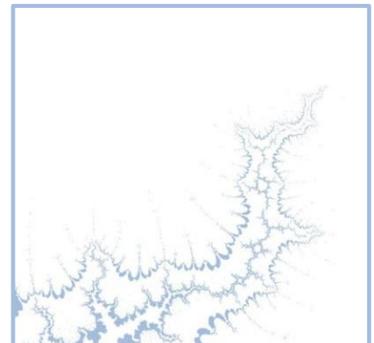# Cambridge, Milton Keynes, Oxford, Northampton Growth Corridor

Final Report for
The National Infrastructure Commission

8 November 2016

SQW

Authorisation and Version History

Version	Date	Authorised for release by	Description
1.0	20/10/16	Anthony Barker	First draft of chapters 1 and 2.
2.0	04/11/16	Ben Gardiner	Complete draft final without MSOA maps or executive summary
3.0	08/11/16	Ben Gardiner	Complete draft final
4.0	09/12/16	Ben Gardiner	Complete final report

Contents

Executive Summary

Background, purpose and definitions

- This report presents research on the *economic rationale* for infrastructure investment in the Cambridge, Oxford, Milton Keynes, and Northampton area (henceforth known as CaMKOx-N). An economic framework is developed which explains the key drivers of and constraints on growth and specialisations, and investigates the nature of the inter-relationships between the four main urban centres that comprise the 'corridor'.

- The focus is primarily, but not exclusively, on the *knowledge-intensive sectors* that make the study area worthy of special attention (as per George Osborne's recommendation). For the purposes of analysis, the knowledge-intensive sectors are split into *High-Tech Manufacturing* (HTM) and *Knowledge Intensive Business Services* (KIBS) – the former is a key driver of productivity growth, but the latter is what drives knowledge-based jobs in most areas.

- The study area presents a complex geography with no precise definition, yet one is still required in order to undertake the analysis. Using data on knowledge-based sector specialisation at Local Authority District (LAD) level, a definition was agreed which allowed for splitting the area into four sub-geographies (as shown in Figure 1):

  - Greater Cambridge and northern Hertfordshire area.
  - Greater Oxford-Swindon area.
  - Milton Keynes-Bedfordshire-Luton-Aylesbury Vale region.
  - Greater Northampton area.

Figure 1: Defining the Study Area and its four sub-areas
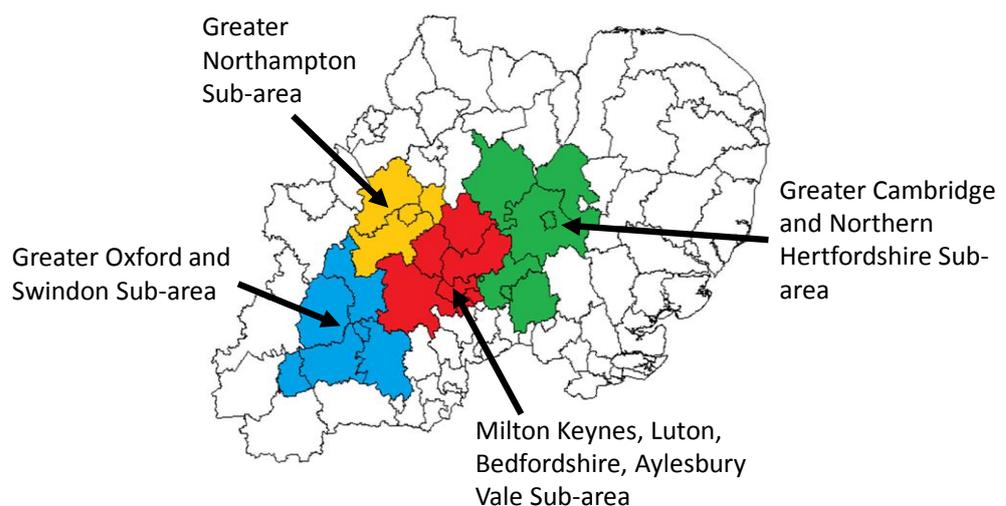
Developing an economic framework

- The economic framework used to assess the role played by improved transport infrastructure focusses on the *agglomeration cycle*, a self-reinforcing process in which high levels of human and physical capital combine to produce growth in output, employment, and knowledge-based assets, that then feedback to attract more human, physical and financial capital to the region. The framework is depicted in figure 2.

- Infrastructure investment, through improved connectivity, can support growth through a variety of channels, including better matching of local skills supply and demand, lowering travel and transport costs, and (ultimately) by allowing for agglomeration benefits to occur. The role that transport plays in connecting activity hubs within growth corridors is another manifestation of the benefits of infrastructure investment, and a particularly important one given the increasing urbanisation of the UK population.

- However, while it is clear that improved transport connectivity can play a facilitating role in promoting economic development and prosperity, the interplay between different factors (infrastructure, skills, agglomeration, specialisation, governance, etc) is too complex to capture in an empirical modelling framework. Thus, in order to calculate an effect on productivity from improvements in infrastructure (which facilitate greater employment density to occur), use is made of the well-established literature on Access to Economic Mass (ATEM), which provides a direct link between these measures.

Figure 2: Overview of the Logic Framework
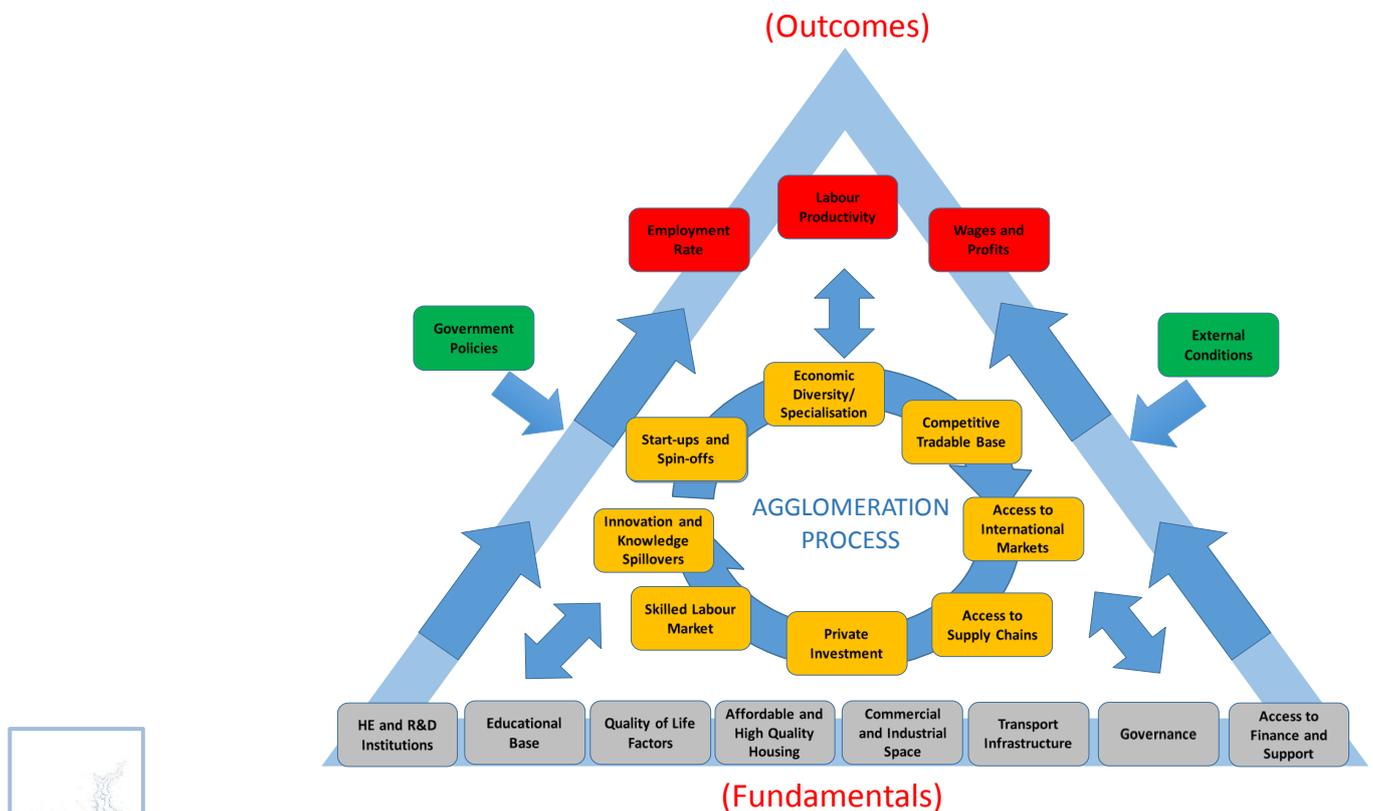
Profile and functionality of the study area

- Both Cambridge and Oxford have developed a considerable knowledge-intensive economy, with strong employment growth rates in the KIBS sectors, but also in the strong productivity growth in the HTM sectors. Cambridge experiences a higher relative degree of specialisation in the science and high-tech sectors, whereas Oxford's knowledge economy is more diverse, with relatively greater levels of employment in more directly business focused sectors.

- Both cities benefit from outstanding assets linked to higher education and research and development institutions. However, they also face a wide range of challenges in the coming decades. Housing and employment space provision has been constrained within the cities themselves for some time now, and as the effective economic footprint of each city has rapidly grown outwards, the infrastructure provision has failed to keep up. This is currently a major constraint to future growth in the two areas.

- Milton Keynes benefits from good transport connectivity and it has been enabled by strong and effective governance and has seen rapid growth in housing, population and jobs over the past 50 years. However, whilst this growth has been impressive, the figures suggest it has not been driven by growth in knowledge intensive sectors, which only constitute 10% of overall growth, compared to figures of 25% and 30% in Oxford and Cambridge respectively, despite its geographical proximity to them.

- Better physical and economic linkages to these two centres may help drive forward knowledge intensive sector growth in the Milton Keynes region, both in the city itself, but also along the east-west route through Aylesbury Vale linking it to Oxford and through Central Bedfordshire to Cambridge.

- Northampton has experienced moderate to high levels of population and employment growth, particularly in its logistics and business support sectors, a function that doubles up with its status as a county town and local retail, public and residential services hub. Its comparatively affordable housing and commercial premises has been a major factor in its growth in recent years, and there appears to be an appetite for further growth in the immediate future. Its growing linkages with Milton Keynes mean it well positioned to benefit from strong economic growth in the central region of the study area.

- The growth story of the four key functional economic areas is summarised in table 1.

Table 1 Summary of Growth Story for the 4 key functional economic areas within the CaMKOx-N corridor

Net Change in Employment, 1990 to 2014	Cambridge and South Cambridgeshire	Oxford, South Oxfordshire, and Vale of White Horse	Milton Keynes-	Northampton
Total	37,000	52,000	66,000	24,000
KIBS	29,000	34,000	35,000	15,000

| HTM	-200	-4,100	-5,100	-7,400

- All four cities saw a significant fall in HTM employment. However, in Cambridge and Oxford's case, this was off-set by a similar sized increase in surrounding districts, particularly in South and East Cambridgeshire. This was not the case for the districts surrounding Milton Keynes and Northampton.

- The main growth in the Cambridge area was seen outside of the city's administrative boundaries. Whereas knowledge intensive employment growth in the city itself was significant, with a 50% increase in KIBS employment. South Cambridgeshire saw a remarkable quadrupling of employment in KIBS sectors.

- The story in Oxfordshire was slightly different, with a more even balance in growth between City and surrounding districts.

- Milton Keynes and Northampton saw similar trends, with an approximate doubling in KIBS employment offset by a significant 75% drop in HTM.

Potential as a Corridor

- The area around greater London (that largely fits the study area defined above) has long been viewed as a high growth area, and in particular one that is based on knowledge-intensive sectors.

