links to the work of Parr (2007, op cit) who noted there is no single definition of a city – it depends on the purpose. Thus, a detailed TTWA based definition of cities is useful for analysing the evolution skills, jobs and employment-related activities. Functional space is important for any country, but for a Great Britain which has become heavily imbalanced over the past decades due to the rise of London and the greater South East, it is especially so.

(iii)     Activity

Many of the changes that have occurred in Great Britain over the past 50 years have a sectoral or activity-based aspect, such as the effects on manufacturing from de-industrialisation, and the rise of services and in particular the role played by Knowledge-Intensive Business Services (KIBS) in taking over the role of supporting productivity growth in an increasingly urbanised country. Having a dataset which distinguishes 45 sectors of activity over 50 years, and over 200 sectors since 1991 can therefore allow for interesting questions to be asked about the role being played by sector mix and transformation in city prospects and performance. Sectoral definitions do not provide the only way of defining activity, however, and as has been shown in the analysis functional definitions are equally if not more important.

## Structural transformation

The findings here are focussed around the role that structural change has had on the he economic growth paths of the 85 British cities over the past 5 decades. The results show a highly divergent mix, with some cities showing fast rates of growth and structural transformation towards KIBS and services in general, others remaining largely in long-term industrial decline, while a few have managed to turn around their performance. Dividing the cities into growth typologies was a way of making sense of the disparate mix of development paths. In Club I both for employment and output (gross value added), the mostly southern cities have grown faster than most. Interestingly, the fastest rates of growth have been among smaller and medium sized cities: the major cities (regional capitals and most of the Core cities') have been among the slowest growing. The exception is London, with a club of its own, and which after growing slowly up to the late-1980s, has since been one of the fastest growing cities in the UK. The northern (and generally more peripheral cities in Club III) have fared less well, with any nascent growth in new service sectors mostly outweighed by the decline of the legacy of their industrial past. In-between are the cities in Club II growing at more or less the national average, where these two forces largely offset each other.

The results also shed light on the importance of between versus within sector changes, which is measuring the importance structural change going on across sectors (e.g. the shift from manufacturing to services) against what is going on inside them (e.g. the shift to higher value-added activities within a given sector). The latter effect has been demonstrated to be the more important one, and understanding the locational reasons behind the division of functions within a sector, as noted by Baldwin (2016), is clearly key in this respect.

## North-south divide

There is a north-south division of cities in terms of productivity, with almost all northern cities having labour productivity levels, both in 1971 and in 2014, below the Great Britain average. While northern showed some tendency to 'catch up' with the southern counterparts over 1971-1991, the process stopped thereafter, and southern cities have since pulled ahead. This has largely been led by London, which has benefitted from being the focus of a largely mono-centric system which has led to the city simultaneously being the financial, cultural-creative, and political centre within the UK – a situation which rarely exists in other countries. Clearly there are winds of change blowing in the form of devolution and a (belated) perception of the degree of spatial imbalance within the country, and the re-discovery of macro regions through the creation of concepts such as the Northern Powerhouse, the Midlands Engine, and also city-deals and mayoral powers at smaller spatial scales is a reflection of this. What is unknown is how far devolution will manage to unwind the decades of centralisation of

power, which has manifested itself in the general discontent with the status quo and demand for change.

Contrary to much of the academic literature, our research finds that a city's economic structure - its sectoral make-up - explains very little of its growth rate relative to other cities. In fact, cities have become increasingly similar over time in their sectoral structures: there has been sectoral convergence at the same time there has been divergent growth. What seems to be more important in determining a city's growth are local' city-specific' factors other than structure. It is not so much what cities do that matters, but how well they do what they do.

**Productivity puzzle**

Analysis of productivity growth for the 85 cities over 1971-2015 shows that over 1971-1991 northern cities enjoyed a faster rate of productivity growth than southern cities, but that since 1991 it has been southern cities that have led productivity growth. However, productivity growth has slowed down almost everywhere since the 1980s, if not before, as performance in service sectors has been unable to offset the higher rates of capital intensity in more industrial-related activities. This fining is consistent with the general move towards structural similarity that has occurred in the UK over the period of analysis, as places become broadly the same their previous locational advantages for specialisation (and resulting productivity gains) have lessened.

However, the work does show that while structural change - the shift from manufacturing, where manufacturing growth tends to be high, to services, where in many such activities, productivity growth is lower - only explains a small part of this general slowdown. As with the analyses in previous chapters, most of the latter appears to be due to 'within-sector' slowdown, and this dimension also differs across cities.

**The skilled city**

A key finding in the occupations-related analysis is that, somewhat contrary to the experience for US cities, in the British case, there is little evidence that skills have increased faster in already-skilled cities, i.e. 'smart cities' have not necessarily become yet more 'smarter'. Neither, again in contrast to the US, have skilled occupations increased faster in larger cities. Rather, there has been a widespread hollowing out of the middle of the skills hierarchy, and polarization between high and low skilled occupations.

Nevertheless, skilled cities (those with higher accumulations of skilled labour) have grown faster than those dominated by lower-skilled occupations, and this supports the general argument of mutually-reinforcing combination of skills, innovation, productivity, and

agglomeration benefits that are expected to accrue from this. But these effects (as measured by their cumulative growth paths and how far they deviate from the national average) do tend to stabilise over time, suggesting that the benefits from such accumulation to not offer a perpetual mechanism to continually improve performance.

The spatial dimension of city skills gaps is also observed, and is to some extent a reflection of the structural and productivity differences highlighted in previous chapters. But the growth of skilled labour in the UK is not solely about London – other smaller cities have managed to successfully grow a high skills base, although many of these are still based around London in the wider South East.

**City-level resilience**

The final aspect the city-based research has examined is the resilience of British cities to economic shocks. Analysis of four major recessions over the last 45 years - the downturns of the mid-1970s, the early-1980s, the early-1990s and the financial crisis of 2008-10 – has revealed that southern cities tend to recover more strongly and sooner that northern cities: that is, they are more resilient. The relationship between resistance and recovery was also been examined, and a change noted over time with the link between a city's ability to resist a shock, and its subsequent strength of recovery, gradually becoming weaker and less associated. Despite the database constructed for the study, there are limitations on being able to investigate a panel-type relationship across all the combinations of downturn and recovery, with the result that empirical conclusions are largely associative. Economic structure does seem to play a role in the ability of a city to resist a shock, but as cities become similar in structure and more diverse, the ability to observe how structure plays a role in resilience will diminish as the role of functions undertaken within section takes on greater prominence.

Using these results as background, further work has been conducted on the likely impact of Brexit on the 85 cities examined in this project. Estimates of the possible sectoral impact of Brexit - both soft and hard exit scenarios - suggest that the impacts are likely to be fairly evenly spread across the country, although with some indication that southern cities would be more likely to recover more quickly from the negative shock associated with Brexit than would northern cities, much in the same way as has happened in previous economic recessions.

## 8.3 Linking Main Findings and Objectives

**Re-cap on thesis objectives**

Here, the objectives listed in the introduction are re-visited so that I can demonstrate how they were met, or adapted, during the course of the resarch. They objectives were:

(i) How have structural transformations observed at national level been distributed across British cities?

*Historical context*

In the period since the oil crisis of the early 1970s, very considerable changes have taken place in the structure of the British economy. Britain has lost much of its industrial base and experienced rapid growth in the service sector. While structural change has affected virtually every aspect of the British economy, perhaps one of the most significant impacts has been on the economic growth of its cities, particularly its large conurbations that owed much of their rapid expansion throughout the 18th and 19th centuries to Britain's industrialisation. Many of Britain's largest cities have struggled to adjust to a post-industrial economy. As cities have lost manufacturing jobs, they have experienced periods of high, often long-term unemployment, and in more recent years, while there have been more job opportunities, these have often been relatively poorly paid, and thus contributed to increased levels of income inequality across British society.

*City groupings*

To examine the patterns of change across British cities, the focused was on cumulative differential growth, whereby, starting in the base year of 1971, each city's growth rate in each year had the corresponding national (Great Britain) rate subtracted from it and cumulateed over time. The overall performance of the 85 cities, measured in terms of their differential growth in output and employment over 1971–2015, was shown in Figure 3.1.

The cities were characterized into three distinctive groups; those cities that had grown faster than the nation, which were termed cities 'pulling away' (Group I); those cities that had grown slower than the national benchmark, which were termed 'falling behind' (Group III); and those cities that had 'kept pace' with the growth of the nation (Group II). Table 3.1 shows which cities are in which group, while Figure 3.2 shows the evolution of the growth of GVA relative to the nation for the groups from 1971 until 2015. The relatively fast-growing Group I cities had an average growth rate of 2.76%, but some cities within the group did better than that, achieving almost 4.5%.

*Shift-share decomposition*

A dynamic shift-share decomposition procedure was adopted which was able to decompose city changes in output and employment on a year-by-year basis, in order to reveal the contribution that changes in economic structure have made to each city group's output growth differential over time. The contribution of the structure effect and local effect to the positive or negative gap in performance compared to national growth was shown in Figure 3.11.

Structural transformations in the national economy have played out quite differently across British cities, shaping, to a considerable extent, their divergent growth trajectories over the past five decades. The cities in Group I (mainly cities in the South of England) and London—which have been pulling ahead—have benefitted substantially from structural transformation and have seen strong growth on the back of high-growth sectors, especially KIBS.

A second set of processes concerns within-sector changes and includes the way in which different parts of the same industry change and evolve over time. They highlight the way in which different firms within the same industry may have different productivity and innovation capabilities and track records. Cities host firms that are classified as belonging to the same industry but are actually quite different in their capabilities, employment, business models and strategies; and these 'within-sector' effects will also contribute to divergent economic performances. The findings on the importance of 'local effects' in some types of cities may well indicate in part that these 'within-sector' effects also have a significant and growing spatial dimension. There are certainly many theoretical arguments that support and envisage this, as they suggest that globalisation and new supply chains and divisions of labour are widening differences between firms within industries and creating new types of specialisations in terms of functions, tasks and capabilities rather than entire sectors. Different rates of entrepreneurship and firm demographics, as well as investment and foreign ownership, may also be reinforcing these spatial variations.

However, a third set of processes centring on the development of cities' local supply factors is also interacting through time with both of these two types of industrial change. We know that there are important differences in the capabilities of cities to offer firms an attractive business environment through the supply of both appropriate 'hard and soft' infrastructure and the development of a local labour force sought by knowledge-intensive and tradeable industries.

As has been argued elsewhere, local areas start with an inherited pattern of land use, a resource base and institutions that were tailored to another era, and the legacy of the past weighs heavily on their ability to adjust to new economic futures. Thus, the Group III cities tend to be among the oldest industrial cities with infrastructure, labour forces and a constrained land use pattern to match.

(ii)     How have the economic structures of British cities changed over time?

Growth of employment also tend to be those that have recorded the fastest rate of growth of employment and vice versa. Some cities, such as Milton Keynes, Northampton, Telford, Crawley and Swindon, have experienced average growth rates in their GVA and employment far exceeding the national average (and totalling to a cumulative differential of over 30–40% over the period). Other cities, such as Liverpool, Glasgow, Newcastle, Birmingham and Sheffield, have grown well below the national rate in both output and employment. Still other cities have tracked national growth. Notwithstanding the high correlation between output and employment growth, however, some cities show a much slower performance in employment than in output, such as Sunderland, Middlesbrough, Manchester and Huddersfield. Still other cities seem to experience much stronger employment growth compared to GVA growth, such as Colchester, Chelmsford, Plymouth and Southend.

Another feature is that many of the fastest growing cities have been in the southern half of Britain (roughly south of a line between the Severn and Humber) and most of the slowest growing cites have been in the north. Notable exceptions to the latter group are Aberdeen (which has benefited from the North Sea oil industry), Telford (a New Town in Shropshire), Leamington Spa and Crewe.

However, structural factors cannot in themselves account for the strong growth of cities in Group I, and many cities in Group II (and the non-urban TTWAs) also managed to deal with structural transformation better than Group III. Moreover, these factors are also insufficient to explain the very lacklustre performance of London until the turn of the century, with a sudden turn-around in its fortunes thereafter, as well as the full extent of the lagging growth in Group III cities.

These results imply that the economic trajectories of cities are the complex and uneven outcomes of three fundamental sets of processes, all of which are interactive and potentially shaped by their policy and institutional contexts. The first are those structural changes in output and employment shares, which we have analysed here in depth. They centre on what we might term between-sector changes and refer to the rise of some

industries and the decline of others. Our analysis has demonstrated the importance of these processes in some cities and has allowed us to understand the extent to which post-industrial transition produces growth-reducing structural change in some categories of city.

(iii)     How and why have cities varied in economic adaptability and to what degree has this been shaped by their industrial structure?

The growth path of a given city is the outcome of a complex and evolving interaction of 'external' (national and indeed global) factors and city-specific factors and conditions. One can think of a city's economy as being an 'ensemble' of activities—a structural ensemble—that is constantly changing as a result of this interaction. Such a structural ensemble can be examined and decomposed in different ways. The analysis has taken industrial sectors as the primary units of a city's structural ensemble – Figure 3.4 shows the pattern of sectoral growth in the British economy over the period 1971-2014.

The sources of this uneven geography of productivity performance lie in a combination of changes to industry structure and spatial differences in within-sector effects. In terms of industry composition, many northern and core cities have suffered a steep decline in export-intensive manufacturing and their tradable industries since the early 1970s. In most cases, they have failed to compensate by developing new higher productivity sectors such as Knowledge Intensive Business Services or creative industries. Instead, the main sectors of employment expansion have been in lower productivity growth services. But changes to industry structure are not the primary cause of urban and regional variations in productivity growth. Instead, the analyses finds that productivity growth differences across cities are primarily due to differences in within-sector productivity growth (Martin et al, 2018). The importance of within-sector effects suggests that firm entry and exit processes have variable dynamics, and that some cities and regions have a greater share of high productivity firms, irrespective of their industry structure. Specialisation by function and task and associated differences in skill and occupational structure appear to be increasing in importance and require investigation.

(iv)     What sort of economic structure - diversified or specialized - is most conducive to regional and city growth?

*Productive performance*

The research has shown that, while productivity growth has slowed in most sectors in recent decades, the decline has been most pronounced in manufacturing, while at the same time the share of manufacturing in total employment has fallen consistently since

the beginning of the 1970s.These shifts in employment have had the effect of reducing the degree of specialisation in almost all cities (see, for example, Figure C4). Or put another way, British cities have become increasingly similar in their employment structures over the past 40 or so years.

To assess the impact of these structural changes on city productivity paths, methods followed by previous authors such as Rodrik and Kruger have been used to decompose total productivity change into a component due to employment shifts between sectors (structural change), and a component due to productivity changes within sectors. Two key features stand out. First, the between-sector (structural change) component is frequently negative, which is consistent with the shift of employment from higher productivity growth sectors into slower productivity growth sectors.

However, second, in most cities the within sector component of productivity change, which is positive across cities, outweighs the structural change component. That is, productivity growth differences across cities are primarily due to differences in within-sector productivity growth. This finding mirrors that found in analyses of differences in productivity growth among countries (for example in the work of Rodrik). It is also perhaps not surprising, given that cities have become less sectorally specialised, that is, more sectorally similar, over time.

Within-sector productivity change appears to be more important than between-sector shifts (structural change) in shaping the pattern of productivity growth across cities. This may reflect the fact that functional or task specialisation (within sectors) is more important than sectoral specialisation per se. However, it is difficult to assemble city data on this aspect of city economic structure.

*Resilience*

In addition, city resilience seems no longer to be shaped by sectoral structure. This, as in the case of productivity growth differences, quite probably reflects the decline in sectoral specialisation across British cities, and the convergence in their sectoral structures. What may be important, however, though it could not explored because of data limitations, is a city's functional specialisations, including its position and role in supply chains and networks.

It is more difficult to explain city differences in resistance to recessionary shocks than their recoverability from them. Second, the factors that appear to be important have varied from recession to recession. For example, while structural factors seem to have influenced recoverability from the first two recessions, they seem to have played much

less of a role in the two recent recessions – possibly reflecting the convergence in structure across cities noted in Chapter 3 and 4 above.

(v)     How have urban and related policies impacted on the structures and growth paths of British cities?

*National policy context*

The national policy context for city economic development comprises several policies directly related to territorial development across the UK including sub-national economic development and spatial policy. But there are also a number of 'spatially-blind' policies which are of great importance for the growth prospects of places across the country: industrial policy, labour market and welfare policy, and macro-economic policies. Taken together this set of policies have undergone several shifts in the past five decades. Table 8.1 below provides an overview of the main initiatives of different governments in these policy domains since the 1970s.