- However, the area currently operates principally as several largely-independent 'wedges', extending outwards from London on radial routes, with transport infrastructure providing several major road (e.g. M11, A1, M1, M40, M4) and rail routes cutting across (see Figure 2). Commuting patterns also point to the current dominance of London affecting the direction of travel. The study area can thus be said to comprise a number of neighbouring, but largely independent, sub-regions, that share similar characteristics in virtue of their similar geographic proximity to (and functional interconnections with) a major world city. As such the area comprising Cambridge, Milton Keynes, Oxford and Northampton cannot currently be defined as a functioning growth corridor.

- Just because the study area does not currently function as a growth corridor does not mean the *potential* does not exist for it to do so. Increasing the connection between these existing transport corridors, as opposed to any of the others around London, may offer some unique opportunities. With the intensive knowledge base of Cambridge on one end, Oxford on the other, and the growing Milton Keynes in the middle, these three may be able to complement each other in a way others cannot.

Figure 3: Transport Corridors Crossing the Cambridge-Oxford Region with proposed new East-West linkage shown in red (approximate route).
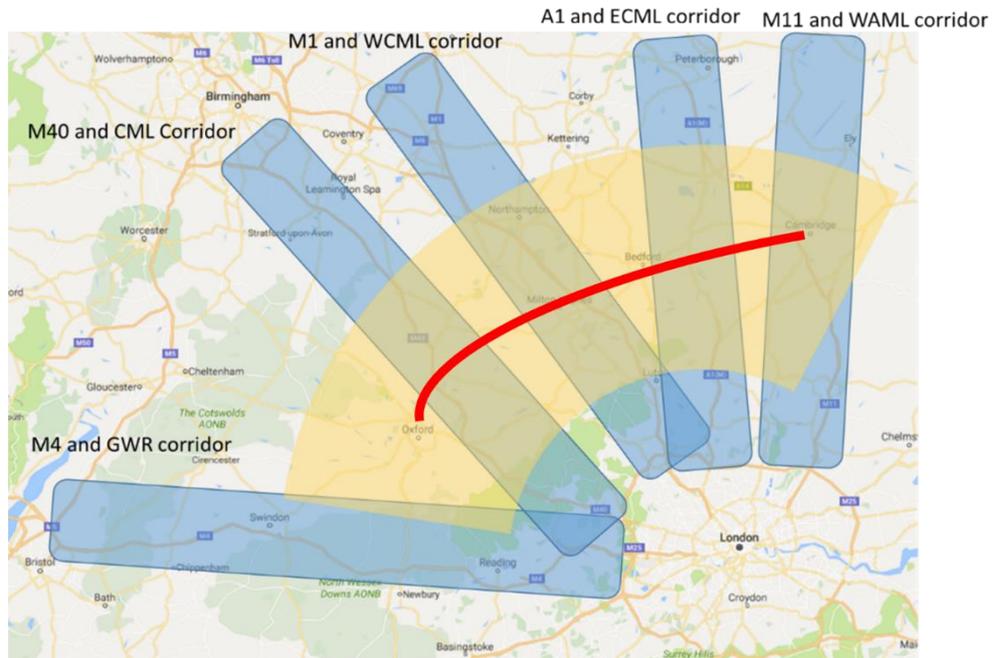
Note(s): GWR = Great Western Railway, CML = Chiltern Main Line, WCML = West Coast Main Line, ECML = East Coast Main Line, WAML = West Anglia Main Line

Lessons from case studies

Three groups of case studies have been completed as part of this study. These consider:

• Historic perspectives on growth within the CaMKOx-N area

• Evidence of the potential for a "single knowledge-based cluster that can compete on a global stage" across the geography of the area

• Examples from elsewhere of economic corridors and/or attempts to create them.

These case studies provide a complex mix of insights. Various conclusions from them have implications for the study area:

• Three case studies (the bioscience sector in the Cambridge area; the high-performance technology and motorsport cluster in the area around Silverstone; and the impact of the opening of the Øresund Bridge on the economies of Copenhagen and Malmo) highlighted the importance of scale and connectivity in developing specialist labour markets which support excellent research and the growth of knowledge-intensive companies.

• The Hong Kong-Guangzhou and Øresund case studies show just how much difference high quality transport infrastructure makes to economic integration; this is evidenced, for example, by some convergence in wage levels in Malmo and Copenhagen. The scale and quality of research, tech business activity and specialist funding and business services in the

CaMKOx-N area is huge (and the area has two of the top four universities world-wide), but it is currently very disjointed compared with international comparators.

- Case Studies offering a historical perspective on the growth of Cambridge and the development of two New Towns (Milton Keynes and Northampton) highlight the critical nature of governance in determining the scale and pattern of economic growth. For example, the early growth of Milton Keynes owed much to the role of the Milton Keynes Development Corporation

- Similarly, it was found that although the transformational impact of the infrastructure required to create a functional corridor is impossible to demonstrate conclusively *ex ante*, "the middle" of the CaMKOx-N area has "matured" as a partner in this endeavour, and the potential benefits to the two "ends" have become clearer in comparison with last big initiative in this domain, which was launched well over a decade ago.

- Finally, a review of the findings of the Redcliffe-Maud report (which was completed 50 years ago) highlighted the potential folly of assuming that long term economic growth can only be incremental (and therefore reasonably predictable) in both geography and composition. With the benefit of hindsight, it is apparent that this report failed to anticipate fully the potential growth that could be generated through the commercialisation of world class knowledge.

Economic scenarios for the study area

There were three scenarios developed as part of this process, based on the following assumptions:

Business as usual
- Existing levels of housing delivery are maintained (which are below those required to address the level of housing need identified in Strategic Housing Market Assessments (SMHAs)). The ONS principal population projection is realised. Existing infrastructure commitments and plans from CP5 and CP6 are carried through, most prominently the completion of East-West Rail and the Girton to Huntingdon A14 upgrade, with additional basic infrastructure improvement and maintenance carried out but no further more ambitious schemes pursued.

- The results of this scenario see positive employment and productivity growth across the study area, but at a rate below the historical trends of the previous 25 years. This is partly due to an uncertain national macroeconomic outlook, but also due to the constraints to growth that have worsened in the past decade, particularly in Cambridge and Oxford. Whilst East-West Rail would undoubtedly provide vital transport links across the corridor, the ultimate impact of this investment is dependent upon the coherent and systematic way it is linked in to enhanced local transport networks in each of the three major settlements covered by the route. These are examined in more detail in the incremental scenario.

Incremental Enhancements
- The assumptions used in the incremental scenario are informed by evidence gathered in chapters 3 and 4, which identified the urgent need for enhanced housing provision and transport networks in both Cambridge

and Oxford in recognition of the rapidly growing economic footprint of these areas into surrounding districts. These assumptions include sufficient additional housing provision to support the ONS high migration projection across the study area, and the additional infrastructure around Oxford and Cambridge in particular, to both maximise the impact of the anticipated East-West Rail link and coincidently release currently constrained employment growth potential in these two areas. The realisation of these additional interventions is calculated to provide the study area with something in the region of **300,000 jobs**, of which 50,000 will be in the Cambridge FEA and 70,000 in the Oxford FEA specifically. We also find an additional productivity boost of **£4,000 per worker** over the entire study area.

Transformational Enhancements

- The assumptions in the transformational scenario include a significantly enhanced house building rate of 23,000 new houses per year, and significant improvements to transport infrastructure both within existing functional economic areas, but also in creating better linkages between them (for example the proposed Oxford-Cambridge Expressway), and thus driving enhanced interaction and collaboration across the corridor. The housing and infrastructure plans are assumed to be coherent and synergistic, with much of the additional housing being built at key crossing points between the new east-west transport infrastructure and existing north-south radial links, allowing residents the option of commuting in multiple directions. We find that this more radical level of intervention provides the study area with an approximate additional **700,000** jobs, of which 250,000 are in the central Milton Keynes sub-area at the heart of the cross-corridor infrastructure improvements. We find an associated productivity boost of **£6,000 per worker**.

- It is also clear that without the housing and infrastructure interventions outlined in Chapter 5 of this report, employment and productivity growth in the four key sub-areas is unlikely to be maintained at current rates, and genuinely transformational changes will be required to realise the full potential of the study area and effect the Chancellor's envisaged "knowledge intensive growth corridor".

The scenario results are summarised in the two tables below:

Table 1 Table showing comparison of key top-level indicators in different scenarios

	Population Growth (%pa)				Employment Growth (%pa)				Productivity Growth (%pa)s			
	Historic (1990 to 2014)	Baseline (2014 to 2050)	Incremental (2014 to 2050)	Transformational (2014 to 2050)	Historic (1990 to 2014)	Baseline (2014 to 2050)	Incremental (2014 to 2050)	Transformational (2014 to 2050)	Historic (1990 to 2014)	Baseline (2014 to 2050)	Incremental (2014 to 2050)	Transformational (2014 to 2050)
CaMKOx-N Corridor	**0.9**	**0.7**	**0.8**	**1.1**	**0.9**	**0.5**	**0.9**	**1.3**	**1.6**	**1.4**	**1.5**	**1.6**
Greater Cambridge-Northern Hertfordshire	0.9	0.7	0.8	1.0	0.8	0.5	1.0	1.3	1.9	1.4	1.5	1.5
Oxford-Swindon	0.7	0.5	0.7	1.0	0.8	0.4	0.9	1.3	1.5	1.5	1.6	1.6
Milton Keynes-Bedfordshire-Aylesbury	1.0	0.9	1.0	1.2	1.0	0.5	0.9	1.4	1.1	1.3	1.6	1.6
Greater Northampton	0.8	0.6	0.7	0.9	0.9	0.4	0.8	1.2	1.6	1.5	1.5	1.6

Table 2 Table showing KIBS and HTM Growth Rates for each scenario

	Knowledge Intensive Business Services Employment Growth (%pa)				High-Tech Manufacturing Employment Growth (%pa)			
	Historic (1990 to 2014)	*Baseline (2014 to 2050)*	*Incremental (2014 to 2050)*	*Transformational (2014 to 2050)*	*Historic (1990 to 2014)*	*Baseline (2014 to 2050)*	*Incremental (2014 to 2050)*	*Transformational (2014 to 2050)*
CaMKOx-N Corridor	**2.1**	**0.7**	**1.4**	**1.9**	**-1.4**	**-1.4**	**-0.4**	**0.0**
Greater Cambridge-Northern Hertfordshire	2.0	0.7	1.5	1.8	-0.2	-1.1	0.1	0.4
Oxford-Swindon	2.3	0.7	1.5	1.8	0.2	-1.3	0.1	0.5
Milton Keynes-Bedfordshire-Aylesbury Vale	2.0	0.8	1.3	2.2	-3.3	-2.5	-1.8	-1.1
Greater Northampton	2.1	0.7	1.1	1.6	-2.4	-2.2	-0.6	-0.1

1 Introduction

1.1 Background to and purpose of the study

Background In his letter of 16th March 2016 to Lord Adonis[1], Chair of the National Infrastructure Commission, the then Chancellor of the Exchequer, George Osborne, highlighted the need for a more detailed review to

'…make recommendations to maximise the potential of the Cambridge – Milton Keynes – Oxford corridor as a single, knowledge-intensive cluster that competes on the global stage' and to *'…look at the priority infrastructure improvements needed, and assess the economic case for which investments would generate the most growth.'*

Furthermore, the aim of the review was to:

'…provide the Government with proposals and options for the long-term infrastructure priorities to unlock growth, jobs, and housing within the Cambridge – Milton Keynes – Oxford corridor over the next 30 years.'

Purpose Alongside three other parallel studies looking at housing, infrastructure, and finance/investment, this report focuses on the *economic rationale* for infrastructure investment in the Cambridge, Milton Keynes, Northampton, and Oxford area. The report was carried out by a consortium of Cambridge Econometrics and SQW.

In doing so, an economic framework is developed which explains the key drivers of and constraints on growth and specialisations therein, and investigates the nature of the inter-relationships between the four main urban centres that comprise the 'corridor'.

The focus of the economics study is primarily, but not exclusively, on the knowledge-intensive sectors that make the study area worthy of special attention. This is because, the future development of the knowledge-based sector would inevitably have housing, transport and financial implications, which would influence the case for investment in the corridor.

1.2 Key definitions and terms

Knowledge-intensive sectors There are a variety of definitions of what comprises the knowledge economy.

In 1996 the OECD published 'The Knowledge-Based Economy'[2] in recognition of the growing importance of sectors based on human capital, knowledge and information, and went on to define sectors from high to low technology according to their R&D intensity. Eurostat has a definition called 'Knowledge-Intensive Services'[3] which cover a variety of NACE-defined activities.

---

[1] See https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/508109/DOC150316-15032016124609.pdf for the full letter.

[2] See https://www.oecd.org/sti/sci-tech/1913021.pdf.

[3] See http://ec.europa.eu/eurostat/statistics-explained/index.php/Glossary:Knowledge-intensive_services_(KIS) for more detail.

Our definition builds on this work, recognising that there are sections of both manufacturing and services that are advanced, have sizable research and development functions, and a significant proportion of knowledge-intensive activity. We have split the knowledge-intensive sector into two broad groups as highlighted in Table 1.1.

Table 1-1. Knowledge-intensive sectors

	Sectors	SIC 2-digit codes
High-Tech Manufacturing (HTM)	Chemicals, Pharmaceuticals, Electronics, Electrical Equipment, Machinery, Motor Vehicles, and Other Transport Equipment	20, 21, 26, 27, 28, 29, 30
Knowledge-Intensive Business Services (KIBS)	Media, IT, Finance and Insurance, Legal and Accounting, Head Offices and Management Consultancy, Architecture and Engineering, Other Professional Services (including Scientific R&D)	58, 59, 60, 61, 62, 63, 64, 65, 66, 69, 70, 71, 72, 73, 74

The reason for identifying the two groups is that, in general, while both sectors tend to have higher-than-average productivity, high-tech manufacturing has been associated with falling employment while the service sector has largely seen jobs growth. This feature will be revisited in the scenario development.

Clusters The term is associated with Michael Porter's (1990) seminal work and is essentially about specialised industry location, something that Marshall (1890) wrote about a century earlier. What started out as a theory of national industrial competitiveness (the competitive diamond) gradually morphed across ever-decreasing spatial scales, such that the geographical proximity of firms in the same location is seen to increase the intensity of the competitive process. These benefits (access to a pool of skilled labour, knowledge spillovers, access to supply chains) are sometimes known as the *economies of localisation[4]*, but they do not necessarily have to occur in urban areas – this depends on the nature of the sector (Porter himself uses the example of Californian wine growers). There may be additional (and generally similar) *economies of urbanisation*, whereby the location of a sector in a city or densely-populated area affords additional benefits (e.g. banking and finance). Both terms are sometimes referred to as *agglomeration economies*, the benefits of which are explored in more detail in the next chapter.

(Growth) corridors There are several possible definitions of an 'economic corridor' available in the literature (see for example, Brunner (2013); Hope and Cox, (2015)), all of which emphasise the importance of infrastructure as a means of harnessing and facilitating coordinated growth along a narrow spatial area along which there is a high degree of movement, i.e. exploiting transport networks. A report by Grant Thornton's (2014) identifies a number of growth corridors in the UK.

---

[4] Despite its widespread popularity in policy circles, the concept is not without its problems and limitations, as summarised by Martin and Sunley (2003).

As the largest and most dominating metropolitan area in the country, London was found to be the host to a particularly large portion of these growth corridors.

The usefulness of the corridor concept to explain growth, and the extent to which the study area can be seen to be already functioning as a growth corridor, is discussed in subsequent chapters.

The study area

The 'Golden Doughnut' Sir Peter Hall made the argument that there existed a "Golden Doughnut" of high employment, high productivity regions surrounding the Greater London area. These regions form a ring around London, more than 25 miles away and hence outside of the green belt and historic commuter belt surrounding the M25, but within 75 miles, roughly 60 to 90 minutes' journey time. Hence, the area is close enough to London that a high degree of connectivity and economic integration with the capital is possible.

Figure 1-1: The study area within the context of a visualised "golden doughnut" around London
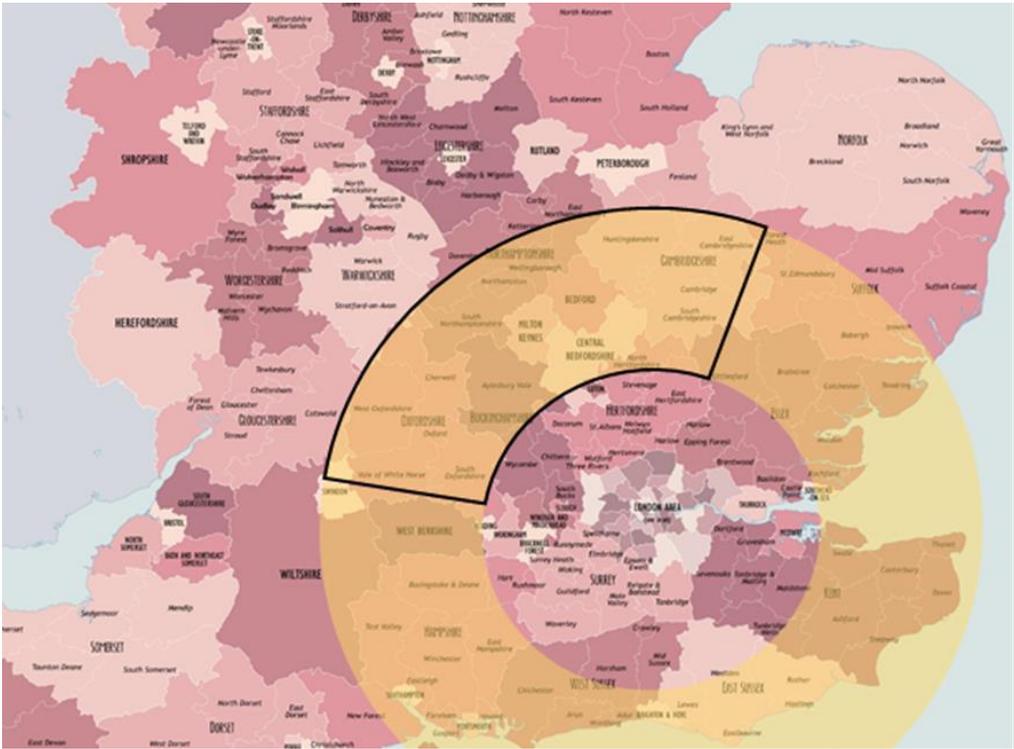
The North-Western sector of this "golden doughnut", located between Greater London and the Midlands, and flanked at either end by two world leading university cities roughly corresponds to the geographical area to be addressed by this study, as seen in Figure 1-1.

Overview of commuting between the major urban areas

Figure 1-2 shows commuting numbers into the major employment centres. Cambridge has a large labour market footprint, partly because it is relatively isolated. It has commuting areas extending north to Ely along the A10, south west along the A505, and then east and west along the A14. There are also isolated hot spots in Peterborough and Downham Market where train connections are quick and frequent. There is a small overlap to the south west with Stevenage's labour footprint (not shown).

Figure 1-2: Commuting map for the study area

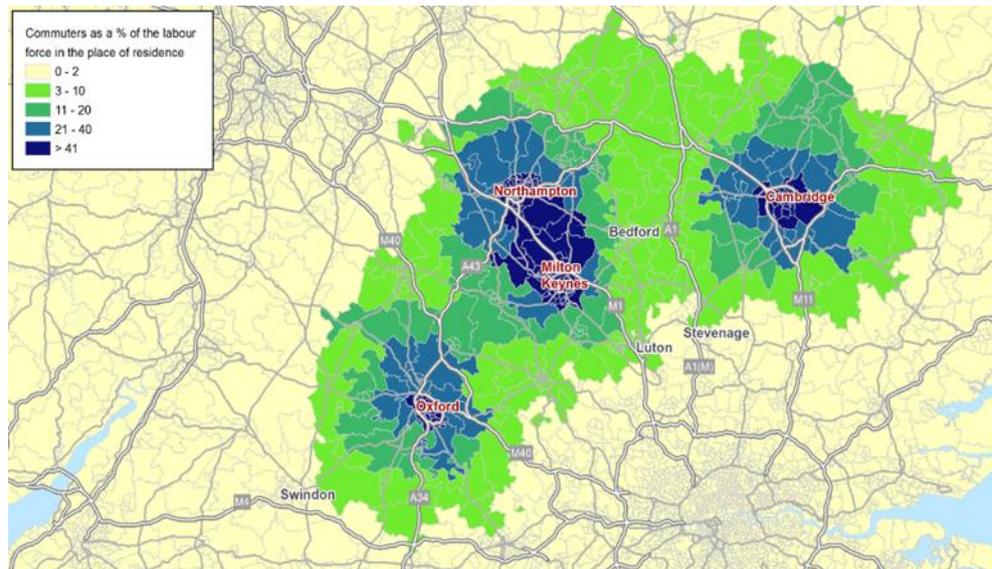There is very little overlap between the Northampton and Cambridge commuter footprints. Northampton's footprint is smaller than Cambridge's, and it extends mainly in a north-easterly direction into Wellingborough and Kettering. It also spreads along the A43 into South Northamptonshire. There is little evidence that the Northampton labour market spreads as far as Kettering, Corby or East Northamptonshire.

Milton Keynes' footprint extends up the M1 to the north, encompassing Northampton, and to the east, encompassing Bedford. It also reaches down the M1 towards Luton. It is interesting to note that Bedford appears in the labour footprint of Milton Keynes, Luton, Stevenage and London, with some suburbs in the labour footprints of Cambridge and Northampton. This shows the extent to which it acts as a dormitory town for surrounding cities.

Oxford's footprint extends to the west and the south into the Vale of White Horse where it overlaps with Swindon's labour footprint (not shown). There is a small degree of overlap to the East with the footprints of Milton Keynes and Northampton, but the two areas appear to operate effectively independently.

Knowledge-sector specialisation

Given the remit of maximising the potential of the knowledge-intensive cluster, it makes sense to see how relative specialisations play out across the area.

KIBS are distributed most strongly in Greater London and surrounding areas, particularly to the south and west of the capital, with a second concentration in the West Midlands, as shown in Figure 1-3. To the south of the study region there is some limited evidence of a band of KIBS employment to the north west of London stretching between Oxford and Cambridge corridor, across from East Cambs in the east, across the southern part of the M1 corridor area, including Luton, Milton Keynes and up the M1 to Northampton, and across through South Oxfordshire to Swindon in the west where it merges with the M4 corridor.

Figure 1-3: Share of Employment in Knowledge Intensive Business Services
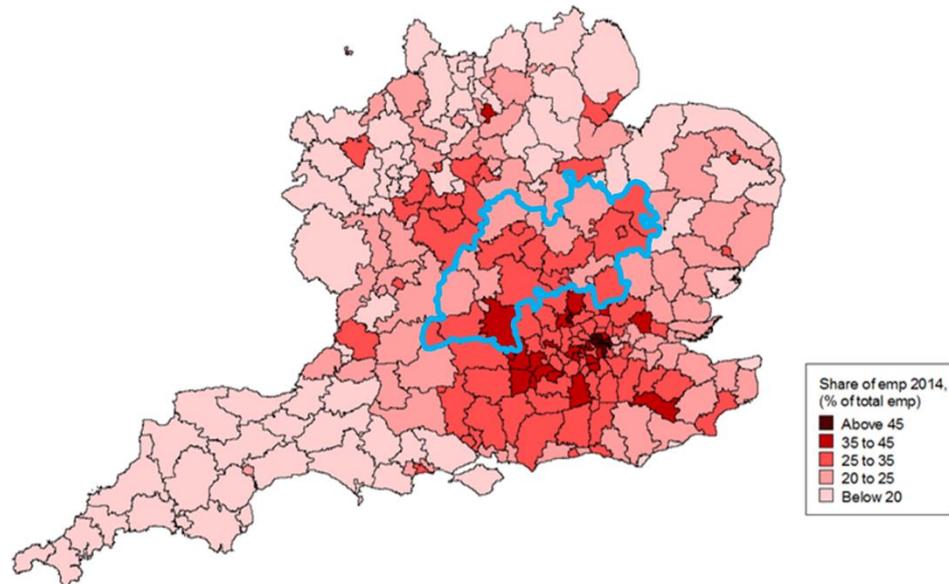
High-tech manufacturing is distributed more evenly across the country, as shown in Figure 1-4, with a small presence in and around London, but instead particular strengths are visible in the West Midlands and to a lesser extent the West of England. There is evidence of an area of HTM activity covering Cambridgeshire and northern Hertfordshire, and other less concentrated region around Swindon and neighbouring parts of Oxfordshire. There is also some evidence that the West Midlands concentration in HTM extends eastwards into western Northamptonshire.