**Table 8.1: Major Shifts in National Policies Across Different Governments since the 1970s**

| Policy Type | 'Spatial Keynesianism' (up to 1979) | Thatcher and Major governments (1979-1997) | Blair and Brown governments (1997-2010) | Cameron and May governments (2010-19) |
|---|---|---|---|---|
| Subnational economic development policy | Regional planning Regional policy | 'Localism' (but very restricted) | Regional Development Agencies in England Devolution to Scotland, Wales and Northern Ireland | Local Enterprise Partnerships City and Devolution Deals Metro-mayors in Combined Authorities Regional Growth Fund |
| Spatial policies | New Town policy | Urban policy | Urban regeneration and neighbourhood renewal | Place-based dimension to New Industrial Strategy |
| Industrial policy | Government ownership and specific support for strategic industries R&D-spending | Privatisation, and abolition of support for specific industries | Focus on innovation (including some cluster-based policies) | New Industrial Strategy with attempt to integrate various policies to stimulate innovation and productivity growth |

| Policy Type | 'Spatial Keynesianism' (up to 1979) | Thatcher and Major governments (1979-1997) | Blair and Brown governments (1997-2010) | Cameron and May governments (2010-19) |
|---|---|---|---|---|
| | in selected industries | | | |
| Labour market and welfare policy | Expanded welfare state Centralised and corporatist institutions for employment support and training | Contraction of welfare state Deregulation of labour market | Continuing flexibility of labour market. Conditional welfare arrangements. Investments in training and skills development. | Continuing flexibility of labour market. Further restrictions and cut-backs in welfare. |
| Macro-economic policies | Aim for full employment Stimulating / restraining demand to manage business cycles | Aim to reduce inflation Capital controls abolition Fiscal austerity | Looser monetary policy Fiscal expansion | Fiscal austerity Quantitative easing |

Source: Table 7.1 in Think-piece submitted for the UK2070 Commission[113].

These shifts are evident in the evolution of governance arrangements and economic development policy initiatives leading to considerable churn and fragmentation. This is true for arrangements at the national level, such as central government departments and their regional offices, as well as various non-departmental executive agencies, for example, those responsible for labour market and skills policy, business support, and the management of public assets especially land and property.

This continual reorganisation is evident at the sub-national level too as governance arrangements and policies have been subject to frequent restructuring. Moreover, the territorial focus of subnational economic development policy has changed frequently from regionalism to localism, back to regionalism, then localism and most recently to city-regionalism. Layered on top of this, there have also been several large-scale reforms of local government in England and Wales, and Scotland, since the 1970s: first around 1974 and then again around 1996 with the Greater London Council and six metropolitan counties (including the West Midlands) abolished in 1986. In all cases, churn and

[113] See http://uk2070.org.uk/wp-content/uploads/2019/03/76-MARTIN-British-Cities-Economic-Performance.pdf.

fragmentation have been key issues, generating costs and absorbing time for economic development policymakers in a constantly shifting institutional and policy landscape.

*New towns as policy success examples*

When re-assessing growth performance, the cities in Group I (methioned earlier) have been characterised by very strong overall growth in output throughout the period of study, though this seems to have levelled off somewhat in the last 15 years of the period under investigation. This group includes Milton Keynes, Northampton, Telford, Peterborough, Reading, Cambridge and Southampton. Several of these cities were promoted as New Towns and assisted by British spatial policy to become centres of growth. The New Town approach was to facilitate a planned approach to economic development, whereby a Development Corporation was established with extensive powers relating to land assembly and the provision of infrastructure in order to promote economic development. The evidence suggests that they may have been quite successful in this respect.

The process of structural change may have had more indirect effects, and may have interacted with the within-sector changes and development of local supply factors in complicated ways. Our fast-growing Group I cities contain post-Second World War New Towns characterised by plentiful and planned land assembly, up-to-date infrastructure and labour with skills more appropriate to the new age. In contrast, the Group III cities tend to be among the oldest industrial cities with infrastructure, labour forces and a constrained land use pattern to match. The legacies of these cities have frequently constrained and filtered the development of growth of service sector firms, as well as the provision of a skilled and educated labour force that is well suited to knowledge-intensive firm growth. Hence there may well be a type of spatial differentiation and sorting in which the emergence and growth of knowledge-intensive and high-productivity firms is shaped by the degree to which their past legacies allow some cities to be more valued by these firms and their employees.

*Policies need to understand and take account of structural change*

How cities deal with structural transformation over time, and the concomitant changes in conditions and opportunities for their economic growth, are clearly major issues for society and the formulation of policy. Indeed, in Britain, as government devolves economic powers from central to local government, it is important that those tasked with managing city economies understand the basic mechanisms that lie behind change, and what may be the scope for intervention to assist the process in a way that enhances local economic growth. Policymakers need to know more about the sectors that are declining,

those that may be experiencing successful upgrading or 'turning around' and those that are new and growing. This knowledge can help them to understand more about how to assist their economies to adapt and adjust their structures in response to both the challenges and opportunities of a rapidly changing globalised marketplace.

## 8.4 Further Areas of Research

**Database**

A first and obvious natural extension of the database is to use it for applied research, but this has already been done as evidenced by the subsequent chapters in this thesis.

As far as extending the database goes, there are a number of areas where the existing indicator list or coverage could be improved:

- Estimating a measure of investment (gross fixed capital formation) which can then be used to calculate capital stock and then a measure of total factor productivity. Currently the ONS produces estimates of investment at NUTS2 level, so an approximation would be required to take this down to LAD level and then back up to the TTWA scale. But it is possible.

- The definition of cities as represented by TTWAs could be further refined. Using recent improvements in GIS software, a more accurate approximation from LAD data, and possibly using lower spatial levels of data such as employment from the Business Register Employment Survey (BRES) would give rise to more robust estimates. This would also allow the full set of TTWAs to be identified and included in the analysis, although this would take the work beyond the cities remit.

- Related to this is the changing definition of TTWA boundaries. Every 10 years, when the full census is undertaken, the TTWA boundaries are reviewed, recalculated and redrawn. The next TTWA revision will be 2021, and as well as applying these new boundary definitions to create an updated dataset, more analysis on the changing nature of these boundaries and how they affect the observed data would be a useful exercise, because the TTWA has been necessarily fixed (at 2011) for the purposes of the current database and studies that rely upon it.

- Finally, linking the developed database into the European taskforce on establishing the harmonised definition of labour market areas[114] is a further development that can take place to aid the process of improving the information base on a wider geographic scale,

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[114] See https://ec.europa.eu/eurostat/cros/content/2018-task-force-european-set-lmas_en.

although the focus on the taskforce is mostly on harmonizing area definitions rather than developing time series data.

## Structural transformation

From the structural perspective, further work could be done to look at the contribution which related and unrelated variety might make to the picture. Currently the sectoral structures are viewed in an unrelated sense, while much work (e.g. by Frenken et al, 2007; Boschma, 2016, and others) in this area has been done to link to explore whether and how far interrelated sets of industries (in terms of input-output linkages, overlapping technologies, related skill requirements, and the like) correspond to regional growth. This could help to reveal alterative typologies that are not defined purely on growth trajectories, but on the factors that underlie them.

A more detailed sectoral investigation could also take place to see whether or not the degree of sectoral disaggregation influenced results. Alongside the main 45-sector database used for the majority of the research, a more detailed 249 (i.e. largely 3-digit level) sector database was also constructed over a shorter time period (1991-2015). As proposed by Richardson (1978) and subsequently defended by Forthergill and Gudgin (1979), the work could be extended to see whether the results were invariant to the number and granularity of sectors being analysed.

## North-south divide

In some ways the debate about imbalance has now moved from the traditional stereotype of the north-south divide. The narrative of more recent years is that of left-behind or forgotten places, as typified by Rodriguiez-Pose (2018) and which has also been linked to the referendum result to leave the European Union. The typology of left-behind places is more nuanced. Left behind places occur in both north and south (e.g. Blackpool and Jaywick Sands) and so analysis would require a deeper and possibly more fine-grain analysis to get below the surface and understand the evolutionary dynamics that causes some places to benefit from a virtuous cycle of growth, agglomeration and competitiveness, while others fall into a vicious circle of firm closures, unemployment, and deprivation. This type of analysis could then potentially link in with other interesting work on the psychology of place, as has already been initiated by the likes of Garretsen et al (2019a, b). This may well go beyond city-level analysis, although there is research to be undertaken as to why, in the UK at least, it is

the wealthiest cities (e.g. Cambridge) which also see the highest degree of inequality within their boundaries[115].

## Productivity puzzle

The spatial aspect of the UK's (and possibly other countries') productivity puzzle still requires much research, and is indeed one of the themes of the Productivity Insights Network[116] of which I am a co-investigator. Firm-level analysis has already started, such as the analysis of the Bank of England[117] but the focus has been mostly on alternative micro-based firm aggregations (e.g. exporting firms versus non-exporting) and not so much on the spatial angle – indeed, Haldane notes that 'Looking at the problem by sector, by region or by city all have merit'. The Centre for Cities[118] has done excellent preliminary work pushing the spatial dimensions of this research, but much more research is needed, directed at changing structures and dynamics over quite long periods of time, rather than static cross section analyses at a particular point in time as currently exists.

## The skilled city

Having established that the findings for the UK economy differ from those of the more established US-dominated literature on the topic, the first natural extension to the skills work is to push this further across other countries to see if the same findings hold true. For example, given that the European urban system is known to differ from that in the US (Dijkstra, et al, 2013), it would be interesting to examine whether the rapid growth of skilled occupations in some smaller, lower density cities, and stronger occupational polarisation in former manufacturing cities, have been seen across other states, or whether they are peculiar to the UK.  Second, a better understanding is needed of the conditions that favour growth in skilled employment. In particular, why are smaller and medium-sized cities showing such a wide range of results in terms of their occupational change? The 'skilled city' view risks over-emphasising city size, agglomeration and KIBs in misleading ways and relying too heavily on education as a measure of skill. Our findings suggest policy needs to acknowledge the potential *and* limitations of 'big city resurgence' while paying more attention to what has facilitated the rapid growth of high-skill sectors and firms in small and medium-sized cities and what else in addition to specialisation in KIBS supports urban employment growth.  While our results support the common policy focus on upskilling and increasing skill levels, the

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[115] See https://www.theguardian.com/uk-news/2018/feb/04/cambridge-most-unequal-city-population-divide-income-disparity.

[116] See https://productivityinsightsnetwork.co.uk/.

[117] See https://www.bankofengland.co.uk/-/media/boe/files/speech/2018/the-uks-productivity-problem-hub-no-spokes-speech-by-andy-haldane.

[118] See https://www.centreforcities.org/publication/the-wrong-tail/.

relative decline in some middle-skilled occupations in northern cities raises profound challenges for this approach. As demand for some of these skills appears to have fallen substantially, the rationale for responses seeking to raise the supply of people with medium-level qualifications and skills is being undermined. Indeed, policies seeking to speed-up the diffusion of new technologies in attempts to raise productivity in such cities may well intensify these patterns. City skills policy faces the challenge of better connecting with other local economic development strategies, devising complementary and co-ordinated interventions to raise the supply *and* demand for skills and supporting appropriate living wage floors (Sissons and Jones, 2016). Our analysis reveals that in many northern cities, the professional group is the only major high-skilled occupational category that has shown strong growth, typically related with public sector growth. Opportunities for city policy to build upon rising demand for skilled labour in other occupational categories are fewer and any skill shortages may be limited to tightly defined, specific groups within occupations. Further research on those cities where medium level skills have continued to increase would be valuable here. Future work should provide more disaggregated analyses of change in specific occupations and cities to strengthen the evidence for policy. The place dimension of skills change needs to be taken more seriously, as it may well be missed by approaches that rely on generalized propositions about the 'skilled city'.

**City-level resilience**

To understand more fully why cities differ in resilience, and why their resilience changes over time, would require more detailed analysis, either using more sophisticated dynamic panel models with spatial effects, which would still be hampered by the sort of data restrictions encountered above, or by means of in-depth investigation on a city-by city case study basis, which would be a very considerable task for all 85 locations included in our study. The latter would require, among other things, detailed micro-data on the firm populations of each city, their dynamics and responses to recession, including their investment, market orientation, exports, supply chains, workforce, migration and financial strategies and options.   It would also require investigation of both locally-specific policy and institutional responses to recessionary shocks, and the impact of national policy reactions and interventions (which are also bound to vary in impact from city to city). While much is made in the literature about the importance of local economic governance arrangements, determining their independent impact on local economic growth and development, let alone resilience, is extremely difficult, the more so in the case of the UK because of the substantial churn in policies and policy institutions that has occurred at the city and regional levels over the past four decades. Reliable estimates of the resilience of British cities to Brexit would also require detailed bottom-up, city-by-city, analysis to be compared against the more generic top-down research.

## 8.5    Implications for Policy

Rather than adopt a chapter by chapter approach in this final section, it is instead structured around the way in which city-level research can and should affect policy, particularly in the UK where initiatives do not seem to be particularly joined up and consistent, and in a country which is becoming ever-more imbalanced.

### Cities as driving forces for rebalance

As noted in the introduction, the UK government has started to take notice of the extent of the imbalance in the economy and take action to address the concentration of economic, cultural, and governance structures in London and the Greater South East. Cities outside London have a key role to play in the rebalancing of the country in a post-Brexit world, whatever that may look like. There is strong evidence (see, for example, Rodríguez-Pose, 2018) that one of the primary causes for the Brexit vote was the degree of spatial imbalance and the feeling of being left behind, with the majority of benefits from globalisation and integration seemingly going mostly to London and the Greater South East. Whatever the final outcome of the Brexit process, there is a strong need to address these imbalances in a thorough way, looking at the manner in which economic, financial, political, and cultural forces have become centralised over the past few decades and exploring ways of redressing the balance.

### One size will not fit all

The heterogeneity of performance across cities and the factors underpinning them mean that the specific policies needed will vary across each city, or at least type of cities. Some 'generic' issues can be identified.  In his discussion of how lagging and old industrial regions can be given 'second or third wind', Krugman (2006) makes a simple but useful distinction between a region's or city's *fundamentals* which are largely place-specific immobile resources and assets, and its *growth and development dynamics*, that is the particular form of a city's or region's economic growth, and the external economies that are themselves a consequence of that pattern of economic development.

While useful, this simple distinction fails to capture the complexity of the policy challenge of reviving or boosting a city's economic performance. For example, a city's economy can be viewed as comprising key *assets* that in turn shape the *drivers* of city growth, prosperity and productivity, which in turn offer various *potential levers for policy* intervention and support: see Figure 8.1 (the list of potential policy levers shown there is meant to be illustrative rather than exhaustive).

**Figure 8.1: The City Economy as a Complex Policy Field**
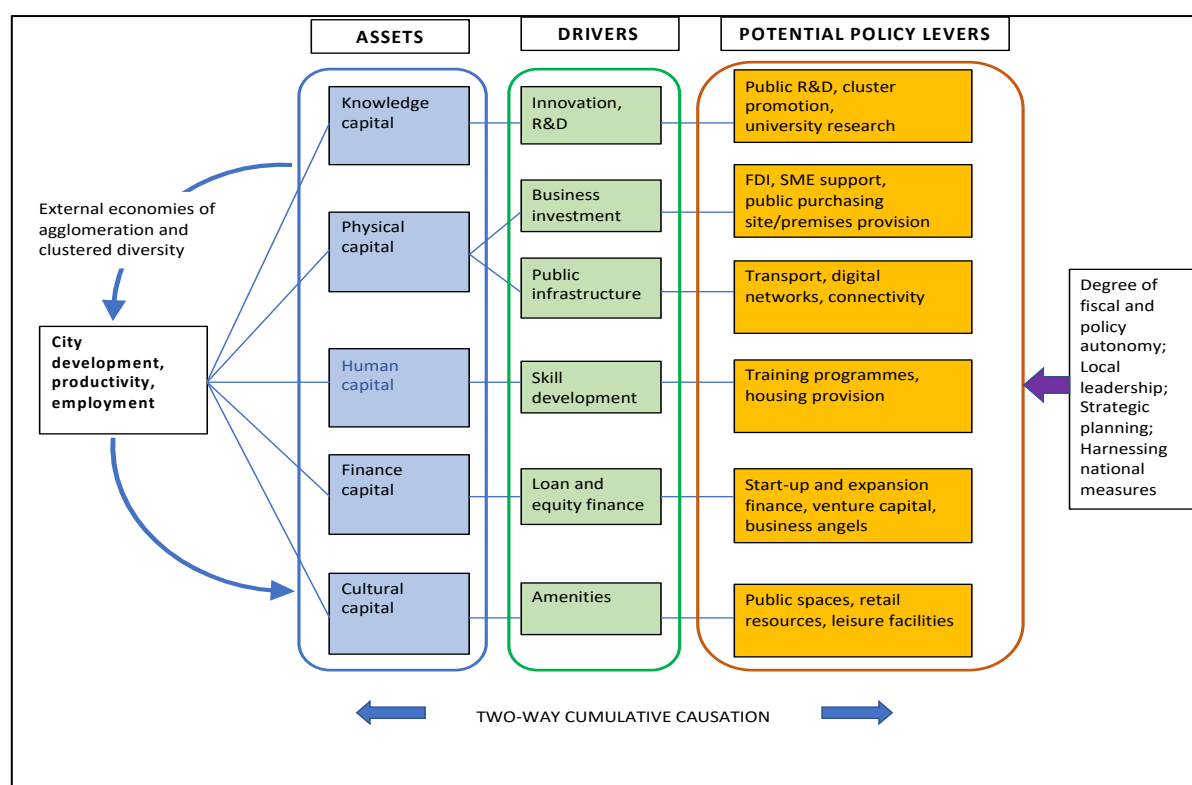


Based on OECD (2018)

The nature and success of policy interventions will depend, among other things, on the degree of local fiscal and policy autonomy, the resources at the city's disposal, local leadership, the nature of strategic planning, and the success to which a city is able to attract and harness national level initiatives and programmes. Note that there are two-way or recursive causal influences at work in Figure 8.1, in that policies can influence the drivers of a city's development, which drivers then reshape the city's key assets. In effect a process of two-way cumulative causation is involved. The policy aim is obviously to make that process a virtuous one, leading to a continual positive adaptation of the city's economy. Note also that the local accumulation and upgrading of a city's assets can generate positive external economies of agglomeration.