The spatial distribution of scientific R&D employment, as presented in Figure 1-5, is strongly concentrated in the UK, with only four LADs having over 4% of employment share in this sector, all of which are in our study region. These are Cambridge, South Cambridgeshire, Stevenage and the Vale of White Horse. Notable from the map is the relative 'under specialisation' of Milton Keynes and Northampton in this sector.

Figure 1-4: Share of Employment in High-tech manufacturing
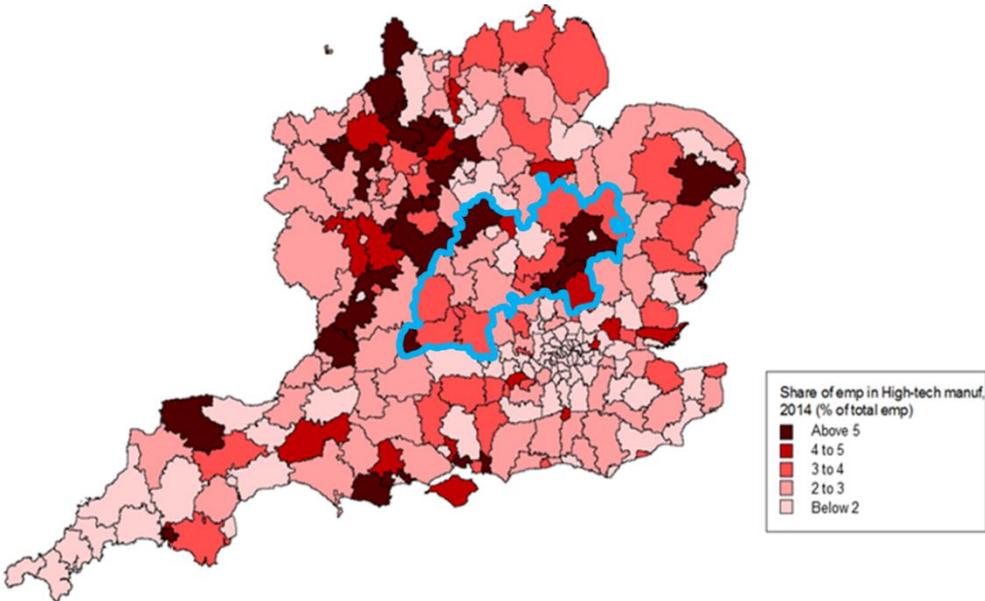
Figure 1-5: Scientific R&D Employment Shares
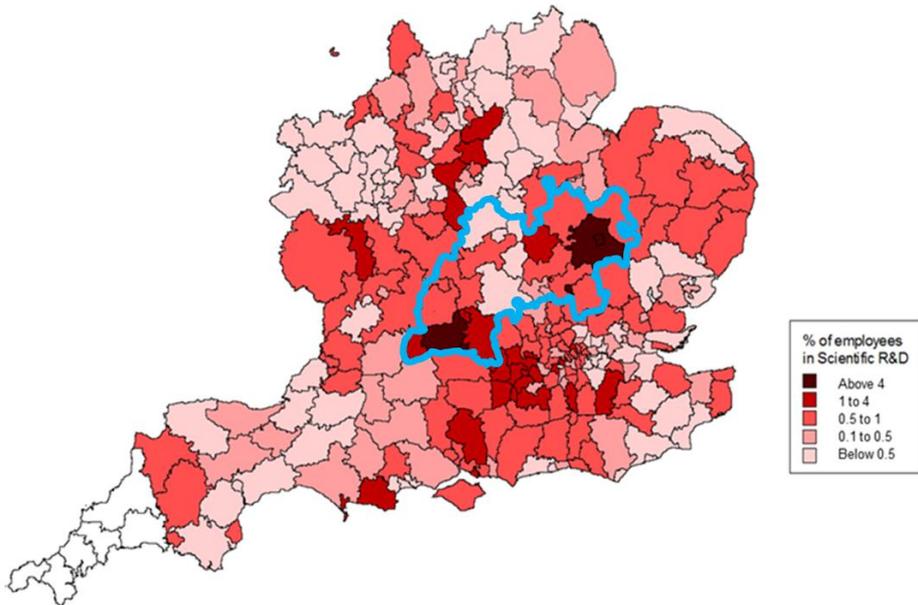
Using the definition mentioned above, the figure below shows the combined employment share of Scientific R&D, Knowledge Intensive Business Services (KIBS), and High-tech Manufacturing (HTM) by Local Authority District (LAD) in 2014.

Putting the sectoral concentration data together, as seen in Figure 1-6, provides limited evidence of an area with knowledge-based industrial specialisations activity stretching from Swindon in the South West, via Oxford, the M1 corridor region and across to Cambridge in the East.

Figure 1-6: Combined knowledge intensive sector specialisation
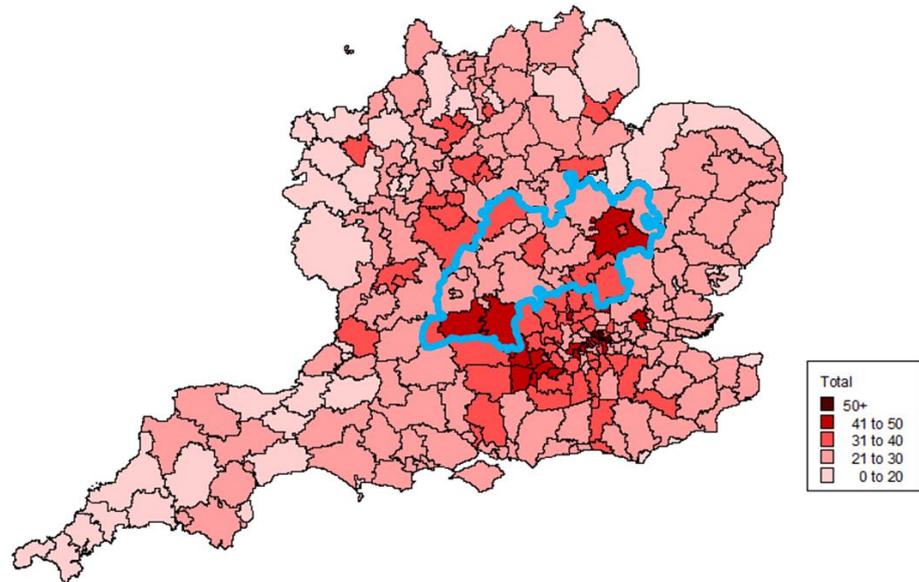
Arguably, the study area appears to be made up of three or possibly four distinct economic areas, with Oxfordshire and Swindon in the west, and much of Cambridgeshire and northern Hertfordshire in the east, both appearing to have a diversity of strengths across KIBS, Scientific R&D and High-tech Manufacturing. Milton Keynes and Daventry are also visible.

Working definition The evidence so far suggests very limited evidence for a single knowledge-based cluster. However, in order to be able to collect data and compare on a like-for-like basis, it is necessary to identify a set of LADs which comprise our defined study area. This is based jointly on similarities in industrial structure and sectoral specialisations in KIBS, High-Tech manufacturing or Scientific R&D.

The proposed definition, shown in Figure 1-7 includes:

- The existing Greater Cambridge and northern Hertfordshire area, shown in green, specialising in scientific R&D, High-tech manufacturing and Knowledge Services. This comprises: Cambridge, South Cambs, East Cambs, Huntingdon, North Herts, East Herts and Stevenage.

- The existing Greater Oxford-Swindon area, shown in blue, specialising in scientific R&D, High-tech manufacturing and Knowledge Services. This comprises Oxford, Vale of White Horse, South Oxfordshire, West Oxfordshire, Cherwell and Swindon.

- The Milton Keynes-Bedfordshire-Luton-Aylesbury Vale region, shown in red. This area currently specialises in Knowledge Intensive Business Services with some expertise in high-tech manufacturing. It is well placed to benefit from planned infrastructure works, because of its central location at the heart of any cross-corridor infrastructure. This area comprises, Milton Keynes, Bedford, Aylesbury Vale, Luton and Central Beds.

- The Greater Northampton area, shown in yellow. Northampton has some strength in KIBs, whereas Daventry is attached to the West Midlands high-

tech manufacturing cluster. This area comprises Northampton, Daventry, Wellingborough and South Northants.

Figure 1-7 Characterising the Study Area and its four sub-areas
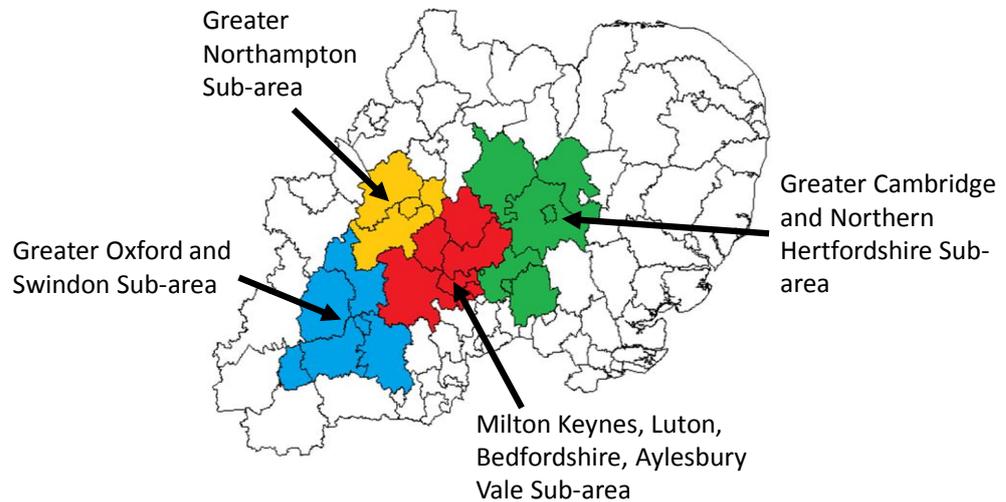
1.3   Report structure

Chapter 2 presents the economic framework that underpins the thinking of what drives economic growth, with a specific focus on those elements most relevant to the study area (namely industrial specialisation, agglomeration, growth corridors and connectivity).

Chapter 3 then applies this framework, focusing first on the four sub-areas defined around Cambridge, Oxford, Milton Keynes and Northampton; and then on the four cities' functional economic areas themselves. It reports on the strength of the knowledge-based sectors in these areas, the nature, drivers of and constraints on growth, as well as investigating the linkages between them – assessing the extent to which the area can already be deemed to be a 'growth corridor'.

A selection of case studies is presented in Chapter 4. The purpose of these is to explore in more detail elements of the growth process across the study area, both historically and currently, and to draw in perspectives from international examples.

Chapter 5 presents the forward-looking part of the study, starting with the baseline projection before moving on to the incremental and transformational investment scenarios. Population, employment and productivity are the main indicators of interest as the scenarios are compared and conclusions drawn as to implications and links with findings of the parallel studies, particularly on transport and housing.

Conclusions are presented in Chapter 6, while the references used for the study are listed in Chapter 7, with subsequent Annexes storing more detailed results and findings that could not fit into the main body of the report.

2 Economic Framework

2.1 Introduction

There are multiple different models and frameworks used and referenced in the literature of city and regional growth, and each has its own strengths and weaknesses. It is unlikely that there will ever be one definitive framework that encompasses every viewpoint and theory. This chapter discusses the main features of these theories and presents a logic framework to aid understanding, with application to the study area and its relevance for being considered as a growth corridor.

2.2 Agglomeration cycle

Much of the argument for investing in the study area is to improve connectivity, foster agglomeration, and create a functioning growth corridor that has high-productivity knowledge-based sectors at its heart.

Therefore, for the purposes of this exercise we are using a framework which is centred around the 'agglomeration cycle'. This may be understood as a series of self-reinforcing processes in which high levels of human and physical capital combine to produce growth in output, employment and knowledge based assets, that then feedback to attract human, physical and finance capital to the region for future time periods (see Figure 2-1).

Figure 2-1: Overview of the Logic Framework
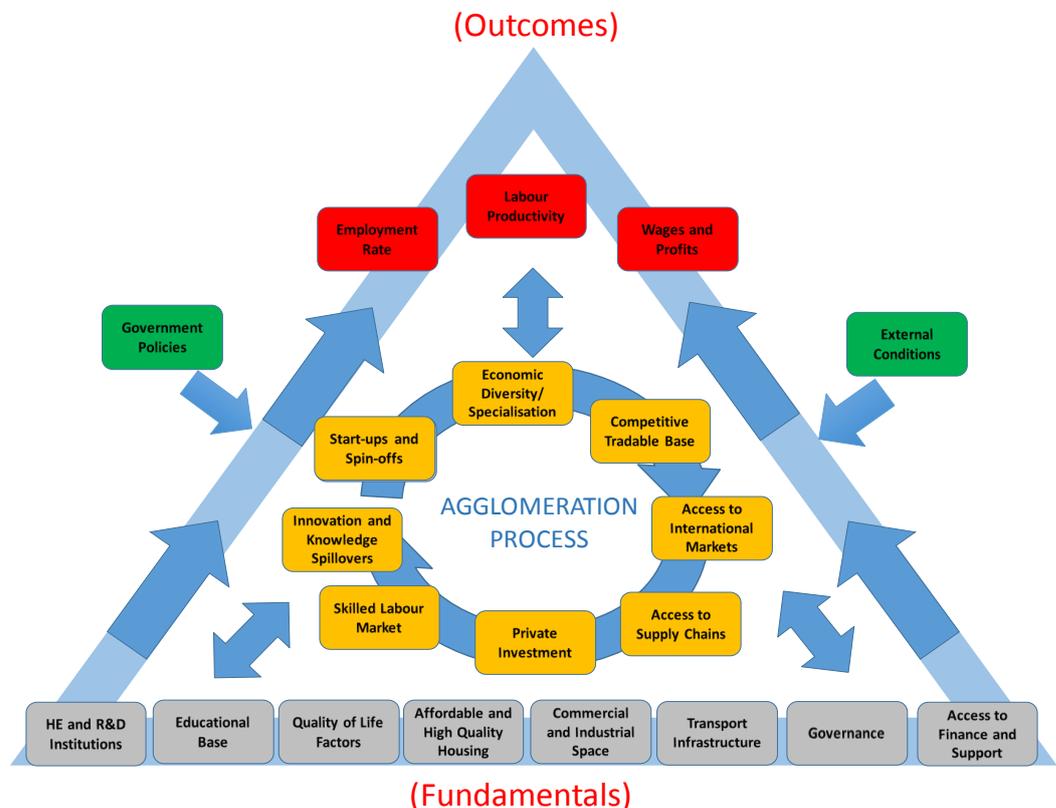
Feeding into this cycle from the bottom of the pyramid are a series of locally-specific 'fundamental' drivers and constraints which directly impact upon the dynamics of the agglomeration cycle and which shape the nature of the local economic development path (Krugman, 2006). These fundamentals are not fixed, but may themselves evolve gradually over time, in part in response to the outcomes from the agglomeration-localisation processes.

At the top of the pyramid are the outcomes, which emerge organically from the combination of fundamental drivers and constraints and the cumulative agglomeration effects.

Fundamentals   There are high levels of demand for highly skilled workers in many cities around the UK. To maintain a highly skilled labour market, the city region must be able to provide high quality of life factors to attract and retain mobile workers. Factors include quality of schools, quality of built and natural environment, and quality of recreation, entertainment, and retail facilities. As a form of attracting skilled workers, these factors are augmented by the quality and affordability of housing, and the local transport infrastructure.

The presence of institutes of high education and research & development has three complementary effects. Firstly, it attracts to the region highly skilled and educated labour pool, who, after finishing their education (in the case of higher education), may decide to stay in the area and enter the regional skilled labour market. Secondly, it is a source of innovation & knowledge spillovers through potential collaborations or engagement with local firms and businesses. Finally, it may be the source of spin-off companies directly into the business population.

The educational base of a region refers to the tendency of local school-leavers to achieve high levels of secondary and further education. These qualifications provide complementary skills to those provided by regionally retained university graduates.

Businesses also require appropriate and affordable commercial and industrial space, and sufficient levels of interregional transport infrastructure to have access to nationally and internationally distributed supply chains and final goods markets.

An important factor, particularly for start-ups and spin-offs, and other businesses looking to innovate and expand, is access to finance and support. This may come in the form of private investment (eg. venture capital institutions and business angels), or through public institutions and organisations.

A mixture of highly skilled labour, innovative, entrepreneurial firms, and visionary local or regional governance often leads to a system of positive reinforcement where specialist sectors emerge and provide a dynamic form of diversified specialisation that provides the highly competitive tradable base than drives the regional economy, and itself acts as both an engine of growth and innovation, but also as a powerful attractor for future skilled labour and private investment.

Agglomeration   Agglomeration is a term used to describe a wide-ranging set of separate but mutually reinforcing mechanisms that describe the various advantages

experienced by firms and households when they gain greater access to other economic actors. These processes operate over different spatial scales and different time horizons. Many mechanisms will themselves result in a greater spatial density of economic mass, and therefore be self-reinforcing over long time periods. Some are narrowly sector-specific, others loosely sector-specific, whilst some act on an economy wide level. Mechanisms that tend to act specifically on a sectoral level are denoted as *localisation* economies, whereas those that act on an economy-wide level are denoted as *urbanisation* economies.

Agglomeration can lead to direct increases in productivity through better access to labour markets; or generalised cost savings through economies of scale, as soon as special clustering occurs; however, there is also a *dynamic effect* where an increase the firm's capabilities to innovate and grow is caused through cross-sectoral knowledge spillovers and imitative effects (Overman, 2014).

Mechanisms of Localisation and Urbanisation

There are various mechanisms of agglomeration, but in general they fall into four categories: improved labour matching, knowledge spillovers, enhanced interfirm and supply chain relationships, and access to infrastructure (physical, soft and institutional). Details of the cycle are explained below:

Firms many be attracted to an area because of availability of skilled workers, and skilled workers many attracted to an area because of availability of skilled employment. This creates a localised virtuous cycle of employment and output growth in knowledge based and other high skill sectors, reducing skill mis-matches and encouraging beneficial labour movement to produce a more optimally efficient set of worker-job matches. When workers move between employment or between education and employment, they take with them tacit knowledge from their previous organisation. Frequent movements lead to the wide dissemination of ideas, and a form of conceptual natural selection occurs as the strongest ideas are able to proliferate across the firm population.[5]

Firms are also more likely to engage in a supply chain or collaboration with other firms they are most aware of and have easy access to. There is a strong spatial component to this factor, with firms that are located closer together, or who have good transport links, most likely to collaborate. Collaboration and supply chain engagement often results in the exchange of knowledge and ideas, and imitative effects. It is also the case that firms in the same sector and the same location may be in competition with each other, with natural selection here occurring on the firm level, rather than the conceptual level.

Workers often interact and socialise with other workers living in their immediate vicinity, even when not directly involved in the same or similar sector. In geographies with a high density of skilled workers, house shares, community groups or sports teams often feature multiple skilled workers who share industry specific knowledge in a social setting.[6] Innovation and

---

[5] For a detail analysis, see the work of Hannan and Freeman on Organisational Ecology, or Nelson and Winters'.contribution to the field of Evolutionary Economics

[6] See for example, Østergaard: "Knowledge Flows Through Social Networks in a Cluster: Comparing University and Industry Links"

knowledge spillovers can often be more rapidly generated in cities where young socially active workers live close to their place of work. Future growth requires either start-ups, spin-offs or existing firms to have strong dynamic capabilities and the ability to invent and innovate. This form of valuable tacit knowledge is extremely difficult to purchase through a market setting and often relies on the kind of knowledge sharing mechanisms listed above.

The benefits of labour pooling and knowledge spillovers may be limited to individual industries (leading to sectoral clustering), or there may be overlap between multiple industries. Many of the most powerful innovative ideas arise when firms or workers from two distinct but related sectors interact.

A similar argument to that which defined the virtuous cycle between employers and employees also applies to the spatial relationship along supply chains. Groups of suppliers reduce their generalised transaction costs by locating themselves close to their customers, and customers by locating themselves close to their suppliers, encouraging a mutually beneficial spatial configuration and a vertically extended clustering effect.

How far such self-reinforcing processes and mechanisms operate, and with what success, will depend, in part at least, on local governance arrangements. These include the presence and emergence of specific institutional forms that support and promote knowledge exchange and transfer, innovation, and enterprise. The local planning regime (which can facilitate or hinder economic expansion) and the nature of the engagement of local authorities with the local business community are also important factors. Other spatial location benefits are not sector specific but still important. The supply of office or industrial space and access to infrastructure are important across most sectors and tend to be most available and accessible in areas with high economic mass, though of course a high mass (high density of development) may restrict the availability of land for office/commercial use (in Milton Keynes for example, the copious supply of land has surely been a key factor behind its extensive development of commercial, logistic, and related activities).

Infrastructure and connectivity

While it is clear that improved transport connectivity can play an enabling role in promoting economic development and prosperity, it is not possible to quantify this exactly. The interplay between different factors (e.g. transport infrastructure, skills, agglomeration, governance, innovation, etc.) is too complex to capture and separate out within an empirical modelling framework.

Instead, the evidence base can point out where improving connectivity can affect different underlying factors in a positive way, such as the case with better transport allowing for a more efficient matching of local skills supply and demand, which would both improve employment prospects and productivity. Different types and modes of infrastructure must all be considered carefully against the specific requirements of the study area to work out the best match between transport needs and supply.

Improved connectivity can immediately and directly increase productivity by: lowering the cost (in terms of time and monetary value) of travel and transport as well as decreasing deadweight losses caused by congestion unreliability of the travel services that were present before. After the improvement, for the same price more goods and individuals can be transported than before,

therefore meaning either costs will fall (if the same number of goods are transported) or output will rise (if the money spent on transport is constant) or a mixture of the two scenarios (Rietveld, 1994).

Another way improved connectivity can have a direct effect on companies and individuals is through lowering fuel costs and leading to more efficient travel in general thus leading to lower labour and capital costs (Rietveld, 1994, ibid). Limao and Venables (2001) find that improved transport investment could lead to increases in the number of people and goods which are transported.

Improvements to connectivity therefore have an immediate impact of lower transport cost and then a residual impact of agglomeration effects. The longer-term effects of improved connectivity can be measured by looking at a firm's or individual's access to economic mass (ATEM). Companies benefit from 'increased productivity because it [greater interconnectedness] allows firms and workers to benefit from agglomeration' through 'linkages between intermediate and final goods suppliers, labour market interactions, and knowledge spillovers.' In this respect the benefits of agglomeration lead to greater productivity through other indicators such as innovation and efficiency gains as mentioned before.

Although there are difficulties in measuring it, transport connectivity has a role in promoting a higher employment rate by improving access to centres of employment, and in promoting higher productivity by improving the attractiveness of an area for investment, improving access to markets, increasing the ability for firms to collaborate thus instigation knowledge spillovers, increasing the pool of workers available to work in higher productivity urban locations, and increasing the effective scale of cities and the associated benefits of agglomeration.