**Identifying policy aims**

If Figure 8.1 identifies some of the potential policy levers for a city's economy, what should be the *aims* of policy? Figure 8.2 show four such broad aims[119]:

[119] It should be noted that the policy aims suggested here go beyond the remit of the thesis and contain ideas and suggestions which do not (in some cases) build on the previous work contained in the preceding chapters. More integrated (and theoretically-consistent work exists within the field of urban economics, whereby one of the core models is based on the

227

(i)     promoting a city's dynamic comparative advantage;

(ii)    promoting inclusive growth;

(iii)   building the resilience of its economy; and

(iv)    raising the quality of life of its population.

**Figure 8.2: Some Major Objectives for City Policy**
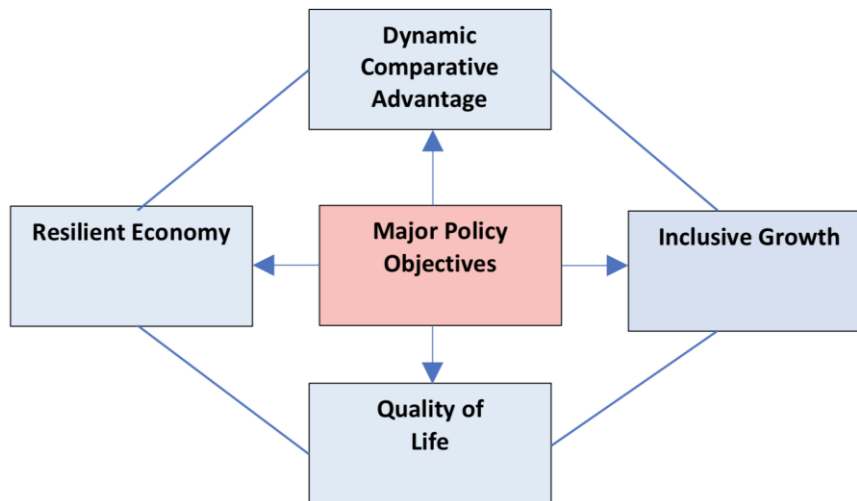


Other major aims could no doubt be added, such as moving towards a low carbon economy. The key point is that major policy goals need first to be specified, since these then determine what city assets, policy drivers and policy interventions are relevant and need to be prioritised. At the same time, major policy objectives, and the measures needed to achieve them, will inevitably be inter-related. Dynamic (and adaptive) comparative advantage is a key building block of a city's economic resilience to shocks. At the same time, a skilled workforce is key not only to dynamic advantage but also to ensuring that a city's economic growth is inclusive, founded on good quality, high wage jobs across its population. Yet again, policies that seek to improve the quality of life for a city's population will enable the city to attract and retain high quality jobs and workers.

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notion of spatial equilibrium (see Brakman, Garretsen, van Marrewijk, 2020) as locational choice across cities of different types (large vs small, dense vs spread out), etc. Here, firms and workers/consumers make location choices (in a particular spatial setting, e.g. a travel-to-work-area) based on the interplay between (the inter-regional variation in) local productivity, local amenities and local housing rents, and the constraints under which they operate. Thus, there is the notion that these variables are not independent, and do not necessarily need to be part of a new policy agenda as they are already incorporated in agents' decision-making processes. It should also be noted that the majority of empirical findings on these processes are based on studies of US cities, so the area is perhaps ripe for research using a UK city database.

**Promoting dynamic comparative advantage**

*Dynamic comparative advantage* refers to the capacity of a city economy to constantly adapt its economic structure (its firms, industries, technologies and skill base) so as to maintain its productivity and competitiveness, especially in export markets. The findings from the research suggest that many of the cities in this study have lost dynamic comparative advantage over recent decades, losing key export activity and lagging in economic growth as a consequence.

Conventionally economists have viewed comparative (or competitive advantage) in static terms, What matters, however, is *dynamic* comparative (or competitive) advantage, since over time advances in technology, shifts in competition (and competitors), trade patterns, and market conditions generally, mean that firms and industries need to adapt. It may also mean that some of a city's firms and industries will decline, so policy will need to promote the conditions that maximise the potential for new firms, new technologies, new industries and new skills to develop to replace those in decline or no longer at the forefront of productivity or technological advance.

**Building a resilient economy**

*Building a resilient economy* refers to promoting an economy that is able both to better resist shocks and disruptions and to successfully recover from them when they do occur. Economic growth is not some smooth incremental process, but one periodically subject to shocks of various kinds, such as major recessions or financial crises. A key finding is that the average performance of many of the UK's larger cities is typically one of lower resistance and recoverability than the national average in most of the recession-recovery cycles of the past forty years. In contrast, while London has not improved its resistance to shocks over this time, its ability to recover has improved with each shock it has faced. Since recoverability is key to long-run growth performance, this is one reason why London has pulled progressively ahead of the other large over recent decades.

Many of the determinants of economic resilience are precisely those that make for a buoyant city economy, and key among these is the ability of a city to adapt over time. Adaptive resilience is central to successful recoverability. Dynamic comparative advantage is quintessentially about the capacity of a city's firms, industries and workers to adapt to changing market and technological conditions. A city's resilience is an ongoing process of upgrading and re-orientating its economic structures and comparative strengths. Economic policies – whether at national level or local (regional and city) level - have not hitherto been concerned with building resilience, yet the latter is central to long-run prosperity. How to

incorporate resilience building into policy-making on a number of fronts is now being actively considered int e EU for example.

**Promoting inclusive growth**

There is widespread concern that over the boom years that preceded the global financial crisis, and indeed in the hesitant recovery since, economic growth has tended to favour certain groups while leaving others behind. Real wages have stagnated for many groups in the labour market, but have been more robust for high-skilled workers. The result has been that wage inequalities have widened everywhere. Although UK employment has expanded, and has been much celebrated by Government, many new jobs have been low-wage and part-time, with inferior conditions and entitlements (the so-called 'gig economy')[120]. There are long-run trends and processes in motion, such as AI and robotics, associated with the changing nature of work, that are militating against the low-skilled and those without skills. A key policy objective must be to ensure a more inclusive mode of economic growth in our cities, involving the creation of an employment base not only sufficient to provide jobs for all those seeking work, but also consisting of good quality jobs paying decent wages. This will require policy action on several fronts. Measures that improve the minimum wage to a liveable standard will help in the short-run. But over the longer term, policy needs to help raise the skill levels across a city's workforce while at the same time promoting and supporting the economic activities that will enable those skilled workers to find local jobs, rather than being forced to move to those cities and regions where attractive jobs can be found. Over the post-war period in the UK, the net movement of the more educated and enterprising workers has been from northern cities and regions to London and the south-eastern region of the country.  This has benefitted the latter, but hindered the growth and prosperity of the former. Promoting a more inclusive mode of growth require both supply-side and demand-side policies.

**Ensuring quality of life**

*Quality of life* has to do with the general well-being of individuals and societies, and spans everything from cost of living, physical health, family, education, employment, wealth, safety, transport, security to freedom, religious beliefs, and the environment. Various composite 'quality of life indices' have been compiled for UK cities and for major cities across the world, and no two lists are the same because of different methodologies and factors included. But the evidence suggests that UK cities do not compare favourably with similar sized cities in the EU, or even in the USA.  Edinburgh ranks the highest both in

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[120] See https://www.cardiff.ac.uk/__data/assets/pdf_file/0011/1309457/6_Insecurity_Minireport_Final.pdf.

international tables and UK rankings.  In UK rankings, Nottingham, Belfast and Liverpool have much lower quality of life indices than Birmingham, Bristol and Leeds. Quality of life and well-being are not only desirable in their own right, but also for the positive impacts they have on attracting both business and workers.

**A final thought…**

While this thesis deals mostly on the economic and financial forces, one recent idea put forward by the Economist (2017)[121] focussed on political centralisation and the idea that Parliament should move north to Manchester, particularly in the context of the vast repairs needed on the Houses of Parliament. Perhaps a bolder plan could be considered whereby Parliament rotates between the main cities of the UK, in the same way that the Royal Court moved around the country in Tudor times. Such a move would truly signal a real political desire for rebalancing, and make politicians more acutely aware of the issues in different areas of what is increasingly a Disunited Kingdom.

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[121] See https://www.economist.com/bagehots-notebook/2017/02/23/the-pragmatic-case-for-moving-britains-capital-to-manchester. Also the Guardian https://www.theguardian.com/politics/2017/jul/18/the-case-for-and-against-moving-parliament-out-of-london.

# 9 Bibliography

Acemoglu, D.and Autor, D. (2011) Skills, Tasks and Technologies: Implications r Employment and Earnings, Ch 12 in Ashenfelter, O. and Card, D. (eds) *Handbook of Labour Economics*, Vol 4b, North Holland, pp. 1044-1171.

Ahrend, R., Farchy, E. Kaplanis, I. and Lemboke, A.C. (2017) What Makes Cities More Productive: Evidence form Five OECD Countries in the Role of Urban Governance, *Journal of Regional Science, 57*, 385-410.

Aiginger, K. and Davies, S. (2004) Industrial specialization and geographic concentration: two sides of the same coin? Not for the European Union, *Journal of Applied Economics, 12*, pp. 231-248.

Aiginger, K. and M. Pfaffermayr (2004) The Single Market and geographic concentration in Europe, *Review of International Economics, 12*, pp. 1-11.

Altunbas, Y., Jones, E. and Thornton, J. (2012) Knowledge spillovers and the growth of cities, *Applied Economics Letters, 20*, pp. 162-166.

Andrews, D., Criscuolo, C. and Gal, P. (2015) *Frontier firms, technology diffusion and public policy: Micro evidence from OECD countries*, Paris: OECD.

Angulo, A.M., Mur, J. and Trivez, F.J. (2018) Measuring Resilience to Economic Shocks: An Application to Spain, *Annals of Regional Science, 60*, 349-373.

Ansari, M. R., Mussida, C. and Pastore, F. (2013) Note on the Lilien and Modifed Lilien Index, *Discussion Paper 7198*, Institute for the Study of Labour, Bonn, Germany.

Arias, A., Hansen, G.D. and Ohanian, L.E. (2007) Why Have Business Cycle Fluctuations Become Less Volatile? *Economic Theory, 32*, 43-58.

Arrow, K. (1962) The Economic Implications of Learning by Doing, *Review of Economic Studies, 29 (3),* pp. 155–73.

Augustine, N., Wolman, H., Wial, H. and McMillen, M. (2013) Regional Economic Capacity, Economic Shocks and Economic Resilience, MacArthur Foundation Network on Building Resilient Regions Working Paper May.

Autor, D. (2015) Why are there still so many jobs? The history and future of workplace automation, *The Journal of Economic Perspectives 29*, 3, 3-30.

Autor, D., Levy, F. and Murnane, R. (2003) The skill content of recent technological change: An empirical exploration, *Quarterly Journal of Economics* 118, 4, 1270-1333.

Bacolod, M., Blum, B. and Strange, W. (2009) Skills in the city, *Journal of Urban Economics 65*, 136-153.

Bahl, R.W., Firestine, R. and Phares, D. (1971), Industrial diversity in urban areas: alternative measures and intermetropolitan comparisons, *Economic Geography, 47*, pp. 414-425.

Bailey, D. and Berkeley, N. (2014). Regional Responses to Recession: The Role of the West Midlands Regional Task Force, *Regional Studies*, 48, pp. 1797-1812.

Bailey, D., Bentley, G., De Ruyter, A., and S. Hall (2014). Plant closures and taskforce responses: an analysis of the impact of and policy response to MG Rover in Birmingham. *Regional Studies*, pp 60-78.

Baily, M.N., Hulten, C. and Campbell, D. (1992) Productivity dynamics in manufacturing plants, *Brookings Papers on Economic Activity, Microeconomics*, pp. 187–267.

Baily, M.N., Bartelsman, E.J. and Haltiwanger, J.C. (2001) Labor productivity: structural change and cyclical dynamics, *Review of Economics and Statistics 83*, pp. 420–433.

Baily, M.N. and Solow R.M. (2001) International productivity comparisons built from the firm level, *The Journal of Economic Perspectives 15*, 3, 151-172.

Baldwin, R. (2016). The Great Convergence: Information Technology and the New Globalization. Cambridge MA: Belknap Press of Harvard University Press.

Baldwin, R. and Everitt, S. (2014) Value Creation and Trade in 21st Century Manufacturing: What Policies for UK Manufacturing? Ch. 4 in Greenaway, D. (Ed) The UK in a Global World, Department of Business, Innovation and Skills, London, pp. 71-128.

Baranzi, M. and Scazzieri, R. (Eds) (1990). The Economic Theory of Structure and Change, Cambridge: Cambridge University Press.

Barbour, E and Markusen, A. (2007) Regional occupational and industrial structure: Does one imply the other? *International Regional Science Review* 30, 1, pp. 72-90.

Barlow Commission (1940) Royal Commission on The Distribution of the Industrial Population, London, H.M. Stationery Office.

Barff, R.A. and Knight, P. L. (1998). Dynamic Shift Share Analysis, *Growth and Change*, 19, pp. 1-10.

Bartelsman, E. and Doms, M. (2000) Understanding productivity: Lessons from longitudinal microdata, *Journal of Economic Literature, 38*, 3, pp. 569-594.

Baumol, W.J. (1967) Macroeconomics of unbalanced growth: the anatomy of urban crisis, *American Economic Review 57*, pp. 415–426.

Baumol, W.J., Blackman, S.A.B. and Wolff, E.N. (1985) Unbalanced growth revisited: asymptotic stagnancy and new evidence, *American Economic Review 75*, pp. 806–817.

Beatty, C. and Fothergill, S. (2016) Jobs, Welfare and Austerity: How the Destruction of Industrial Britain Casts a Shadow over Present-Day Public Finances, Centre for Regional Economic and Social Research, Sheffield Hallam University.

Beaudry, C. and Schiffauerova, A. (2009) Who's right, Marshall or Jacobs? The localization versus urbanisation debate, Research policy, 38, pp. 318-337.

Bienne, M. and S. Coulombe (2007), Economic integration and the diversification of regional exports: evidence from the Canadian-U.S. Free Trade Agreement, *Journal of Economic Geography, vol. 7*, pp. 93-111.

Berger, T. and Frey, C. B. (2016). Structural Transformation in the OECD: Digitalisation, Deindustrialisation and the Future of Work. OECD Social, Employment and Migration Working Papers No. 193. Paris: OECD Publishing.

Bernanke, B.S. (2004) The Great Moderation, Remarks at the Meeting of the Eastern Economic association, Washington DC February 20 (available at http://www.federalreserve.gov/boarddocs/speeches/2004/20040220/).

Berry, C. and Glaeser, E. (2005) The divergence of human capital levels across cities, *NBER Working Paper* 11617.

Binelli, M. (2013) The Last Days of Detroit: Motor Cars, Motown and the Collapse of an Industrial Giant.

Birch, K., MacKinnon, D. and Cumbers, A. (2010). 'Old Industrial Regions in Europe: A Comparative Assessment of Economic Performance', *Regional Studies*, 44, (1), pp. 35-53.

Blanchard, O.J., and Katz, L.F. (1992) Regional Evolutions, *Brookings Papers on Economic Activity*, 1992;1 :1-75.

Boschma, R. (2015) Towards an Evolutionary Perspective on Regional Resilience, *Regional Studies*, 49, 733-751.

Boschma, R. (2016) Relatedness as a driver of regional diversification: a research agenda, *Regional Studies* DOI: 10.1080/00343404.2016.1254767

Boschma, R. and Martin, R.L. (Eds) (2010). Handbook of Evolutionary Economic Geography, Cheltenham: Edward Elgar

Bosker, M. (2007) Growth, Agglomeration and Convergence: A Space-Time Analysis for the European Regions, *Spatial Economic Analysis*, 2, pp. 91-100.

Bluestone, B. and Harrison, B. (1982). The Deindustrialization of America: Plant Closings, Community Abandonment, and the Dismantling of Basic Industry. New York NY: Basic Books.

Brakman, S., Garretsen J.H. and Marrewijk, C. (2009) The New Introduction to Geographical Economics, Cambridge (Second Edition): Cambridge University Press.

Brakman, S., Garretsen J.H. and Marrewijk, C. (2020) The New Introduction to Geographical Economics, A Spiky World, Cambridge (Third Edition): Cambridge University Press.

Briscoe G. and Wilson, R. (2003) Modelling UK occupational employment, *International Journal of Manpower* 24, 5, pp. 568-589.

Bristow, G. (2010) Resilient Regions: Re-place-ing Regional Competitiveness, *Cambridge Journal of Regions, Economy and Society*, 3, 1, pp. 153-167.

Bristow, G. and Healy, A. (2015) Crisis Response, Choice and Resilience: Insights from Complexity Thinking, *Cambridge Journal of Regions, Economy and Society*, 8, 241-256.

Bristow, G. and Healy, A. (Eds) (2015) Economic Crisis and the Resilience of Regions: A European Study, Cheltenham: Edward Elgar.

Brown, G. (2010) Mansion House Speech, The Mansion House, City of London, June 20 (available at http:webarchive.nationalarchives.gov.uk/+/http:/www.hm-treasury.gov.uk/2014.htm)

Brown, J., McGuiness, F., Sandford, M. and Ward, M. (2018) Skills Devolution in England, CDP 2018/0017, House of Commons Library: London.

Brülhart, M. and Traeger, R. (2005), An account of geographic concentration patterns in Europe, *Regional Science and Urban Economics*, 35, pp. 597-624.

Brunow, S and Blien, U. (2013). Agglomeration Effects on Labour Productivity: An Assessment with Microdata. Norface Migration. Discussion Paper No 2014.

Burchfield, M., Overman, H.G., Puga, D., and M.A. Turner (2006), Causes of Sprawl: A Portrait from Space, *The Quarterly Journal of Economics*, Volume 121, Issue 2, 1 May 2006, Pages 587–633, https://doi.org/10.1162/qjec.2006.121.2.587.

Business (1987) Across the North South Divide, September.

Cable, V. (2013) London Draining Life out of Rest of Country, http://www.bbc.co.uk/news/uk-politics-25444981

Cameron, D. (2010) Transforming the British Economy: Coalition Strategy for Economic Growth, Speech, 28 May, Prime Minister's Office, London. https://www.gov.uk/government/speeches/transforming-the-british-economy-coalition-strategy-for-economic-growth

Caniglia, B., Vallee, M. and Frank, B. (Eds) (2017) *Resilience, Environmental Justice and the City*, London: Routledge.

Cantner, U. and Krüger, J.J. (2006) Micro-heterogeneity and aggregate productivity development in the German manufacturing sector: results from a decomposition exercise, *Discussion Paper 02/2006* Jenaer Schriften zur Wirtschaftswissenschaft, Friedrich-Schiller-University Jena.

Carmody, C. (2013) Slowing Productivity Growth: A Developed Economy Comparison, *Economic Roundup*, Issue 2, The Treasury, Australian Government,http://www.treasury.gov.au/PublicationsAndMedia/Publications/2013/Economic-Roundup-Issue-2/Economic-Roundup/Slowing-productivity-growth.

Caro, P. and Fratesi, U. (2018) Regional Determinants of Economic Resilience, *Annals of Regional Science, 60*, 235-240.

Casado-Díaz, J.M. (2000). Local labour market areas in Spain: A case study. *Regional Studies*, 34, 843-856.

Cattan N (2001) Functional Regions: a summary of definitions and usage in OECD countries OECD (DT/TDPC/TI(2001)6), Paris.

CBI (2016) Unlocking Regional Growth: Understanding the Drivers of Productivity across the UK's Nations and Regions, London: CBI.

Centre for Cities (2017) Cities Outlook 2017, Centre for Cities, London.

Cerra, V. and Saxena, S.C. (2008) Growth Dynamics: The Myth of Economic Recovery, *American Economic Review*, volume 98, issue 1, 439-57.

Cerra, V. Panizza, U. and Saxena, S.C. (2013) International Evidence of Recovery from Recessions, *Contemporary Economic Policy, 31*, 424-439.

Chen, W., Los, B., McCann, P., Ortega-Argiles, R., Thissen, M., van Oort, F., (2017) The Continental Divide? Economic Exposure to Brexit in Regions and Countries on both Sides of the Channel, Papers in Regional Science, DOI: https://doi.org/10.1111/pirs.12334.

Chern T.S., Ping, T.S., Robinson, E. and Wilson, P. (2002). Assessing Singapore's Export Competitiveness: A Dynamic Shift-Share Analysis, Occasional Paper 23, Economic Policy Department, Monetary Authority of Singapore.

Champion T., Coombes, M. and Gordon, I. (2014) How far do England's second order cities emulate London as human-capital 'escalators'?, *Population, Space and Place*, 20, pp. 421-433.

Cheshire, P. Nathan, M. and Overman, H. (2014). Urban Economics and Urban Policy, Cheltenham: Edward Elgar.

Cheshire, P.C. and S. Magrini, (2006) 'Population Growth in European Cities: weather matters – but only nationally', *Regional Studies*, 40, 1, 23-37.

Chinitz, B. (1961) Contrasts in agglomeration: New York and Pittsburgh, *American Economic Review* 51, 2, 279-289.

Chisholm, M. and J. Oeppen (1973) The Changing Pattern of Employment. Regional Specialisation and Industrial Location in Britain, Beckenham: Croom Helm.

Christopherson, S. (2002) Why do national labor market practices continue to diverge in the global economy? The missing link of investment rules, *Economic Geography* 78, 1, 1-20.

City of London Corporation (2011) London's Competitive Place in the UK and Global Economies, Research Report, City of London Corporation

City of London Corporation (2014) London's Finances and Revenues, Research Report, City of London Corporation.

City Growth Commission (2014) Unleashing Metro Growth, London: The City Growth Commission, London: RSA.

Claeys, G. and Walsh, T. (2015) The 'Plucking Model' of Recessions and Recoveries, http://bruegel.org/2015/02/the-plucking-model-of-recessions-and-recoveries/.

Clegg, N. (2010) Fair Shares, The Northern Echo, 29 June. (htttp://www.theNorthernecho.co.uk/features/leader/8244486.Fair_shares/)

Combes, P-P. and L. Gobillon (2015) The Empirics of Agglomeration, Chapter 5 in The Handbook of Regional and Urban Economics (2015), Vol 5, pp 247-348, Edited by Gilles Duranton, J. Vernon Henderson, and William C. Strange.

Conroy, M. (1975) Regional Economic Diversification, New York: Praeger.

Conway, P. and Nicoletti, G. (2007) Product Market Regulation and Productivity Convergence: OECD evidence and implications for Canada, *International Productivity Monitor*, 15, pp 3-24

Coombes, Mike. (2002). Travel to Work Areas and the 2001 Census.

Coombes, M.G., Green, A. E., and Openshaw, S. (1986) An efficient algorithm to generate official statistical reporting areas: the case of the 1984 Travel-to-Work Areas revision in Britain, *Journal of the Operational Research Society* 37, 943-953.

Coombes, M. and Wymer, C. (2015) Updating the definition of Primary Urban Areas, a report prepared by CURDS (Newcastle University) for the Centre for Cities.

Coombes, M., Casado-Díaz, J.M., Martínez- Bernabéu, L., and F. Carausu, (2012) Study on comparable labour market areas – final research report. See http://www.istat.it/it/files/2014/12/Final-Report LMA-v1-0-17102012.pdf.

Coppola, F. (2017) Fiscal Austerity After the Great Recession was a Catastrophic Mistake, https://www.forbes.com/sites/francescoppola/2017/08/31/fiscal-austerity-after-the-great-recession-was-a-catastrophic-mistake/#58015ff712fe

Cornwall, J. and Cornwall, W. (1994). Growth Theory and Economic Structure, *Economica*, NS 61, 242, pp. 237-251.

Coulter, S. (2016) The UK Labour Market and the 'Great Recession', *LSE Research Online*, http://eprints.lse.ac.uk/65615/1/Coulter_The%20UK%20labour%20market%20and%20the%20great%20recession.pdf

Coutts, K., Gudgin, G. and Buchanan, J. (2018) How the Economics Profession got it Wrong on Brexit, *Working Paper 493*, Centre for Business Research, Judge Business School, University of Cambridge.

Cowell, M.M. (2013) Bounce Back or Move on: Regional Resilience and Economic Development, *Planning*, 212-222.

Cowell, M. M. (2015). Dealing with Deindustrialization: Adaptive Resilience in American Midwestern Regions. London: Routledge.

Cowell, M. (2014) Deindustrialisation: Adaptive Resilience in American Midwestern Regions, London: Routledge.

Cowen, T. (2016) Silicon Valley has not saved us from a productivity slowdown, Economic Review, The New York Times, 4 March

(http://www.nytimes.com/2016/03/06/upshot/silicon-valley-has-not-saved-us-from-a-productivity-slowdown.html)

Coyle, D. (2014) GDP: A Brief but Affectionate History, Oxford: Princeton University Press.

Crafts, N. (2002) The Solow Productivity Paradox in historical perspective, *Discussion Paper 3142*, Centre for Economic Policy Research, London School of Economics.

Crafts, N. (2005) Regional GDP in Britain, 1971-1911: Some Estimates, *Scottish Journal of Political Economy*, 52, pp. 54-64.

Cross, R. (1993) On the Foundations of Hysteresis in Economic Systems. *Economics and Philosophy, 9*, 53–74.

Crozet, M. and Koenig, G, P. (2007) The Cohesion-Growth Trade-Off: Evidence from EU Regions, Paris, University of Paris.

Cuadrado-Roura, J.R., Garcia-Greciano, B. and. Raymond, J.L. (1999) Regional convergence in productivity and productive structure: The Spanish case, *International Regional Science Review, 22*, 35-53.

Dall'erba, S. and Hewings, G.J.D. (2003) European Regional Development Policies: The Trade-off between Efficiency-Equity Revisited, Discussion Paper 03-T-2, Regional Economics Applications Laboratory, University of Illinois.

Davies, A., Tonts, M. (2010) Economic Diversity and Regional Socio-Economic Performance, *Geographical Research, 48*, pp. 223–234.

Davis, D.R. (1998) The Home Market, Trade, and Industrial Structure, *American Economic Review*, vol. 88, 1264-1276.

Department of Business, Innovation and Skills (2010) Understanding Local Growth, BIS Economics Paper, London:

Department of Business, Energy and Industrial Strategy (2017) *Industrial Strategy: Building a Britain fit for the Future*, Department of Business, Energy and Industrial Strategy, London.

Department for Communities and Local Government (2006) State of the English Cities

Deutsche Bank (2013) London and the UK Economy: In for a Penny, in for a Pound? Special Report, Deutsche Bank Markets Research.

Dickerson, A. Wilson, R., Kik, G. and Dhillon, D. (2012) Developing Occupational Skills profiles for the UK: A Feasibility Study UK Commission for Employment and Skills, Evidence Report 44, www.ukces.org.uk

Dhingra, S., G. Ottaviano, T. Sampson and J. Van Reenen (2016) The Consequences of Brexit for UK Trade and Living Standards, *CEP Brexit Analysis No. 2* (http://cep.lse.ac.uk/pubs/download/brexit02.pdf).

Dhingra, S., Huang, H., Ottaviano, G., Pessoa, J. P., Sampson, T., and van Reenan, J., (2017) The Costs and Benefits of Leaving the EU: the Trade Effects, *CEP Discussion Paper No 1478* April.

Dhingra S., Machin S. and H. G. Overman (2017), The Local Economic Impacts of Brexit. Centre for Economic Performance Brexit Analysis, No. 10. https://cep.lse.ac.uk/pubs/download/brexit10.pdf.

Dijkstra, L., Garcilazo, E. and McCann, P. (2013) The Economic Performance of European Cities: Myths and Realities, *European Planning Studies*, 21, pp. 334-354.

Disney, R., Haskel, J. and Heden, Y. (2003), Restructuring and productivity growth in UK Manufacturing, *Economic Journal, 103*, pp. 666-694.

Dixon, R J. and Thirlwall, A.P. (1975) *Regional Growth and Unemployment in the United Kingdom*, London: Macmillan Press.

D'Lima, M. and Medda, F. (2015) A New Measure of Resilience An Application to the London Underground, *Transportation Research: Policy and Practice, 81*, 35-46.

Dolman, B. (2009) What Happened to Australia's Productivity Surge? *Australian Economic Review*, *42*, pp. 243-263.

Doran and Fingleton, B. (2013) US Metropolitan Area resilience: Insights from Dynamic Spatial Panel Estimation, *Environment and Planning A: Economy and Space, 50*, 111-32.

Duranton, G. (2007) Urban evolutions: The fast, the slow and the still, *American Economic Review*, *97*, 1, pp. 197-221.

Duranton, G. and Puga, D. (1999) Diversity and Specialisation in Cities: Why, Where and When Does it Matter? *Research Papers in Environmental and Spatial Analysis 56*, Department of Geography and Environment, London School of Economics.

Duranton, G. and Puga, D. (2014) The growth of cities, Chapter 5 in P. Aghion and S. Durlauf (Eds.) *Handbook of Economic Growth* Vol. 2, 781-853. London: Elsevier.

Ebell, M., Hurst, I. and Warren, J., (2016) Modelling the Long-term Economic Impact of Leaving the European Union. *NIESR Discussion Paper 462,* June 2016.
Economists for Brexit (2016) The Economy After Brexit,
https://issuu.com/efbkl/docs/economists_for_brexit_-_the
economy/1?e=24629146/35248609).

Enelow, N. (2013) The Resilience of Detroit: An Application of the Adaptive Cycle Metaphor to an American Metropolis, *Paper*, Economics for Equity and Environment (e3enetwrok.org).

Evans, R. and Karecha, J. (2014) Staying on Top: Why is Munich so Resilient and Successful? *European Planning Studies*, 22, 1259-1279.

Elhorst, P. (2014) Spatial Econometrics: From Cross-Sectional Data to Spatial Panels, Springer Briefs in Regional Science.

European Central Bank (2016) The slowdown in US labour productivity growth – stylised facts and economic implications, ECB (https://www.ecb.europa.eu/pub/pdf/other/eb201602_focus01.en.pdf)

European Commission (2016) The State of European Cities 2016 (see http://ec.europa.eu/regional_policy/en/policy/themes/urban-development/cities-report/).

Fagerberg, J. (2000) Technological progress, structural change and productivity growth: a comparative study, *Structural Change and Economic Dynamics, 11*, pp. 393–411.

Farhauer, O. and Kröll, A. (2012) Diversified specialisation: Going one step beyond regional economics' specialisation-diversification concept, *Jahrbuch für RegionalWissenschaft, 32, 1*, pp. 63-84.

Feldman, M.P. and Audretsch, D. (1999) Innovation in cities: Science-based diversity, specialisation and localised competition, *European Economic Review, 43*, pp. 409-429.

Feng, Z. (2009). The fuzziness of travel-to-work areas. *Regional Studies*, 43(5), 707-720. https://doi.org/10.1080/00343400801922806.

Fenton, A, Tyler, P. Markkenen, S and Clarke, A. (2008). The "Ward Penalty in Birmingham". Barrow Cadbury Trust, 2008.

Findeisen, S. And Südekum, J. (2008) Industry churning and the evolution of cities: Evidence for Germany, *Journal of Urban Economics, 64*, pp. 326-339.

Fingleton, B., Garretsen, H. and Martin, R.L. (2012) Recessionary Shocks and Regional Employment, *Journal of Regional Science* 52, 1, 109-133.

Fingleton , B. and Palombi, S. (2013) Spatial Panel Estimation, Counterfactual Predictions and Local economic resilience Among British Towns in the Victoria Era, *Regional Science and Urban Economics*, 43  649-660.

Fingleton, B., Garretsen, H. and Martin, R. L. (2015) Shocking Aspects of Monetary Union: The Vulnerability of Regions in Euroland, *Journal of Economic Geography*, 15, 907-934.

Florida, R. (2008) Whose Your City? How the Creative Economy Is Making Where To Live the Most Important Decision of Your Life, New Yok: Random House.

Florida R., and Mellander C. (2018) Talent, Skills, and Urban Economies, Chapter in G.Clark, M. Feldman, M. Gertler and D. Wojcik (Eds.) The New Oxford Handbook of Economic Geography, Oxford: OUP.

Florida R., Mellander C., Stolarick and Ross A, (2012) Cities, skills and wages, *Journal of Economic Geography* 12, 355-377.

Folke, C., Carpenter, S., Walker, B., Scheffer, M. Chapin, T. and Rockstom, J. (2010) Resilience Thinking: Integrating Resilience, Adaptability and Transformability, *Ecology and Society, 15, 4.*

Foster, L., Haltiwanger, J. and Krizan, C.J. (1998), Aggregate Productivity Growth: Lessons from Microeconomic Evidence, *NBER Working Paper 6803*.

Fothergill, S. and Gudgin, G. (1979). In Defence of Shift Share, *Urban Studies*, Vol. 16, No. 3, pp. 309-319.

Fothergill, S. and Gudgin, G. (1982). Unequal Growth: Urban and Regional Employment in the United Kingdom, London: Heinemann.

Freeman, C. and Louca, F. (2001). As Time Goes By: From the Industrial Revolutions to the Information Revolution, New York: Oxford University Press.

Frenken, K. and Boschma, R. (2007). 'A Theoretical Framework for Evolutionary Economic Geography: Industrial Dynamics and Urban Growth as a Branching Process', *Journal of Economic Geography*, 7, (5), pp. 635-649.

Frenken, K., van Oort, F. and Verburg, T. N. (2007) Related Variety, Unrelated Variety and Regional Economic Growth, *Regional Studies, 41*, 685-697.

Friedman, M. (1968) The 'Plucking Model' of Business Fluctuations Revisited. Hoover Institution, Stanford University, Working Paper in Economics E 88–48.

Friedman, M. (1993) The 'Plucking Model' of Business Fluctuations Revisitedor maxi, *Economic Inquiry* (April), 177-193.

Fujita, M. and Thisse, J.F. (2002). Economics of Agglomeration: Cities, Industrial Location and Regional Growth.

Gabaix, X. (1999) Zipf's Law for Cities: An Explanation, *Quarterly Journal of Economics*, 114, pp. 739-67.