Economic specialisation

Traditionally, the Marshallian argument for cities to specialise assumes that knowledge spillovers among similar firms promotes innovation (Marshall, 1890), in contrast with Jacobs' idea that specialised cities are prone to shocks in one industry and diversification creates more opportunities for complementary spillover across industries (Jacobs, 1969). However, Martin, Gardiner and Tyler (2014) refer to 'diversified specialisation' "where a city or region specialises in a few (related) sectors but is otherwise diversified", and thus potentially benefits from the positive externalities associated with both diversified and specialised economies simultaneously. A separate formulation, that of 'related variety' meaning a group of sectors sharing inputs, markets, skills or technologies, allows for economies of scope between interacting sectors as well as scale, and the possibility of innovative activity being stimulated through cross-sectoral knowledge sharing. These types of economic structure allow the local area to take advantage of both knowledge spillovers and the diffusion of innovation missing from the decision to either specialise or diversify.

.

These modern concepts offer a reasonable rationale for why cities continue to specialise in certain industries, as is the case in all major cities on the Corridor. For example, Cambridge and Oxford are highly specialised in high-tech industries such as biosciences, computer services, research and

development (R&D), and professional and business services; Milton Keynes and Northampton have a large proportion of economic activities in business services and consumer services.

Despite stemming from a common idea, it is important to distinguish the reasons for such specialisation in each city. Cambridge and Oxford both benefit greatly from the presence of universities and research facilities which support health and education sectors on both the supply and demand sides. Together with tourism, these sectors are significant sources of income not only from elsewhere in the UK but also from overseas, mainly through the large number of international students at various universities and colleges, a booming area of exports (LSE, 2013). The clusters of high-tech companies and start-ups that form part of the Golden Triangle circling Oxford, London and Cambridge also contribute to local growth by generating income from the commercialisation of research and providing a reputation boost to the cities as strategic business locations.

Milton Keynes mirrors Cambridge and Oxford only slightly in the large professional, business and technical service base and differs substantially in the detailed sector composition. The city is surrounded by equally major towns and largely characterised by migration, which makes it a popular destination for headquarters as well as non-financial business sectors. On the other hand, Northampton's growth may be partly attributable to affordable property prices and good transport and digital connectivity. These features are particularly crucial to businesses looking for office and commercial spaces in light of price hikes in London and neighbouring areas. This is likely to explain the above average business birth rates and the large proportion of small and micro businesses in these cities, according to data from ONS Business Demography. Nevertheless, consumer-driven service sectors such as retail in Milton Keynes and Northampton both benefit from their large population.

Human Capital Several studies have highlighted the role of a skilled labour force in fostering growth, which is fundamental to the Corridor with its ready access to education and training. In particular, "cities that have highly skilled residents seem to be better able to adapt to changing economic circumstances and opportunities, and to attract, nurture and develop new industries and reinvent themselves" (Glaeser, 2005; Moretti, 2013). In other words, highly-educated and skilled labour are likely to attract more of similar workers to a city by raising output and productivity, in the same way that people with creative and entrepreneurial qualities are key to successful businesses which in turn draws more capital and business ventures into the area.

Measured in terms of qualifications and educational attainment, skills may contribute less to growth in Milton Keynes and Northampton as in Cambridge and Oxford. However, Milton Keynes and Northampton have the advantage of a business environment friendly to start-ups and small businesses which could be a great potential source of growth. In this case, the impact of human capital on city growth may be more through the arrival of talented entrepreneurs and the investment that comes with them than highly educated residents already in the area.

2.3   Growth corridors

The concept of growth corridors is less of a theoretical concept, and more of a practical description of how a particular geography is seen to be performing strongly, and what are the characteristics that make it work in this way.

Bruner (2013) defines the role of economic corridors to '…connect economic agents along a defined geography. They provide connection between economic nodes or hubs, usually centred on urban landscapes, in which large amount of economic resources and actors are concentrated. They link the supply and demand sides of markets'. In relation to the role of transport, Brunner goes on to say that 'economic corridors are not mere transport connections along which people and goods move. Economic corridors are integral to the economic fabric and the economic actors surrounding it'. Transport then has a role to play in improving the functioning of an economic or growth corridor by enhancing the connections between the activity hubs and increasing the degree of interaction between the economic actors within it.

The area around greater London has long been viewed as a high growth area. Over the past couple of decades, it has also exhibited a high degree of population growth as London itself has continued to expand. This growth is something that the area shares with other areas neighbouring major metropolitan centres around the United Kingdom.

However, the growth around London is different to the extent that it is based on knowledge intensive businesses and industries. Grant Thornton LLP (2014) attempt to differentiate regional growth in the United Kingdom by quality of growth. They put forth two indices, one which measures the more traditional aspects of growth, such as employment and GVA growth, and another which is based upon economic dynamism and is intended to measure growth quality. The report defines quality growth as growth based on knowledge intensive businesses which employ highly skilled labour and continually seek to innovate and develop new products and solutions. While the area around London performs well when looking at the traditional index, Milton Keynes and Cambridge coming in at number three and ten, respectively, in terms of the highest growth areas outside of London, the quality based index tells an even more positive story. It shows that the area to the north and west of Greater London almost completely dominates the rest of the country in terms of growth quality, Cambridge being way ahead at number one in terms of the best performing areas outside London and Oxford, Milton Keynes and Northampton coming in at five, seven and eighteen respectively. Thus, it seems that this area serves as the main driver of sustainable growth in the United Kingdom. Furthermore, most of them combine both high traditional growth as well as high levels of economic dynamism.

However, the area currently operates principally as several largely-independent 'wedges', extending outwards from London on radial routes, with the transport infrastructure providing several major road and rail routes cutting across the area. It is entirely possible that the study area comprises a number of neighbouring, but largely economically independent sub-regions, that share

similar characteristics purely because of their similar geographic proximity to (and functional interconnections with) a major world city.

Figure 2-2: Transport Corridors Crossing the Cambridge-Oxford Region.
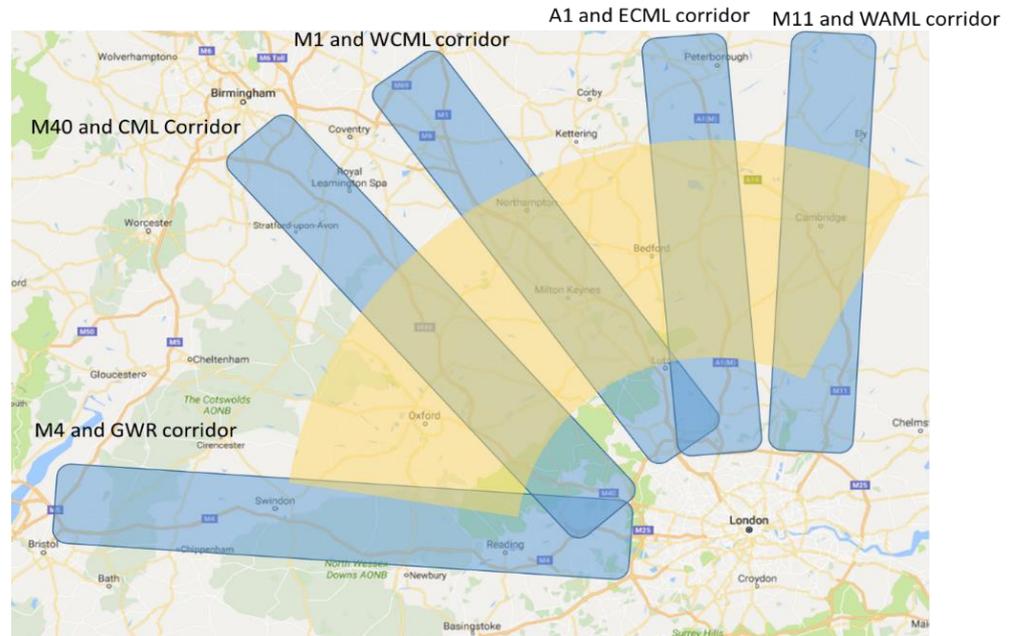
Note(s): GWR = Great Western Railway, CML = Chiltern Main Line, WCML = West Coast Main Line, ECML = East Coast Main Line, WAML = West Anglia Main Line

These growth corridors, that is high performing areas extending along major routes from major metropolitan centres, are also identified in Grant Thornton's report. As the United Kingdom's largest and most dominating metropolitan area, London was found to be the host node to a particularly large portion of these growth corridors. For a deeper look at the inner workings of these corridors it's interesting to look at the proposed London Stansted Cambridge corridor, which is defined by the London Stansted Cambridge Corridor Growth Commission (2016), including the London boroughs of Enfield, Hackney, Haringey, Redbridge and Waltham Forest as well as Cambridge City, South Cambridgeshire, Peterborough, Broxbourne, East Hertfordshire, Stevenage, Epping Forest, Harlow and Uttlesford. In its report the Commission found that this area had 16% higher productivity than the rest of the United Kingdom and had exhibited a great deal of growth in the last decades, growth between 1997 and 2014 being 20% higher than the national average and 65% higher than the national average between 2010-2014. Population growth has also been higher than the national growth, 19.1% between 2000-2014 as opposed to 9% nationally. This has further been supplemented by high employment growth in the area, the number of jobs increasing by 10.5% from 2009 to 2014 and the workforce growing by 20.2% at the same time, the national equivalents being only 4.1% and 9% respectively. Furthermore, the growth in the workforce has been disproportionately biased towards the better educated, meaning that, overall the workforce has steadily become more educated than the national average. However, this amount of growth has not come about without any

problems. Housing shortages have led to high surges in housing prices, the transport system has in many instances not been able to keep up with population growth and there has been a continuing demand for more skilled workers.

The London-Cambridge-Stansted corridor is generally typical of the corridors radiating from London. Even if they might differ slightly by numbers and overall makeup, they all have in common that they exhibit the same high economic and population growth, driven mainly by knowledge intensive sectors, while also facing various problems related to this explosive growth, for example greatly needed infrastructure improvements and the supply of skilled workers not keeping up with demand.

The interplay between the Milton Keynes, Oxford and Cambridge growth corridors

The potential of these growth corridors around London has not escaped notice throughout the years and many have had the idea to establish connections between them to better release this potential and at the same time create opportunities for economies of scale. Most notably, to the topic at hand, is the ARC initiative, which was established in 2003 by various stakeholders, both public and private, in order to explore the possibility of combining the Oxford, Milton Keynes and Cambridge corridors into one large knowledge based growth area (Miles, 2008). This initiative was then later renamed LOC Ltd in 2005 (LOC standing for London Oxford Cambridge) accompanied by a change in focus with London being included amongst the proposed connections, the so called 'Golden triangle' being at the forefront of these plans. In the end, the main achievement of this initiative was its contribution to the development of the proposed, and now confirmed, East-West rail project. This involves the reestablishment and expansion of the retired Varsity line, which ran between Cambridge and Oxford. Recently there have also been plans to expand the road network between Cambridge, Milton Keynes and Oxford, the Department for Transport already having commissioned an evaluation of the project. According to this evaluation (CH2M, Steer Davies Gleave and WSP | Parsons Brinckerhoff, 2016) all three areas enjoy very good connections with London but the transport infrastructure between them is limited and heavily congested. The report thus concludes that a new highway between Oxford and Cambridge through Milton Keynes would do much to improve connectivity between the areas as well as improving economic efficiency by increasing commuting and the dispersion of skilled labour.

Increasing the connection between these three corridors specifically, as opposed to any of the others around London, may offer some unique opportunities. With the intensive knowledge base of Cambridge on one end, Oxford on the other, and the growing Milton Keynes in the middle, these three may be able to complement each other in a way the others can't. While Cambridge and Oxford benefit greatly from being hosts to two world class universities, as well as numerous branches and headquarters of industry leading businesses, both cities are constrained by a number of factors. These constraints are especially apparent in the case of Oxford, which suffers greatly from a lack of buildable land, expansion being halted by flood risk, the designated green space around the city as well as a general lack of publicly held land upon which to launch new developments. In order to alleviate these

problems, the city has tried to redirect new developments to the rural areas around it. However, due to the transport system in and around the city being insufficient to accommodate these developments it has left the city as one of the most congested in the country (Oxfordshire Local Enterprise Partnership, 2014). Cambridge faces the same problems, although to a lesser extent, housing prices within the city having skyrocketed over the last couple of decades (London Stansted Cambridge Corridor Growth Commission, 2016). Milton Keynes on the other hand, while it may not possess any world leading universities (although it does have a vibrant economy despite this), has plenty of room for expansion. In fact, the city was the fastest growing economy in the United Kingdom from 1981 to 2013, both in terms of output and employment. This growth has to a large part been driven by the city's role in fulfilling the housing needs of its neighbours (Milton Keynes Futures 2050 Commission, 2016).

Increasing the connection between the corridors therefore might serve to benefit all the areas. The growth in Cambridge and Oxford would be higher since business and workers will be less constrained by the lack of new housing and infrastructure. Milton Keynes on the other hand could benefit both from an influx of highly skilled workers as well as businesses which might choose to relocate there to be close to both Oxford and Cambridge.

3 Policy and Growth Narratives

3.1 Introduction

This chapter seeks to outline the policy narratives and quantitative data underlying the economic growth across the study area. This is completed first for each sub-area, and then some comparisons are made. The narrative is informed by data analysis (completed by Cambridge Econometrics, mainly on the basis of its proprietary data but also drawing on data from the Business Register and Employment Survey (BRES)) and local literature reviews (particularly relating to the past and current planning context). Some of the issues raised are explored in considerably more depth through a series of case studies which are presented in Chapter 4 (which follows).

3.2 Greater Cambridge – Northern Hertfordshire Sub-area

Policy Narrative Some commentators have asserted that the Cambridge Cluster was "born" in 1960 – the year in which Cambridge Consultants, one of the highly influential technology consultancies, was formed; it was this anniversary that led to the study of the "Cambridge Cluster at 50" in 2010/11[7]. The origins of the Cambridge Cluster are, of course, much earlier: the University of Cambridge celebrated its 800th birthday in 2009, and the history of the Cambridge Cluster cannot be accurately told without reference to Cambridge Scientific Instruments and Pye, both of which were formed in the late 19th Century[8].

However, it certainly is true that until at least the 1960s, Cambridge was a small town in a predominantly rural area and it was relatively isolated; it was also not an affluent place as evidenced, for example, by the quality of the housing stock (compared to, say, Oxford). The University of Cambridge was important as a local employer, but not at that stage in terms of the wider impacts linked to its scientific (and other) research.

The subsequent growth narrative owes much to two key shifts in policy, some twenty years apart (see Chapter 4). The first – in the late 1960s – was linked to the publication of the Mott Report. This resulted in a far more positive and proactive stance from the University in respect of commercialisation and it led, most immediately, to the steps taken by Trinity College to form Cambridge Science Park in 1970. The second – in 2003 – surrounded the publication of the Cambridgeshire and Peterborough Structure Plan. For the first time, this provided a planning policy framework which allowed the urban area of Cambridge to grow physically; previous policy had essentially been to try and disperse growth across the county, leaving Cambridge itself as a small and compact university city.

Over the last two decades, Cambridge has seen substantial growth (some of which has been physically within South Cambridgeshire). Knowledge-based

---

[7] *Cambridge Cluster at 50 – The Cambridge economy: retrospect and prospect.* Report by SQW to EEDA and partners, March 2011

[8] *The Cambridge Phenomenon: The growth of high-technology industry in a university town.* Segal Quince Wicksteed, 1985

sectors have been central to the narrative. The role of the technology consultancies (Cambridge Consultants, TTP, etc.) was formatively important as, in the early decades, was the growth of inkjet printing (Domino, Xaar, etc.). Subsequently, IT-related businesses have grown quickly, if erratically; there have been some outstanding successes (most notably Autonomy and ARM) but also some disappointments (e.g. Ionica). Over the last decade, bioscience has been central to the growth narrative; this has seen the successful development of "Cambridge companies" (like Cambridge Antibody Technology, Horizon Drug Discovery and Abcam), but also some major inward investors, most notably Astra Zeneca.

Role of hard and soft Infrastructures

Throughout, both the "hard" and "soft" infrastructures have evolved to be formatively important. The Cambridge area has several science parks, innovation centres and incubators that have supported the growth of early stage science-based businesses; Cambridge Science Park and St John's Innovation Centre were established early on, but more recently, Babraham Science Park and Granta Park have also been important, and Cambridge Biomedical Campus is currently being developed. Moreover, Cambridge has a series of very active business networks. It also has a group of very influential serial investors/entrepreneurs. Cambridge has – to quote Andy Richards – become a "low risk place to do high risk things" and this tacit culture and understanding is important in terms of "how Cambridge works".

The wider sub-area

However, it would be wrong to conclude either that Cambridge is all about knowledge-based growth, or that the area we are defining as "Greater Cambridge-northern Hertfordshire" is only about the urban area of Cambridge.

In terms of the first, as the population of the Cambridge area has grown, so there has been a substantial increase in local service employment. Cambridge is a major hub for both education and health, and its effective catchment in relation to both is substantially wider than the city's geography. In addition, particularly during the 2000s, Cambridge emerged as a sub-national centre for an array of public sector functions: it was home to the regional development agency, the Government Office, and the regional arms of organisations like Homes and Communities Agency. Although this role has declined as the public sector has restructured, elements of it remain. Finally, Cambridge was – and is – a major focus for international tourism and this is a key part of the local economy. In economic terms, Cambridge is a rounded city-economy and although both crucial and distinctive, the knowledge-based cluster needs to be recognised as part of this mix.

Reflecting travel to work patterns and also the footprint of some key knowledge-based activities, the definition of "Greater Cambridge – northern Hertfordshire" includes five other local authority districts which are home to a number of market towns – Huntingdon, St Ives, St Neots, Ely, Royston, Hitchin, Bishop's Stortford. It also includes Stevenage, which is a sizeable New Town with very strong credentials in respect of both bioscience and advanced engineering/manufacturing. Collectively, the population of these towns is similar in scale to Cambridge itself, and all of them make some contribution to knowledge-based growth. Some of these settlements (e.g. Ely and Stevenage) are seeing planned growth (relative to their size), albeit with some constraints (relating mainly to infrastructure). In addition, across this

wider area, there are some major development schemes which will affect the area's economic geography. For example, Alconbury (to the north of Huntingdon) is an Enterprise Zone, and the plans for it include 8,000 jobs and 5,000 homes.

Insights from the data For analytical purposes, this area is defined as seven local authority districts: four in Cambridgeshire and three in northern Hertfordshire.

By 2014, the total resident population of this area was in the order of 900,000 people and the number of jobs was just under 500,000 (Chart A). On both headline metrics – though particularly in relation to employment – the area had seen substantial growth since the early 1980s and the pace of growth was close to double the national average.

A snapshot of the largest 10 sectors by employment in the sub-area economy in 2014 shows that whilst the economy of this sub-area largely follow national trends, with the major service sectors of Education, Heath, Retail and Business Support Services at the top of the list (Chart B), both Information Technology and Other Professional Services (largely corresponding to Scientific R&D) also feature strongly. This outcome is also reflected in Chart C, which depicts the sectors which have been largest absolute net

Figure 3-1 Average employment in all private sectors between 2011 and 2015 by medium level super output area. Complete maps, with key, can be found in Appendix B
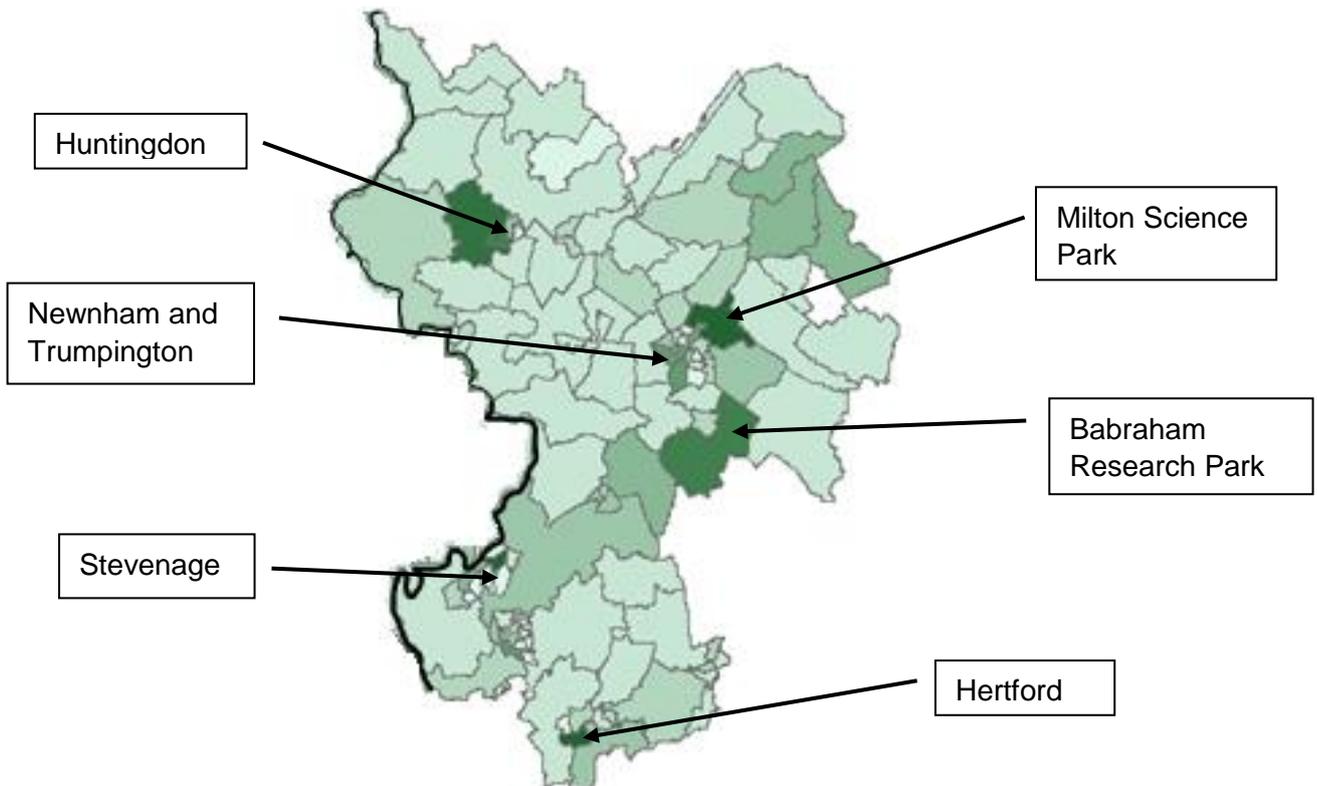
contributors to jobs growth between 1990 and 2014. Here we see that five of the top ten sectors by absolute employment growth are in knowledge intensive industries. Between 1990 and 2014, employment increased by 100,000 jobs

in the sub-area in total, one third of which were in knowledge intensive industries.

The map in figure 3.1 shows the average distribution of private sector employment within the Greater Cambridge – northern Hertfordshire sub-area in the period 2011 to 2015. Pockets of employment can be seen in west and central Cambridge, but also to the north, east and south of the city in Milton, Fulbourn and Babraham wards, and further afield in Soham and Ely to the North, Royston, Stevenage and Hertford to the South, and Huntingdon to the West.

Knowledge Intensive Sectors Against this backdrop of above average and often knowledge focused employment growth, the pattern of growth in knowledge-based sectors has been mixed. Focusing on the period from 1990-2014 and considering the area as whole:

Knowledge intensive business services saw rapid *employment growth* across Greater Cambridge-Hertfordshire in the late 1990s, consistent with the "dot com bubble". Employment then declined before stabilising through most of the 2000s – until the recession linked to the credit crunch, at which point it declined again. In the period from 2011 to 2014, employment grew, and by the end of the period it stood at about 100,000 jobs (Chart D), roughly 20% of total employment across the area. Throughout, *labour productivity* increased year-on-year, but at a modest rate.