Gabe, T. (2009) Knowledge and earnings, *Journal of Regional Science* 49, 3, 439-457.

Gagliardi, L., Iammarino, S. and Rodriguez-Pose, A. (2015) Offshoring and the geography of jobs in Great Britain, *CEPR Discussion Paper* 10855.

Garretsen, H., Stoker, J., Soudis, D., Martin, R.L. and J. Renfrow (2019a) The relevance of personality traits for urban economic growth: making space for psychological factors, *Journal of Economic Geography*, 19, 541–565.

Garretsen, J.H., Stoker, J., Martin, R.L. and J. Renfrow (2019b) 'Urban Psychology' and the Economic Resilience of UK cities: Do Personality Traits Influence the Urban Resilience to UK Recessions? *Journal of Urban and Regional Research*, forthcoming.

Geary, F. and Stark, T. (2015) Regional GDP in the UK, 1861-1911: New Estimates, *Economic History Review*, 68, pp. 123-144.

Geary, F. and Stark, T. (2016) What Happened to Regional Inequality in Britain in the Twentieth Century, *Economic History Review*, 69, pp. 216-228.

Gibbons, S., H. G. Overman and P. O. Pelkonen (2011) Area disparities in Britain: understanding the contribution of people versus place through variance decompositions, *Oxford Bulletin of Economics and Statistics*, 76 (5), 745-763.,

Gibbs, J.P. and Postan, D.L. (1975) The division of labor: conceptualisation and related measures, *Social Forces, 53*, pp.

Glaeser E., Kallal H.D., Scheinkman J.A., and Shleifer, A. (1992) Growth of cities. *Journal of Political Economy, 100*, pp. 1126–1152.

Glaeser, E. (2005) Reinventing Boston: 1640-2003, *Journal of Economic Geography, 5*, pp. 119-153.

Glaeser, E. (2009) The death and life of cities, Chapter 2 in R.P. Inman(Ed) Making Cities Work: Prospects and Policies for Urban America, Princeton: Princeton University Press, pages 22-62.

Glaeser, E (1996) Why economists still like cities, *City Journal*, Spring, 1-7. http://www.city-journal.org.

Glaeser, E. (2012) The Triumph of the City: How Urban Spaces Make Us Human, Pan Books, London.

Glaeser E. and Berry, C. (2006) Why are smart places getting smarter? *Rappaport Institute and Taubman Center Policy Briefs* PB 2006-2. March

Glaeser, E. and Gottlieb, J. (2008). The Economics of Place-Making Policies. IDEAS/RePEc 39. Issue 1 (Spring), pg 155-253.

Glaeser, E. and Gottlieb, J. (2009) The wealth of cities: Agglomeration economies and spatial equilibrium in the United States, *Journal of Economic Literature* 47, 4, 983-1028.

Glaeser, E., Kolko, J. and Saiz, A. (2001) Consumer city, *Journal of Economic Geography* 1, 27-50.

Glaeser E. and Maré, D. (2006) Cities and skills, *Journal of Labor Economics* 19, 2, 316- 342.

Glaeser, E. and Resseger, M. (2010) The complementarity between cities and skills, *Journal of Regional Science* 50, 1, pp. 221-244.

Glaeser, E. and Saiz, A. (2003) The rise of the skilled city, *NBER Working Paper* 10191.

Glaeser, E., Ponzetto, G. and Tobio, K. (2014) Cities, skills and regional change, *Regional Studies* 48, 1, 7-43.

Glaeser, E., Scheinkman and Shkleifer, A. (1995) Economic growth in a cross-section of cities, *Journal of Monetary Economics* 36, 117-143.

Goos, M. and Manning, A. (2007) Lousy and lovely jobs: the rising polarization of work in Britain, *The Review of Economics and Statistics* 89, 1, 118-133.

Goos, M., Manning, A. and Salomons, A. (2014) Explaining job polarization: Routine-biased technological change and offshoring, *The American Economic Review* 104, 8, 2509-2526.

Gordon, I. Champion, T. and Coombes, M. (2015) Urban escalators and interregional elevators: the difference that location, mobility and sectoral specialisation make to occupational progression, *Environment and Planning A* 47, pp. 588-606.

Gordon, R. J. (2016) *The Rise and Fall of American Growth*, Princeton: Princeton University Press.

Government Office for Science (2016) Future of Cities, collection of project reports (see https://www.gov.uk/government/collections/future-of-cities#project-reports).

Green, A.E. (1997) Alternative Approaches to Defining Local Labour Markets for Urban and Regional Policy, in TUROK I. (ed) Travel-to-Work Areas and the Measurement of Unemployment. Conference proceedings, Edinburgh.

Green, A., Hogarth, T., Barnes, S. Gambin, L., Owen, D. and Sofroniou, N. (2016) The UK's Skill System: Training, Employability and Gaps in Provision, Future of Skills and Lifelong Learning Evidence Review, Foresight Government Office for Science.

Green, F., Felstead, A. Gallie, D. and Henseke, G. (2016) Skills and work organisation in Britain: a quarter century of change, *Journal of Labour Market Research* 49, 121-132.

Gregg, P. and Wadsworth, J. (2010) Employment in the 2008-2009 Recession, *Economic and Labour Market Review, 4, 8*, 37-43.

Griliches, Z. and Regev, H. (1995) Productivity and firm turnover in Israeli industry, 1979–1988, *Journal of Econometrics, 65*, pp. 175–203.

Haaland, J.I. Kind, H.J., Midelfart-Knarvik, K.H. and J. Torstensson (1999) What determines the economic geography of Europe? *CEPR Discussion Paper, No. 2072*, London School of Economics.

Haldane, A.G. (2017) *Productivity Puzzles*, Bank of England Speech, London School of Economics (www.bankofengland.co.uk/speeches).

Hall, P.G. (1962) The Industries of London since 1861. London: Hutchinson.

Hall, P.G. and D. G. Hay (1980) Growth Centres in the European Urban System, London: Heinemann Educational.

Haltiwanger, J. (2000) Aggregate growth: What we have learned from microeconomic evidence, OECD Economics Department Working Papers No. 267, OECD, Paris.

Hamilton, J.D. (1989) A New Approach to the Economic Analysis of Non-stationary Time Series and the Business Cycle, *Econometrica*, 57, 357-384.

Han, Y. and Goetz, S.J. (2015) The Economic Resilience of US Counties During the Great Recession, *The Review of Regional Studies*, 45, 131-149.

Harris, R. and Moffat, J. (2015) Total factor productivity growth in Local Enterprise Partnership Regions in Britain, 1997-2008, *Regional Studies 49*, 6, 1019-1041.

Hassink, R. (2010) Regional Resilience: A Promising Concept to Explain Differences in Regional Economic Adaptability? *Cambridge Journal of Regions, Economy and Society*, 3, 1, 45-58.

Hausner, V. (Ed). (1987). Critical Issues in Urban Economic Development, Oxford: Clarenden Press.

Henderson, V. (2003). The Urbanization Process and Economic Growth: The So-what Question, *Journal of Economic Growth*, 8, pp. 47–71.

Henderson, J.V., Squires, T., Storeygard, A., and D. Weil (2018), The Global Distribution of Economic Activity: Nature, History, and the Role of Trade, *The Quarterly Journal of Economics*, Volume 133, Issue 1, 1 February 2018, Pages 357–406, https://doi.org/10.1093/qje/qjx030.

Henseke, G., Felstead, A., Gallie, D. and Green, F. (2018) *Skill Trends at Work in Britain – First Findings from the Skills and Employment Survey 2017*, London: Centre for learning nd Life Chances in Knowledge Economies, UCL Institute of Education.

Heseltine, M. (2012) No Stone Unturned: In Pursuit of Growth, London: Department for Business, Innovation and Skills.

Hijzen, A., Görg, H. and Hine, R. (2005) International outsourcing and the skill structure of labour demand in the United Kingdom, *The Economic Journal 115*, 506, pp. 860-878.

Hill, E., St Clair, T., Wial, H., Wolman, H., Atkins, P., Blumenthal, P. Ficence, S. and Friedhoff, A. (2012) Economic Shocks and Regional Economic Resilience, *Building Resilient Regions,* Wagner Institute, New York University, 193-274.

H.M. Government (2010) Local Growth: Realising Every Place's Place's Potential, Cm 7961, London.

HM Government (2011) Unlocking Growth in Cities. See https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/7523/CO_Unlocking_20GrowthCities_acc.pdf.

H.M. Treasury (2007) Regional Disparities and Growth in Europe, (Author C. Lees), mimeo, H.M. Treasury, London.

H. M. Treasury (2016) H. M. Treasury Analysis: the Long-Term Economic Impact of UK Membership and the Alternatives, CM 9250, April.

H.M. Treasury (2015) Fixing the Foundations: Creating a More Prosperous Nation, HM Treasury, Cm 9098, London.

Hobor, G. (2013). 'Surviving the Era of Deindustrialization: The New Economic Geography of the Urban Rust Belt', *Journal of Urban Affairs* 35, (4), pp. 417-434.

Hottman, C., Redding, S. and Weinstein, D. (2016) Quantifying the sources of frim heterogeneity, *The Quarterly Journal of Economics*, pp. 1291-1364.

Hu, X. and Hassink, R. (2017) Exploring Adaptation and Adaptability in Uneven Economic Resilience: A Tale of Two Chinese Mining Regions, *Cambridge Journal of Regions, Economy and Society, 10*, 527-541.

Hudson, R. (2011). 'Geographies of Economic Decline', in Leyshon, A., Lee, R., McDowell, L. and Sunley, P. (Eds.). The Sage Handbook of Economic Geography. London: Sage, pp. 261-272.

Ibl, M., Svoboda, O. and Siegert, M. (2018) Resilience Analysis of the 2008 economic Crisis Using Entropic Measures, *Journal of Economic Studies and Research*.

Isard, W. (1960) Methods of Regional Analysis: An Introduction to Regional Science, Cambridge, Mass: MIT Press.

Jacobs, J. (1969) *The Economy of Cities*, New York: Random House.

Jacobs, J. (1984) Cities and the Wealth of Nations: Principles of Economic Life, New York: Random House.

Kaldor, N. (1966). Causes of the Slow Rate of Economic Growth in the United Kingdom Cambridge: Cambridge University Press.

Kaldor, N. (1967). Strategic factors in economic development, Ithaca, NY: Cornell University Press.

Kaldor, N. (1968). Productivity and Growth in Manufacturing Industry: A reply, *Economica*, 35, pp. 385–391.

Kaldor, N. (1981) The Role of Increasing Returns, Technological Progress and Cumulative Causation in the Theory of International Trade and Economic Growth, *Economie Appliquée*, XXXIV, pp. 593-617.

Keeble, D and Tyler, P (1995). Enterprising Behaviour and the Urban-Rural Shift. Urban Studies. Vol 32. Issue 6.

Kemeny, T. and Storper, M. (2014) Is specialisation good for regional growth? *Regional Studies* 49, pp. 1003-1018.

Kim, H-J. (2006) *The Shift to the Service Economy: Causes and Effects, Research Paper 2006.7.7*, Institute for Monetary and Economic Research, The Bank of Korea.

Krüger, J. J. (2006) The Sources of Aggregate Productivity Growth: US Manufacturing Industries, 1958-1996, *Discussion Paper 10/2006*, Jenaer Schriften zur Wirtschaftswissenschaft, Friedich-Schiller University, Jena.

Krüger, J. J. (2008). Productivity and Structural Change: A Review of the Literature, *Journal of Economic Surveys*, 22, pp. 330-363.

Krugman, P. (1991) Increasing returns and economic geography, *Journal of Political Economy 99, pp. 183-199.*

Krugman, P. (1993) Lessons of Massachusetts for EMU, pp. 241-261 in Torres F. and Giavazzi, F. (eds) *Adjustment and Growth in the European Monetary Union*, Cambridge: Cambridge University Press.

Krugman, P. (1994) *The Age of Diminished Expectations,* Cambridge, Mass: MIT Press.

Krugman, P. (1996) The Self-Organising Economy, Oxford: Blackwell.

Krugman, P. (2006) Second Winds for Industrial Regions? In Coyle, D., Alexander, W. and Ashcroft, B. (Eds) New Wealth for Old Nations, Oxford: Princeton university Press, pp. 35-47.

Krugman, P. (2009) The New Economic Geography: Now Middle-Aged, *Regional Studies*, 45, pp. 1-7.

Krugman, P. (2015) The Case for Cuts was a Lie: Why Does Britain Still Believe it? The Austerity Delusion, https://www.theguardian.com/business/ng-interactive/2015/apr/29/the-austerity-delusion/.

Kucera, D. and Roncaolato, L. (2012) Structure Matters: Sectoral Drivers of Growth and the Labour Productivity-Employment Relationship, *ILO Research Paper 3*, Geneva: International Labor Office.

Kuznets, S. (1957). Quantitative Aspects of the Economic Growth of Nations: II. Industrial Distribution of National Product and Labour Force, Economic Development and Cultural Change, 5 (Supplement), pp. 3–111.

Kuznets, S. (1973). Modern Economic Growth: Findings and Reflections, *American Economic Review*, 63, pp.47–258.

Labonte, M. (2008) Has the Economy Become Less Volatile Over Time? Congressional Research Paper, Report for congress (RL33959), https://www.everycrsreport.com/files/20080801_RL33959_1b5a8c40d633d0da46c084cef3a40f0672ed49ed.pdf.

Laitner, J. (2000) Structural change and economic growth, *Review of Economic Studies, 67*, pp. 545–561.

Landesmann, M. (2000), Structural change in the Transition Economies 1989-1999, *Economic Survey of Europe, 2*, pp. 95-123.

Leuning, T. and Swaffham, J. (2007) Cities Unlimited: Making Urban Regeneration Work, Policy Exchange, London.

Lewis, M. and Conaty, P. (2012) The Resilience Imperative: Cooperative Transitions to a Steady-State Economy, Gabriola Island; New Society Publishers.

Lilien, D.M. (1982) Sectoral Shifts and Cyclical Unemployment, *Journal of Political Economy, 90*, pp. 777-793.

Lindbeck, A. (1983) The recent slowdown of productivity growth, *Economic Journal, 93*, pp.

Linkon, S. (2013). 'Narrating Past and Future: Deindustrialized Landscapes as Resources', *International Labour and Working Class History*, 84, (Fall), pp. 38-54.

Linkon, S. (2014) The Half-Life of Deindustrialisation: Twenty-First Century Narratives of Work, Place and Identity. Paper presented at Deindustrialization and Its Aftermath: Class, Culture and Resistance, Centre for Oral History, Montreal, Quebec, May.

Lewis, J. and Townsend, A. R. (eds.) (1989) The North-South Divide: Regional Change in Britain in the 1980s. London: Paul Chapman Publishing.

LSE Growth Commission (2017). UK Growth: A New Chapter. London: London School of Economics.

Losch, A. (1939) The Economics of Location, English Translation, 1954. Yale University Press, New Haven, CT.

Mackinder, H.J. (1919) Democratic Ideals and Reality: A Study in the Politics of Reconstruction, New York: H.H. Holt

Markusen, A. and Schrock, (2006) The distinctive city: Divergent patterns in growth, hierarchy and specialisation, *Urban Studies* 43, 8, 1301-1323.

Martin, R.L. (1988) The political economy of Britain's North-South Divide, *Transactions of the Institute of British Geographers*, 13, pp. 389-418.

Martin, P. (2005) The Geographies of Inequality in Europe, Swedish Economic *Policy Review*, 12, pp. 85-108.

Martin, R.L. (2008) National Growth Versus Regional Equality? A Cautionary Note on the New Trade-Off Thinking in Regional Policy Discourse, *Regional Science, Policy and Practice*, 1, pp. 3-13.

Martin, R.L. (1986) 'Thatcherism and Britain's Industrial Landscape', in Martin, R. and Rowthorn, B. (eds.). The Geography of De-industrialisation. Basingstoke: Macmillan, pp. 238-290.

Martin, R.L. (2012) Regional Economic Resilience, Hysteresis and Recessionary Shocks, *Journal of Economic Geography*, 12, 1-32.

Martin, R.L. (2015) Rebalancing the Spatial Economy: The Challenge for Regional Theory, *Territory, Politics, Governance*, 3, p. 235-272.

Martin, R.L. (2016) Divergent Urban Economic Development: Reflections on a Tale of Two Cities, *Regional Studies, 50*, 1623-1627.

Martin, R.L. (2017) Cumulative Causation, Endogenous Growth and Regional Development, Chapter 22 in Dunford, M. (Ed) Encyclopedia of Geography: People, The Earth, Environment and Technology, New York: Wiley

Martin, R.L. and Rowthorn, B. (1998). (eds.). The Geography of De-industrialisation. Basingstoke: Macmillan, pp. 1-30.

Martin, R.L. and Gardiner, B. (2017). 'Reviving the 'Northern Powerhouse' and Spatially Rebalancing the British Economy: The Scale of the Challenge', in Berry, C. and Giovannini, A. (Eds.) The Political Economy of the Northern Powerhouse. Basingstoke: Palgrave.

Martin, R.L. (2018) Shocking Aspects of Regional Development: Towards an Economic Geography of Resilience, Ch. 45 in Clark, G.L., Feldman, M., Gertler, M. and Wojcik, D. (Eds) *The New Oxford Handbook of Economic Geography*, Oxford: Oxford University Press, 837-864.

Martin, R.L., Pike, A., Tyler, P. and Gardiner, B. (2016b). 'Spatially Rebalancing the UK Economy: Towards and New Policy Model?' *Regional Studies*, 50, (2), pp. 342-357.

Martin, R. and Sunley, P. (1998) Slow convergence? The new endogenous growth theory and regional development, *Economic Geography 74*, 3, 201-227.

Martin, R.L. and Sunley, P. (2006). 'Path Dependence and Regional Economic Evolution', *Journal of Economic Geography*, 6, (4), pp. 395-437.

Martin, R.L. and Sunley, P. (2015). On the Concept of Regional Economic Resilience: Conceptualisation and Explanation, *Journal of Economic Geography*, 15, pp. 1-42.

Martin, R.L., Sunley, P. and Gardiner, B. (2016) How Regions React to Recession: Resistance, Recoverability and Resilience, *Regional Studies*, *50*, 561-585.

Martin, R.L., Sunley, P., Gardiner, B., Evenhuis, E., and P. Tyler (2018) The city dimension of the productivity growth puzzle: the relative role of structural change and within-sector slowdown, *Journal of Economic Geography*, Volume 18, Issue 3, 1 May 2018, Pages 539–570, https://doi.org/10.1093/jeg/lby008.

Martin, R.L., Sunley, P., Tyler, P. and Gardiner, B. (2016a). 'Divergent Cities in Post-industrial Britain', *Cambridge Journal of Regions*, Economy and Society, 9, (2), pp. 269-299.

Martin, R. L., Gardiner, B. and Tyler, P. (2014) The Evolving Economic Performance of British Cities: City Growth Patterns, 1981-2011, Working Paper 5, Foresight Programme of The Future of Cities, UK Government Office for Science, Department of Business, Innovation and Skills, London.

Massey, D. (1995). Spatial Divisions of Labour: Social Structures and the Geography of Production, Second Edition. Basingstoke: Palgrave-Macmillan.

May, T. (2016) Speech given at the Conservative Party Annual Conference, 5 October, Manchester.

McCann, P. (2016). The UK Regional-National Economic Problem: Geography, Globalisation and Governance. London: Routledge.

McCann, P., van Oort, F. and J. Goddard, (2017), The Empirical and Institutional Dimensions of Smart Specialisation. Routledge.

McCombie, J. S.L. and Spreafico, M.R.M (2017) Brexit and its Possible Implications for the UK Economy and Its Regions, *Papers in Regional Science*, pp. 1-17, DOI: 10.1111/pirs.12338.

McMillan, M.S. and Rodrik, D. (2011) Structural change and productivity growth, *Working Paper 17143*, National Bureau of Economic Research, Cambridge, Mass.

Melitz, M. (2003) The impact of trade on intra-industry reallocations and aggregate industry productivity, *Econometrica, 71*, pp 1695-1725.

Melitz, M. and Redding, S. (2012) *Heterogeneous firms and trade,* Centre for Economic Performance, LSE, Discussion Paper 1183.

Metcalfe, J.S. (2003). Industrial Growth and the Theory of Retardation: Precursors of an Adaptive Evolutionary Theory of Economic Change, *Revue Économique*, 54, pp. 407–432.

Metcalfe, J.S., Foster, J. and Ramlogan, R. (2006). Adaptive Economic Growth, *Cambridge Journal of Economics*, 30, pp. 7-32.

Michaels, G. and Van Reenen, J. (2010) The shrinking middle, *CentrePiece Magazine 15*, 2, 22-26.

Michaels, G., Rauch, F. and Redding, S. (2013) Task Specialisation in US Cities from 1880-2000, *CEP Discussion Paper 1186*, London School of Economics.

Modica, M. and Reggiani, A. (2015) Spatial Economic Resilience: Overview and Perspectives, *Networks and Spatial Economics, 2*, 211-233.

Moretti, E. (2013). The New Geography of Jobs. Boston MA: Mariner Books.

Muro, M. and Parilla, J. (2017) Why some US cities are so much more productive than others, *Wall Street Journal*, 18 May (https://blogs.wsj.com/experts/2017/05/18/why-some-u-s-cities-are-so-much-more-productive-than-others/).

Nathan, M. and H. Overman, (2013) Agglomeration, clusters, and industrial policy, *Oxford Review of Economic Policy*, Volume 29, Issue 2, pp 383–404.

Neffke, F., Henning, M. and Boschma, R. (2011). 'How do Regions Diversify over Time? Industry Relatedness and the Development of New Growth Paths in Regions', Economic Geography, 87, (3), pp. 237-265.

Ocampo, J. A., Rada, C. and Taylor, L. (2009). Growth and Policy in Developing Countries: A Structuralist Approach. New York: Columbia University Press.
O'Connor, S. (2017) Robot shock threatens the most vulnerable communities, Artificial Intelligence and Robotics, The Financial Times, 19 September 2017.

Oesch, D. and Riodriguez Menes, J. (2011) Upgrading or polarization? Occupational change in Britain, Germany, Spain and Switzerland, 1990-2008, *Socio-Economic Review 9*, 3, 1-29.

OECD (2012) Redefining "Urban": A New Way to Measure Metropolitan Areas, OECD Publishing. See http://dx.doi.org/10.1787/9789264174108-en.

OECD (2014) Regional Outlook 2014, OECD: Paris.

OECD (2015) The Metropolitan Century: Understanding Urbanisation and its Consequences, Paris: OECD.

OECD (2015) *The Future of Productivity*, Paris: OECD.

Office of the Deputy Prime Minister (2006) State of the Cities Report.

Oguz, S. (2017) Regional firm-level productivity analysis for the non-financial business economy: January 2017, ONS London.

Oguz, S. and Knight, j. (2011) Regional economic indicators with a focus on the relationship between skills and productivity, Economic and Labour Market Review Feb 2911, 133-164.

Olley, G.S. and Pakes, A. (1996) The dynamics of productivity in the telecommunications equipment industry, *Econometrica, 64*, pp. 1263–1297.

Ottaviano, G. (2011) 'New' new economic geography: firm heterogenenity and agglomeration economies, *Journal of Economic Geography 11*, pp. 231-240.

Osborne, G. (2014) We Need a Northern Powerhouse, Speech delivered in Manchester 23 June.

Oulton, N. (2001) Must the growth rate decline? Baumol's unbalanced growth revisited, *Oxford Economic Papers, 53*, pp. 605–627.

Overman, H. and Rice, P. (2008) Resurgent Cities and Regional Economic Performance, *SERC Policy Paper* 1, June 2008.

Overman, H. (2011) How did London Get Away With It? *Centrepiece* (Winter 2010/2011), London School of Economics.

Owen, T. (2011) The Great Stagnation: How America Ate All the Low-Hanging Fruit of Modern History, Got Sick, and Will (Eventually) Feel Better, New York: Dutton).

Oxford Economics (2007) London's Place in the UK Economy, Report for the City of London Corporation: London: Oxford Economics.

Palan, N. (2010) Measurement of Specialisation: The Choice of Indices, *Working Paper 62*, Forschungsschwerpunkt Internationale Wirtschaft, Vienna.

Pallgast, K.M. (2010), 'Viewpoint: The planning research agenda: shrinking cities – a challenge for planning cultures', *Town Planning Review*, 81 (5), i-iv.

Parkinson, M.   (2016) UK city regions; policies, performance and prospects, *Town Planning Review 87*, 6, 629-653.

Parr, J. B. (2007) Economic Definitions of the City: Four Perspectives, *Urban Studies*, Vol 44 Issue 2. See https://doi.org/10.1080/00420980601075059.

Pasinetti, L. (1981). Structural Change and Economic Growth, Cambridge: Cambridge University Press.

Pasinetti, L. (1993). Structural Economic Dynamics, Cambridge: Cambridge University Press.

Peck, J. (2016) Economic rationality meets celebrity urbanology: Exploring Edward Glaeser's City, *International Journal of Urban and Regional Research 40*, 1, 1-30.

Pieper, U. (2000) Deindustrialization and the social and economic sustainability nexus in developing countries: Cross-country evidence on productivity and employment, *Journal of Development Studies*, 36, pp. 66–99.

Peneder, M. (2003) Industrial structure and aggregate growth, *Structural Change and Economic Dynamics* 14, pp. 427–448.

Percoco, M., Dall'erba, S. and Hewings, G. (2005) Structural convergence of the national economies of Europe, MPRA Paper, No. 1380.

Pike, A. (2009). 'De-Industrialization', in Kitchin, R. and Thrift, N. (eds.) International Encyclopaedia of Human Geography. Oxford: Elsevier, pp. 51-59.

Pike, A., Dawley, S. and Tomaney, J. (2010). Resilience, Adaptation and Adaptability, *Cambridge Journal of Regions, Economy and Society*, 3, pp. 59-70.

Pilat, D. Lee, F. and van Ark, B. (2002) Production and Use of ICT: A Sectoral Perspective on Productivity Growth in the OECD Area, *OECD Economic Studies*, 35, pp 47-78.

Potter, A. and Watts, H.D. (2011) Evolutionary agglomeration theory: increasing returns, decreasing returns and the industry life cycle, *Journal of Economic Geography*, 11, pp. 417-455.

Power, A., Plöger, J. and Winkler, A. (2010). Phoenix Cities: The Fall and Rise of Great Industrial Cities. Bristol: Policy Press.

Pudelko, F. and Hundt, F. (2017) Gauging Two Sides of Regional Economic Resilience in Western Germany – why Resistance and Recovery Should not be Lumped Together, *Review of Regional Research*, pp. 1-33.

Puga, D. (2017) The Changing Distribution of Firms and Workers Across Cities, Centro Studi Luca d'Agliano Development Studies Working paper 418.

Ray, M., Lamarche, R.H. and M. Beaudin (2012) Economic growth and restructuring in Canada's heartland and hinterland: From shift-share to multifactor partitioning, *Canadian Geographer,* 56(3).

Rhodes, J. (1986). 'Regional Dimensions of Industrial Decline', in Martin, R. and Rowthorn, B. (eds.) The Geography of De-industrialisation. Basingstoke: Macmillan, pp. 138-168.

Rhodes, C. (2016). Industrial Strategy, House of Commons Library Briefing Paper 07682.

Richardson, H. W. (1978). *Urban and Regional Economics*. Harmondsworth: Penguin.

Riley, R. and Bondibene, C. (2016) Sources of labour productivity growth at a sector level in Britain, after 2007, a firm level analysis, NESTA *Working Paper 16/01.*

Rockefeller Foundation (2015) *City Resilience Framework - 100 Resilient Cities*, Rockefeller Foundation and Arup.

Rodin, (2015) The Resilience Dividend: Managing Disruption, Avoiding Disaster and Growing Strong in an Unpredictable World, London: ProfiGe Books.

Rodriguez-Pose, A. (2018) The Revenge of Places that Don't Matter (and What to do About it), *Cambridge Journal of Regions, Economy and Society*, 11, 189-209.

Rodrik, D. (2016) 'Innovation is Not Enough', Project Syndicate 9 June 2016. https://www.project-syndicate.org/commentary/innovation-impact-on-productivity-by-dani-rodrik-2016-06

Romer, P. (1986) Increasing Returns and Long Run Growth, *Journal of Political Economy, 94*, pp. 1002-1037.

Romer, P. (2001) Advanced Macroeconomics, New York: McGraw Hill.

Roncolato, L. and Kucera, D. (2014). Structural Drivers of Productivity and Employment Growth: A Decomposition Analysis for 81 Countries, *Cambridge Journal of Economics*, 38, pp. 399-424.

Rosenthal. S. and Strange, W. (2003) Geography, industrial organization, and agglomeration, *Review of Economics and Statistics, 85*, 2, pp. 377-393.

Rowthorn, R.E. (1986). 'De-industrialisation in Britain', in Martin, R. and Rowthorn, B. (eds.) The Geography of De-industrialisation. Basingstoke: Macmillan, pp. 1-30.

Rowthorn, R.E. (2010). 'Combined and Uneven Development: Reflections on the North-South Divide', *Spatial Economic Analysis*, 5, (4), pp. 363-388.

Royuela, V., Veneri, P. and R. Ramos (2019) The short-run relationship between inequality and growth: evidence from OECD regions during the Great Recession, *Regional Studies*, 53:4, 574-586, DOI: 10.1080/00343404.2018.1476752.

Rubenstein, W.D. (1977) The Victorian Middle Classes: Wealth, Occupation and Geography, *Economic History Review*, 30, pp. 602-623.

Rubenstein, W.D. (1981) Men of Property: The Very Wealthy in Britain since the Industrial Revolution, Beckenham: Croom Helm.

Salvati, L., Carlucci, M. and Venanzoni, G. (2017) Recession, Resilience, Local Labour Markets: Wealthier is Better? *Letters in Spatial and Resource Sciences,* 177-204.

Salvatori, A. (2015) *The anatomy of job polarisation in the UK*, IZA Discussion Paper 9193, Bonn Germany.

Sandford, M. (2016) Public services and local government: the end of the principle of 'funding following duties', *Local Government Studies*, Volume 42, 2016 - Issue 4.

Sapir, A. (1996), The effects of Europe's internal market program on production and trade: A first assessment, *Weltwirtschaftliches Archiv, 132*, pp.457-475.

Sbergami, F. (2002) Agglomeration and Economic Growth: Some Puzzles, HEI Working Paper 02/2002, Graduate Institute of International Studies, Geneva.

Schilling, M. (2000) Toward a general modular systems theory and its application to interfirm product modularity, *Academy of Management Review, 25*, 312-334.

Schmidheiny, K., and J. Suedekum, (2015). The pan-European population distribution across consistently defined functional urban areas. *Economics Letters*, 133: 10–13.

Scott, A. (2001) Globalization and the Rise of City-regions, *European Planning Studies*, Vol 9: 813-826.

Scott, A.  (2009) Human capital resources and requirements across the metropolitan hierarchy of the USA, *Journal of Economic Geography 9*, 207-226.

Scott, M.F. (1989) *A New View of Economic Growth*, Oxford: Clarenden Press.

Scott, P. (2007) The Triumph of the South: A Regional Economic History of Early Twentieth Century Britain, Farnham: Ashgate,

Selting, A. and Loveridge, S. (1990). Testing dynamic shift-share, http://www.jrap-journal.org/pastvolumes/1990/v24/24-1-2.pdf.

Selting, A.C.  and Loveridge, S. (1992). A Summary of the Literature on Shift-Share Analysis, Staff Paper P92-13, Department of Agricultural and Applied Economics, University of Minnesota.

Sensier, M. (2018) Measuring Resilience Across in European Regions, Ch. 2 in Bristow, C. and Healy, A. (Eds) *Economic Crisis and the Resilience of Regions: A European Study*, Cheltenham: Edward Elgar.

Sensier, M., Bristow, C. and Healey, A. (2016) Measuring Regional Economic Resilience across Europe: Operationalising a Complex Concept, *Spatial Economic Analysis, 11*, 128-151.

Setterfield, M (1998) Rapid Growth and Relative Decline, London: Macmillan.

Setterfield, M. (2010) Hysteresis, *Economics Working Pap*er 1004, Trinity College Dublin.

Sheffi, (2015) The Power of Resilience: How the Best Companies Manage the Unexpected, Cambridge, Mass: MIT Press.

Simmie, J. and Martin, R.L. (2010) The Economic Resilience of Regions; Towards an Evolutionary Approach, *Cambridge Journal of Regions, Economy and Society*, 27-43.

Simon, C. (1998) Human capital and metropolitan employment growth, *Journal of Urban Economics* 43, 223-243.

Simon, C. (2004) Industrial reallocation across US cities, 1977-1997, *Journal of Urban Economics* 56, 119-143.

Simon, C. and Nardinelli, C. (1996) The talk of the town: Human capital, information and the growth of English cities, 1861-1961, *Explorations in Economic History* 33, 384-413.

Simon, C. and Nardinelli, C. (2002) Human capital and the rise of American cities 1900-1990, *Regional Science and Urban Economics* 32, 59-96.

Sissons, P. and Jones, K. (2016) Local industrial strategy and skills policy in England: Assessing the linkages and limitations – a case study of the Sheffield City Deal, *Local Economy* 31, 8, 857-872.

Smart, M. W. (1974) Labour market areas: uses and definitions, *Progress in Planning* 2, 239-353.

Soo, T.K. (2005) Zipf's Law for Cities: A Cross Country Investigation, *Regional Science and Urban Economics*, 35, pp. 239-263.

Spencer, S.S. (2018) The Fiscal Resilience of American Cities, Masters Thesis, Virginia Polytechnic Institute.

Steeck, W. (2016) *How Will Capitalism End?* London: Verso.

Stock, J.H. and Watson, M.W. (2003) Has the Business Cycle Changed and Why? In Gertler, M. and Rogoff, K. (Eds) *NBER Macroeconomics Annual, Vol. 17*, MIT Press, 159-230.

Storper, M. (2013). Keys to the City: How Economics, Institutions, Social Interaction, and Politics Shape Development. Oxford: Princeton University Press.

Storper, M., Chen, Y. and De Paolis, F. (2002), Trade and the location of industries in the OECD and European Union, *Journal of Economic Geography*, vol. 2, pp. 73-107.

Storper, M. and Scott, A. (2009) Rethinking human capital, creativity and urban growth, *Journal of Economic Geography 9*, 2, pp. 147-167.

Storper, M., Kemeney, T., Makarem, N. P., and Osman, T. (2015). The Rise and Fall of Urban Economies: Lessons from San Francisco and Los Angeles. Stanford CA: Stanford University Press.

Strangleman, T. (2016). 'Deindustrialisation and the Historical Sociological Imagination: Making Sense of Work and Industrial Change', *Sociology*, (2016), pp. 1-17.

Sturgen, N. (2014) Speech to Scotland's Business Sector, Glasgow (1 December 2014), Reported in The Herald (Scotland) http://www.heraldscotland.com/politics/scottish-politics/sturgeon-london-brings-benefits-to-scotlands-economy.1417439283.

Swinney, P. and Thomas, E. (2015) A century of cities. Urban economic change since 1911, prepared by the Centre for Cities.

Syverson, C. (2016) Challenges to mismeasurement explanations for the US productivity slowdown, *Working Paper 21974*, National Bureau of Economic Research, Cambridge Mass.

TheCityUK (2017) UK-Based Financial and Related Professional Services: Enabling Growth across the UK, London.

The Economist (2017) The Pragmatic Case for Moving Britain's Capital North, The Economist, London.

Thirlwall, A.P. (1983). A Plain Man's Guide to Kaldor's Growth Laws, *Journal of Post Keynesian Economics*, M.E. Sharpe, Inc., vol. 5(3), pages 345-358, April.

Timmer, M. P., and de Vries, G. J. (2009) Structural change and growth accelerations in Asia and Latin America: a new sectoral data set, *Cliometrica, 3,* pp. 165-190.

Tooze, A. (2018) Crashed: How a Decade of Financial Crises Changed the World, London: Allen Lane.

Townsend, A. R. (1983). The Impact of Recession on Industry, Employment and the Regions, 1976-1981. London: Croom Helm.

Treado, C.D. (2010) Pittsburgh's Evolving Steel Legacy and the Steel Technology Cluster, *Cambridge Journal of Regions, Economy and Society, 3*, 105-120.

Triplett, J.E. (1999) The Solow Productivity Paradox: what do computers do to productivity, *Canadian Journal of Economics, 32*, pp. 309-334.

Tyler, P., Evenhuis, E., Martin, R., Sunley, P., and B. Gardiner; Growing apart? Structural transformation and the uneven development of British cities, *Cambridge Journal of Regions, Economy and Society*, Volume 10, Issue 3, 14 October 2017, Pages 425–454, https://doi.org/10.1093/cjres/rsx017.

United Nations (2014), World Urbanisation Prospects (2014 Revision). See https://esa.un.org/unpd/wup/.

Van der Panne, G. (2004) Agglomeration externalities: Marshall versus Jacobs, *Journal of Evolutionary Economics, 14*, pp. 593-604.

Walker, B. , Holling, C.S., Carpenter, S. and Kinzig, A. (2004) Resilience, Adaptability and Transformability in Socio-Ecological Systems, *Ecology and Society, 9, 2,*

Walter, B. and Salt, D. (2006) *Resilience Thinking: Sustaining Ecosystems and People in a Changing World*, Washington: Island Press.

Walter, B. and Salt, D. (2006) *Resilience Practice: Building Capacity to Absorb Disturbance and Maintain Function*, Washington: Island Press.

Webber, D.J., Healy, A. and Bristow, C. (2018) Regional Growth Paths and Resilience: A European Analysis, *Economic Geography, 94*, 355-375.

Webber, D.J., Hudson, J., Boddy, M. and Plumridge, A. (2009) Regional productivity differentials in England: explaining the gap, *Papers in Regional Science, 88*, pp. 609-621.

Webster, D. (1997) Travel to work areas and local unemployment statistics: a Glasgow view. In: Turok, I. (ed.) Travel-to-Work Areas and the Measurement of Unemployment: Conference Proceedings. Series: *Occasional Papers* (38). Centre for Housing Research and Urban Studies: Glasgow, pp. 33-75. ISBN 9781871769098.

Williamson, J.G. (1991) Productivity and American leadership: a review article. *Journal of Economic Literature 29*, pp. 51–68.

Wolfe, D.A. (2010) The Strategic Management of Core Cities: Path Dependence and Economic Adjustment in Resilient Regions, *Cambridge Journal of Regions, Economy and Society, 3*, 139-152.

World Bank (2008) *Unleashing Prosperity*, Washington: World Bank.

Zoli and Healy (2012) *Resilience: Why Things Bounce Back*, New York: Simon and Shuster.

# Appendix A: Data Definitions

**Table A1: 45-sector and 82-sector disaggregation**

| 45 Sectors | 82 Sectors | SIC 2007 codes (82 Sector) |
|---|---|---|
| Agriculture, forestry & fishing | Crop and animal production, hunting and related service activities | 1 |
| | Forestry and logging | 2 |
| | Fishing and aquaculture | 3 |
| Mining & quarrying | Mining of coal and lignite | 5 |
| | Extraction of crude petroleum and natural gas | 6 |
| | Mining of metal ores | 7 |
| | Other mining and quarrying | 8 |
| | Mining support service activities | 9 |
| Food, drink & tobacco | Manufacture of food products | 10 |
| | Manufacture of beverages | 11 |
| | Manufacture of tobacco products | 12 |
| Textiles etc | Manufacture of textiles | 13 |
| | Manufacture of wearing apparel | 14 |
| | Manufacture of leather and related products | 15 |
| Wood & paper | Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials | 16 |
| | Manufacture of paper and paper products | 17 |
| Printing & recording | Printing and reproduction of recorded media | 18 |
| Coke & petroleum | Manufacture of coke and refined petroleum products | 19 |
| Chemicals | Manufacture of chemicals and chemical products | 20 |
| Pharmaceuticals | Manufacture of basic pharmaceutical products and pharmaceutical preparations | 21 |
| Non-metallic mineral products | Manufacture of rubber and plastic products | 22 |
| | Manufacture of other non-metallic mineral products | 23 |
| Metals & metal products | Manufacture of basic metals | 24 |
| | Manufacture of fabricated metal products, except machinery and equipment | 25 |
| Electronics | Manufacture of computer, electronic and optical products | 26 |
| Electrical equipment | Manufacture of electrical equipment | 27 |
| Machinery | Manufacture of machinery and equipment n.e.c. | 28 |

| 45 Sectors | 82 Sectors | SIC 2007 codes (82 Sector) |
|---|---|---|
| Motor vehicles | Manufacture of motor vehicles, trailers and semi-trailers | 29 |
| Other transport equipment | Manufacture of other transport equipment | 30 |
| Other manufacturing & repair | Manufacture of furniture | 31 |
| | Other manufacturing; Repair and installation of machinery and equipment | 32, 33 |
| Electricity & gas | Electricity, gas, steam and air conditioning supply | 35 |
| Water, sewerage & waste | Water collection, treatment and supply | 36 |
| | Sewerage | 37 |
| | Waste collection, treatment and disposal activities; materials recovery | 38 |
| | Remediation activities and other waste management services. This division includes the provision of remediation services, i.e. the cleanup of contaminated buildings and sites, soil, surface or ground water. | 39 |
| Construction | Construction of buildings, Civil engineering, Specialised construction activities | 41,42,43 |
| Motor vehicles trade | Wholesale and retail trade and repair of motor vehicles and motorcycles | 45 |
| Wholesale trade | Wholesale trade, except of motor vehicles and motorcycles | 46 |
| Retail trade | Retail trade, except of motor vehicles and motorcycles | 47 |
| Land transport | Land transport and transport via pipelines | 49 |
| Water transport | Water transport | 50 |
| Air transport | Air transport | 51 |
| Warehousing & postal | Warehousing and support activities for transportation | 52 |
| | Postal and courier activities | 53 |
| Accommodation | Accommodation | 55 |
| Food & beverage services | Food and beverage service activities | 56 |
| Media | Publishing activities | 58 |
| | Motion picture, video and television programme production, sound recording and music publishing activities | 59 |
| | Programming and broadcasting activities | 60 |
| | Telecommunications | 61 |
| IT services | Computer programming, consultancy and related activities | 62 |
| | Information service activities | 63 |
| Financial & insurance | Financial service activities, except insurance and pension funding | 64 |

| 45 Sectors | 82 Sectors | SIC 2007 codes (82 Sector) |
|---|---|---|
| | Insurance, reinsurance and pension funding, except compulsory social security | 65 |
| | Activities auxiliary to financial services and insurance activities | 66 |
| Real estate | Real estate activities | 68 |
| Legal & accounting | Legal and accounting activities | 69 |
| Head offices & management consultancies | Activities of head offices; management consultancy activities | 70 |
| Architectural & engineering services | Architectural and engineering activities; technical testing and analysis | 71 |
| | Scientific research and development | 72 |
| Other professional services | Advertising and market research | 73 |
| | Other professional, scientific and technical activities | 74 |
| | Veterinary activities | 75 |
| Business support services | Rental and leasing activities | 77 |
| | Employment activities | 78 |
| | Travel agency, tour operator and other reservation service and related activities | 79 |
| | Security and investigation activities | 80 |
| | Services to buildings and landscape activities | 81 |
| | Office administrative, office support and other business support activities | 82 |
| Public Administration & Defence | Public administration and defence; compulsory social security | 84 |
| Education | Education | 85 |
| Health | Human health activities | 86 |
| Residential & social | Residential care activities | 87 |
| | Social work activities without accommodation | 88 |
| Arts | Creative, arts and entertainment activities | 90 |
| Recreational services | Libraries, archives, museums and other cultural activities | 91 |
| | Gambling and betting activities | 92 |
| | Sports activities and amusement and recreation activities | 93 |
| | Activities of membership organisations | 94 |
| Other services | Repair of computers and personal and household goods | 95 |
| | Other personal service activities | 96 |

**Figure A1: Selected TTWAs from the 2011 definition**
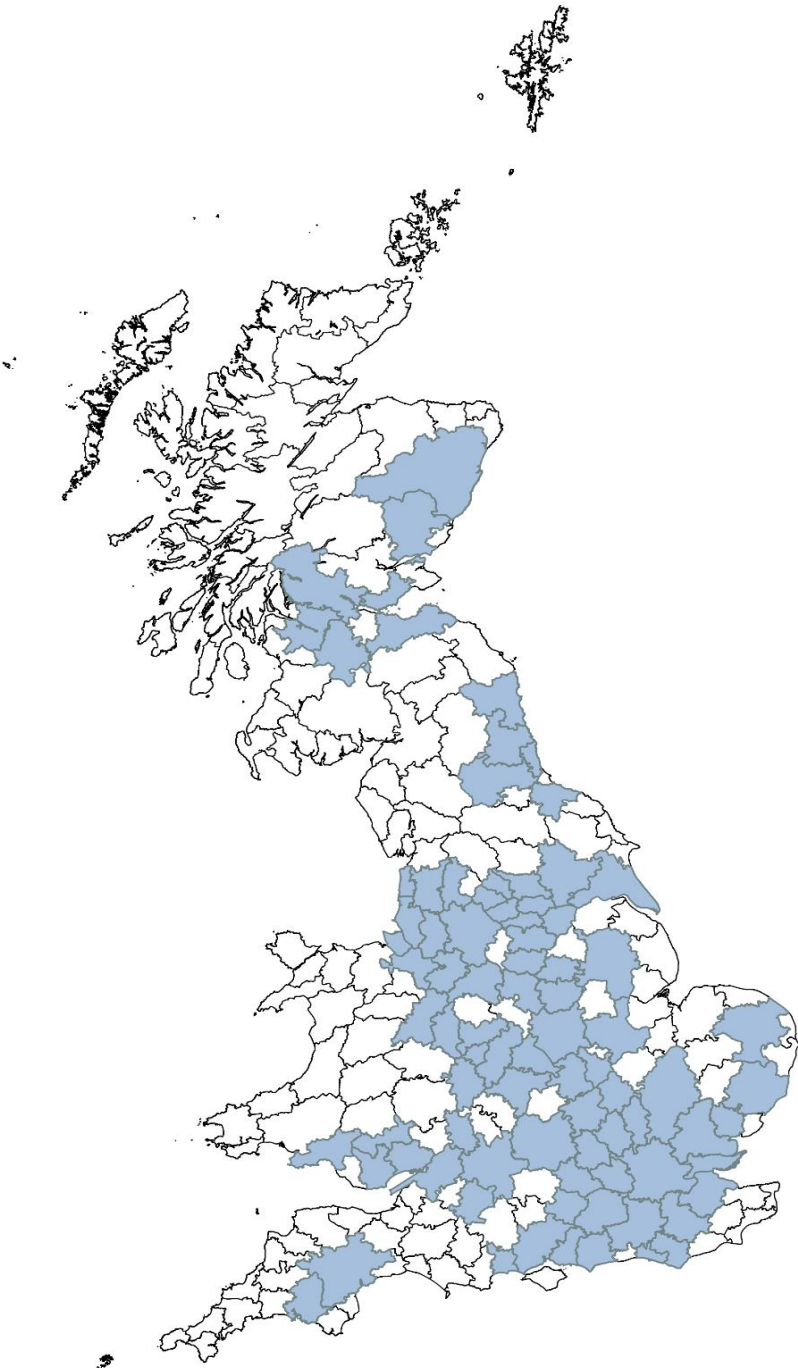
# Appendix B: Chapter 6 Technical Results

**Table B1: Initial regression with insignificant results**

Dependent Variable: EMPLGR8115
Method: Least Squares
Date: 09/14/17   Time: 13:42
Sample: 1 85
Included observations: 85

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C | 3.011066 | 1.176328 | 2.559717 | 0.0128 |
| HSKILLSSH81 | 0.020137 | 0.010644 | 1.891862 | 0.0630 |
| EMPL81 | -0.148121 | 0.090383 | -1.638818 | 0.1061 |
| AGGLOM81 | -0.177150 | 0.071066 | -2.492768 | 0.0152 |
| MANSH81 | -0.001876 | 0.008777 | -0.213719 | 0.8314 |
| KIBSSH81 | -0.012991 | 0.016302 | -0.796904 | 0.4284 |
| KSI81 | -0.971807 | 0.563138 | -1.725699 | 0.0892 |
| PROD81 | 0.029229 | 0.020680 | 1.413375 | 0.1623 |
| NEDUM | -0.540688 | 0.211290 | -2.558980 | 0.0128 |
| NWDUM | -0.294684 | 0.160419 | -1.836963 | 0.0708 |
| SCDUM | -0.721202 | 0.167742 | -4.299472 | 0.0001 |
| WADUM | -0.573671 | 0.221511 | -2.589812 | 0.0118 |
| LODUM | 0.146824 | 0.463247 | 0.316946 | 0.7523 |
| EMDUM | -0.102202 | 0.165313 | -0.618236 | 0.5386 |
| EEDUM | -0.062162 | 0.128728 | -0.482895 | 0.6308 |
| WMDUM | -0.023202 | 0.164221 | -0.141284 | 0.8881 |
| YHDUM | -0.244487 | 0.156473 | -1.562487 | 0.1230 |
| SWDUM | -0.015012 | 0.159301 | -0.094237 | 0.9252 |
| CAPCIT | 0.417022 | 0.267693 | 1.557837 | 0.1241 |
| NEWTOWN | 0.543435 | 0.126430 | 4.298289 | 0.0001 |

| | | | | |
|---|---|---|---|---|
| R-squared | 0.721973 | Mean dependent var | | 0.756988 |
| Adjusted R-squared | 0.640703 | S.D. dependent var | | 0.508699 |
| S.E. of regression | 0.304921 | Akaike info criterion | | 0.664797 |
| Sum squared resid | 6.043496 | Schwarz criterion | | 1.239538 |
| Log likelihood | -8.253860 | Hannan-Quinn criter. | | 0.895974 |
| F-statistic | 8.883680 | Durbin-Watson stat | | 2.096874 |
| Prob(F-statistic) | 0.000000 | | | |

# Appendix C: Chapter 7 Additional Figures

**Figure C.1 The Falling Share of Manufacturing Employment by City, 1971-2015**



**Figure C.2 The Rising Share of KIBS Employment by City, 1971-2015**
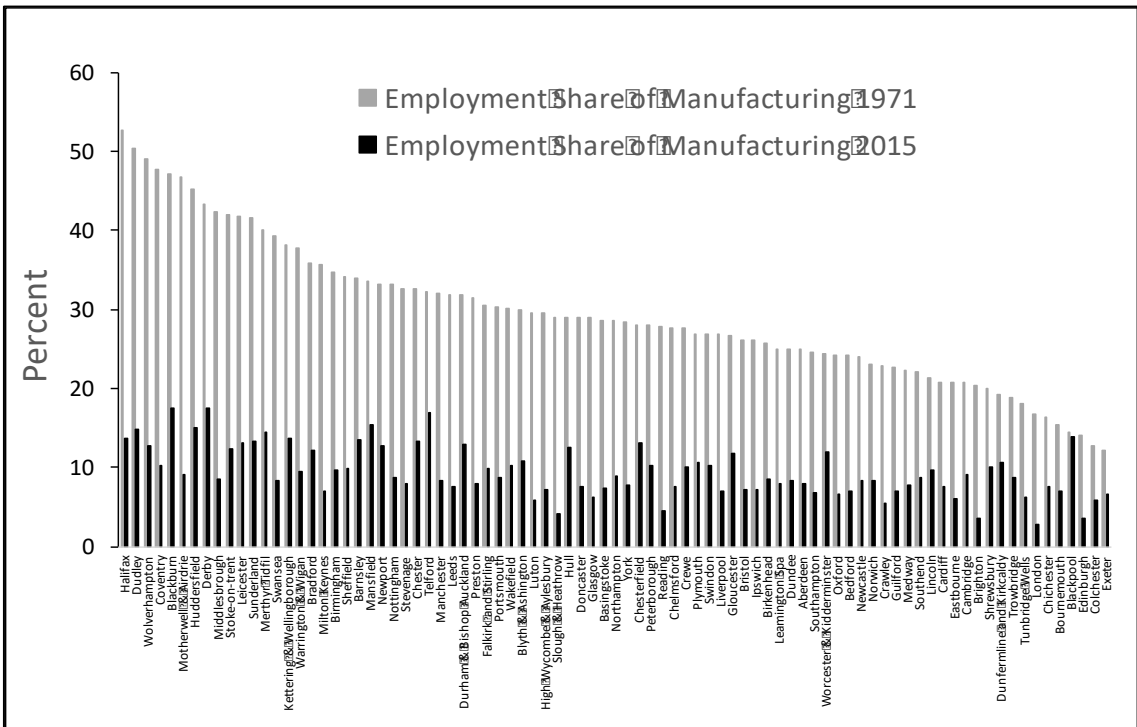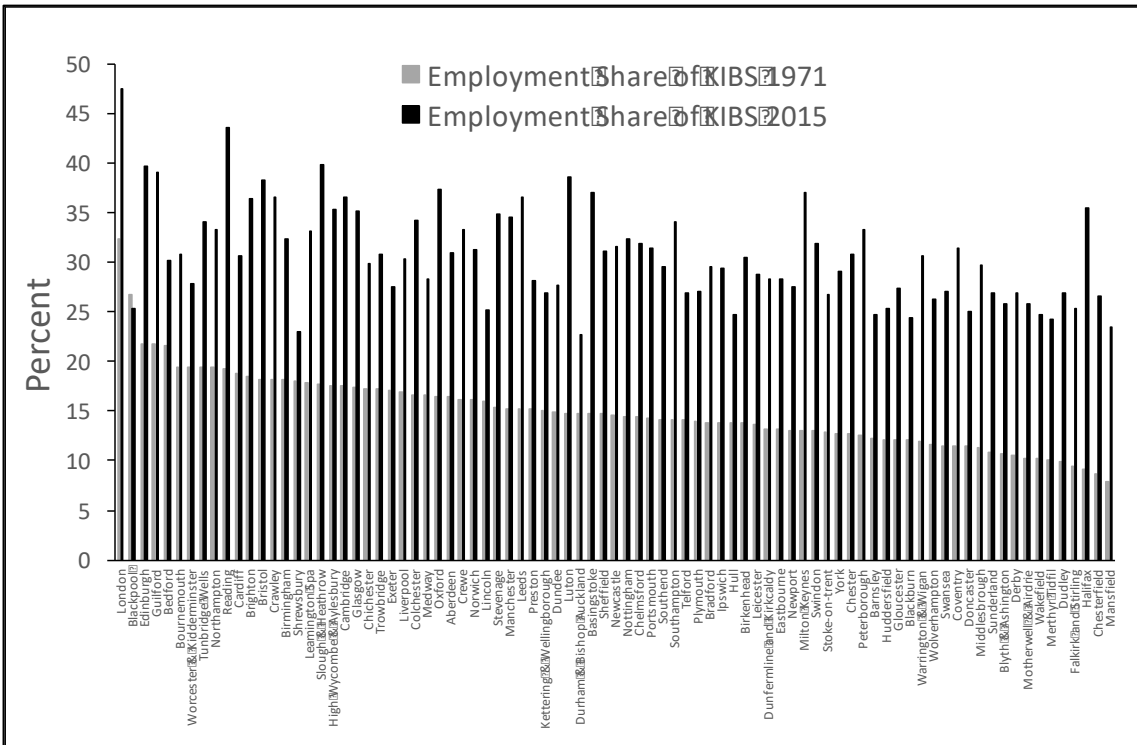
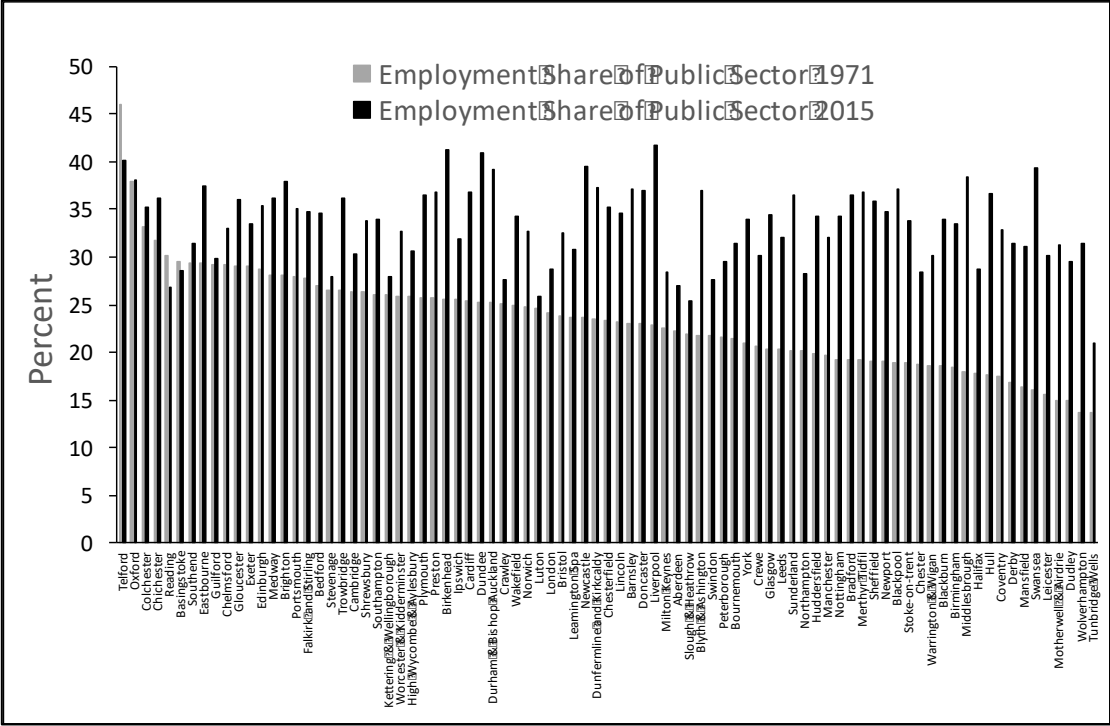**Figure C.3 The Uneven Growth of Public Sector Employment by City, 1971-2015**



**Figure C.4 The Declining Specialisation of Cities, Krugman Index, 1971-2015**
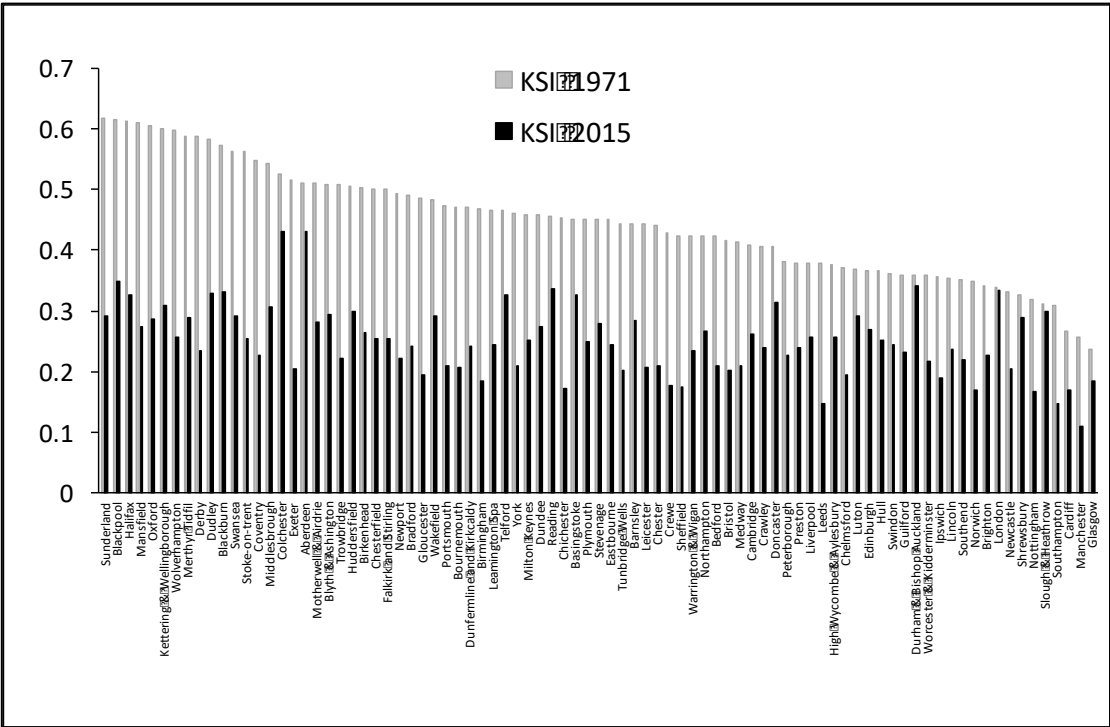
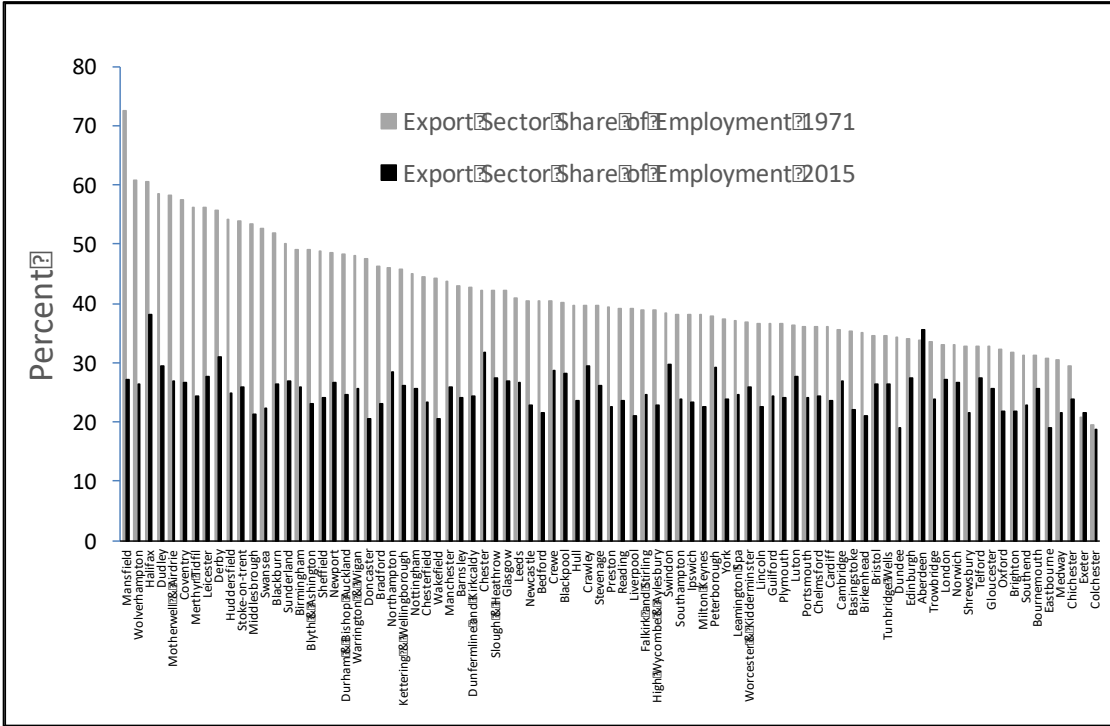**Figure C.5 The Falling Export Share of City Employment, 1971-2015**



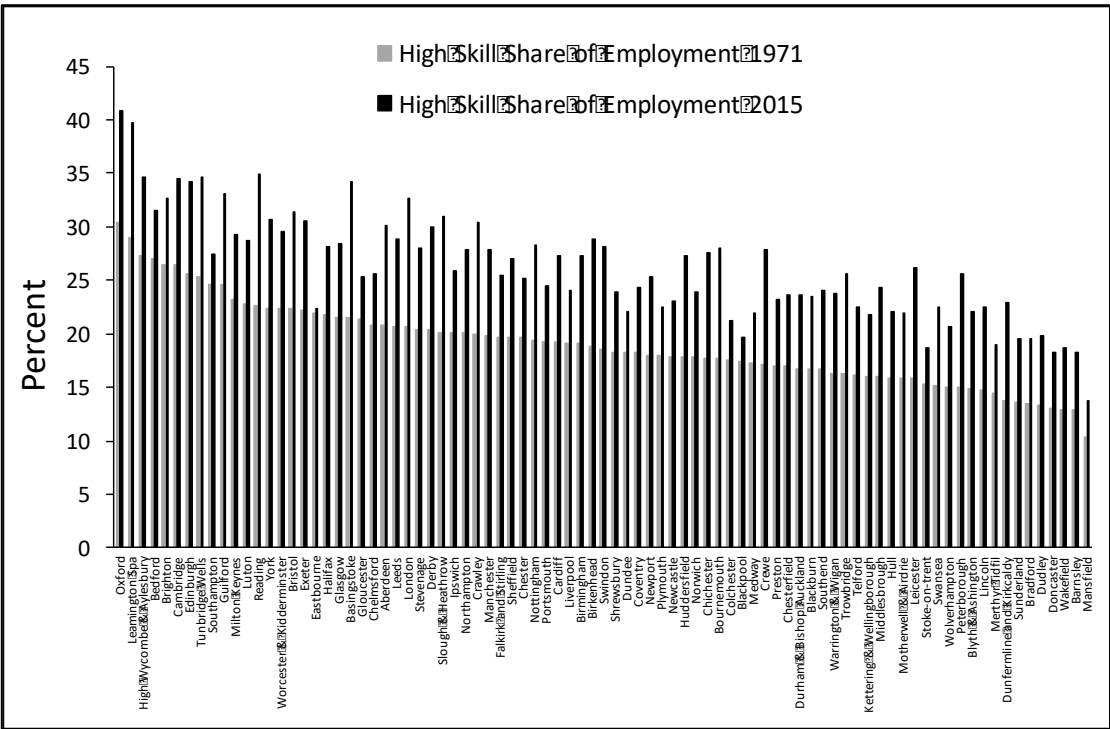**Figure C.6 The Rising Share of City Employment in High Skill Occupations, 1971-2015**

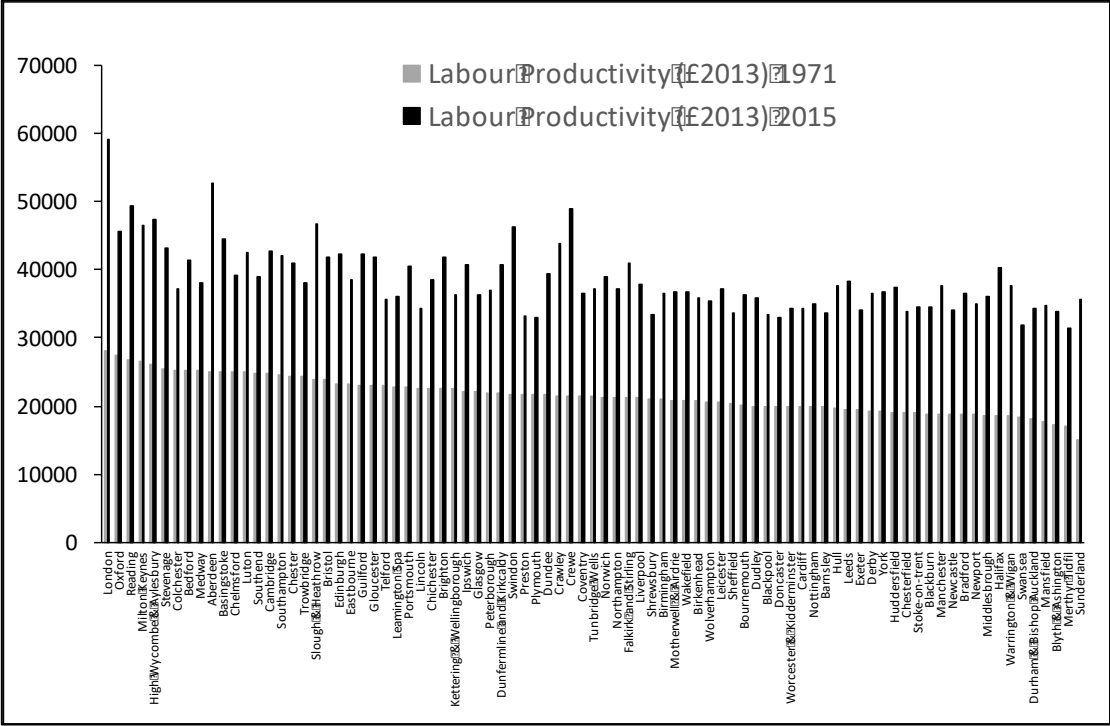**Figure C.7 The Growth in Labour Productivity by City, 1971-2015**



**Figure A.8  The Localisation of Patenting Across Cities, 1990 and 2012**