The number of jobs in high-tech manufacturing fluctuated between about 20,000 and 25,000 between 1990 and 2014 (Chart D), and in 2014 there were still approximately the same number of workers employed in HTM as there had been 24 years previously. In employment terms, it is a much smaller sector than KIBS, but it performs more strongly on measures of productivity – both in absolute terms and in relation to the pattern of growth. By 2014, GVA per job was in the order of £120k (Chart E).

KIBS sub-sectors Overall, in 2014, Cambridge City and South Cambridgeshire had the largest number of jobs in KIBS – combined, there are 40,000 KIBS jobs in this area, compared to 15,000 in Huntingdon and East Cambridgeshire, and 28,000 in the Stevenage and NE Hertfordshire area (Chart F). All three regions show an upward trend in KIBS employment.

Looking at the sub-sectors in more detail, the largest sub-sectors in terms of employment were Other Professional Services and Information Technology, both of which have grown strongly over the past two decades, as 17,000 jobs have been created and filled in these two sub-sectors alone. Both are particularly strong in the Cambridge and South Cambridgeshire area (Chart G). In 2014, 50% of employment in IT was in Computer Consulting, with a further 25% in Software Development, whilst 80% of the employment in the Other Professional Services sector was in Scientific Research and Development. This is reflected in the figure 3.2, which shows the average KIBS employment distribution between 2011 and 2015. Here we see clusters of KIBS not just within Cambridge in Newnham (site of the University West Camspus), Trumpington (site of Addenbrookes Hospital) and East Chesterton (where the St Johns Innovation Centre is located), but also in the surrounding district of South Cambridgeshire, notably in the areas containing the Milton,

Babraham and Melbourn Science Parks, which are marked on the map. Other concentrations are visible in Huntingdon and Hertford.

Figure 3-2 Average employment in KIBS Sectors between 2011 and 2015 by medium level super output area. Complete maps, with key, can be found in Appendix B
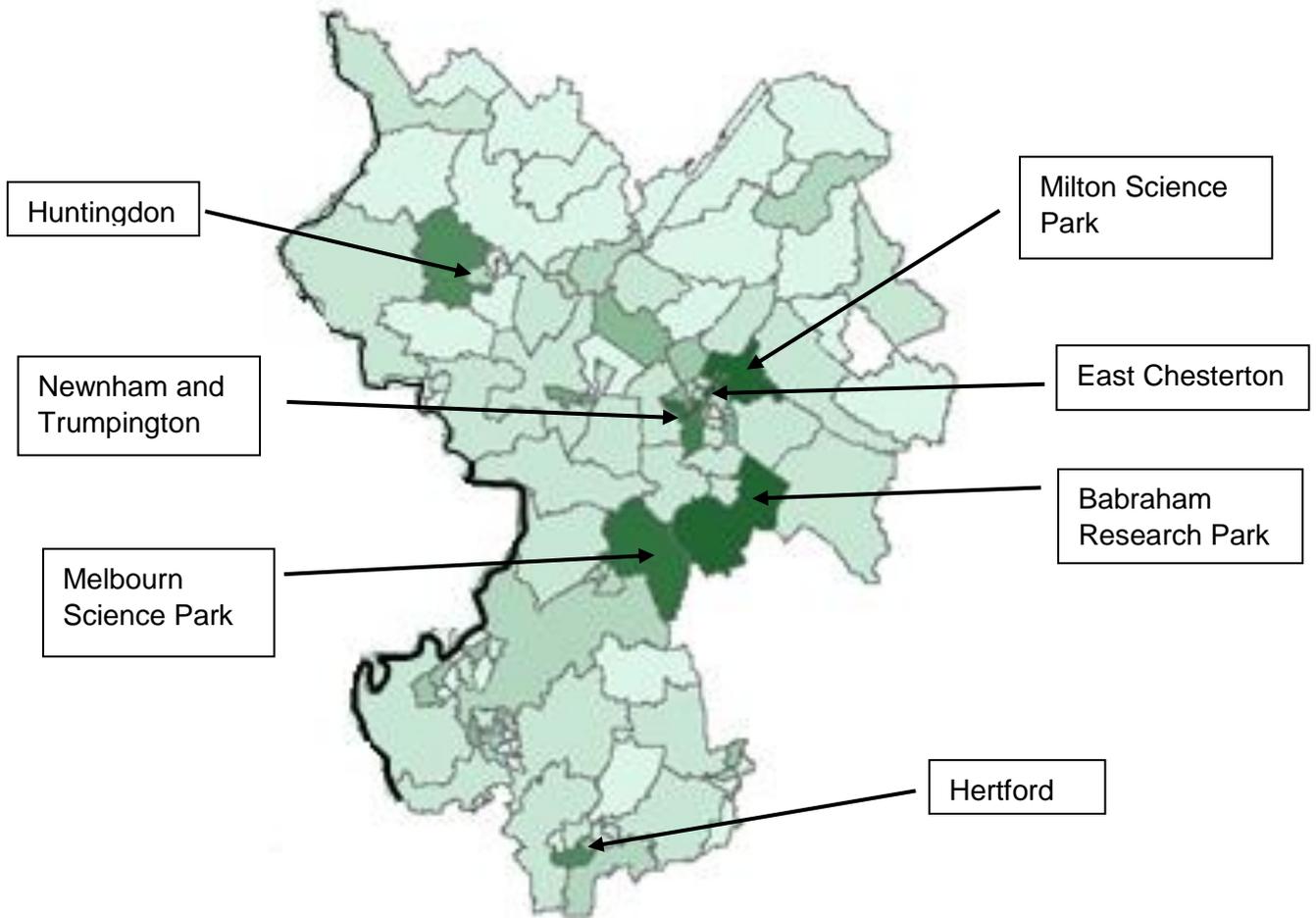
HTM Sub-sectors   Although the numbers are much smaller, jobs in high-tech manufacturing are of interest because of the high levels of productivity seen in the underlying sectors, and the potential for future productivity growth. Although employment in HTM has been largely flat across the sub-area as a whole, Chart I shows that although the levels of employment in Cambridgeshire have fluctuated over time, only Stevenage and NE Hertfordshire show a noticeable negative trend.

The largest HTM sectors by employment are Pharmaceuticals, Electronics, Machinery and Other Transport Equipment (Chart J). The employment in HTM is distributed a lot more evenly across the 7 LADs than KIBS, which tends to be focused around urban centres, although pockets of specialisation remain. Key strengths in electronics are the manufacturing of electronic instruments, component boards and computer chips; machinery is well distributed across districts and industries; the Other Transport Equipment sector is dominated by the Air and Spacecraft Sector in South Cambridgeshire and Stevenage, and

Pharmaceuticals is particularly concentrated in the Stevenage area due to the presence of GSK.

The most productive sub-sector is Pharmaceuticals, with around a GVA level of £250,000 per worker.

Figure 3.3 shows the average distribution of HTM employment between 2011 and 2015. There is only a small amount in Cambridge, this time on the eastern side of the city in East Chesterton, Cherry Hinton and Abbey. Much of HTM within the Greater Cambridge region is distributed across South Cambridgeshire and southern Huntingdonshire, most strongly concentrated in the areas surrounding the city primarily in Milton, but also in Cottenham and Waterbeach, Babraham and Bar Hill.

Figure 3-3 Average employment in HTM Sectors between 2011 and 2015 by medium level super output area. Complete maps, with key, can be found in Appendix B
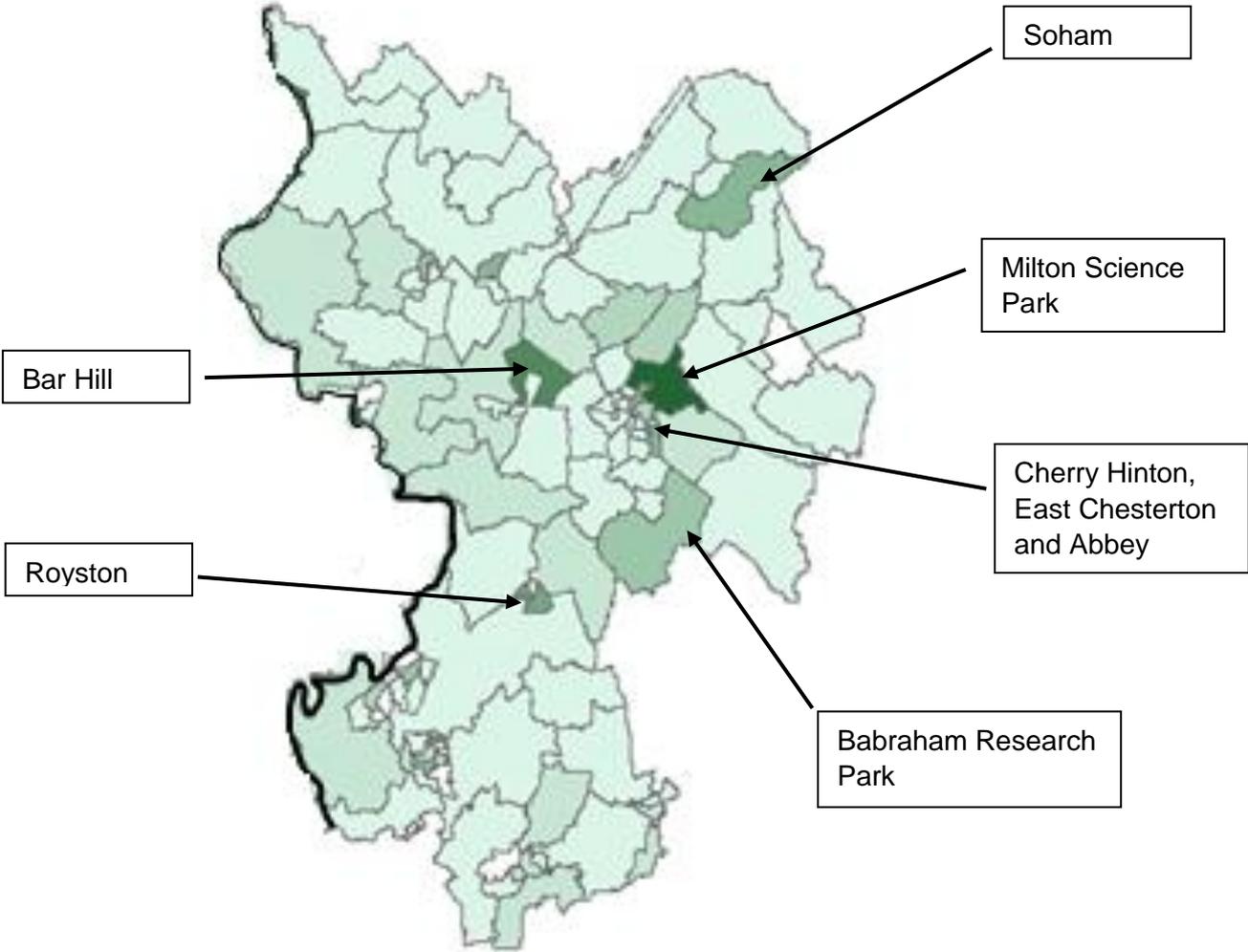
Figure 3-4 Data-based economic profile of Greater Cambridge/northern Hertfordshire

A: Population and Employment Growth, 1981-2014	B: Top 10 sectors by employment, 2014
C: Top 10 sectors by absolute employment growth, 1990 - 2014	D: Employment in Knowledge-Based Sectors
E: Productivity in Knowledge-Based Sectors	F: Employment Time Series in KIBS across the sub-area
G: Employment in KIBS sub-sectors across the sub-area	H: Productivity in KIBS sub-sectors in Greater Cambridge-northern Hertfordshire sub-area in 2014

I: Employment Time Series in HTM across the sub-area	J: Employment in HTM sub-sectors across the sub-area

| K: Productivity in HTM sub-sectors in Greater Cambridge-northern Hertfordshire sub-area in 2014 | |

3.3 The Greater Oxford-Swindon Area

The Greater Oxford-Swindon area is defined as comprising the whole of Oxfordshire (including the local authority districts of Cherwell, Oxford, South Oxfordshire, Vale of White Horse and West Oxfordshire) and the Swindon Borough Council area.

Policy narrative The policy context within which growth has occurred across this area varies considerably. The two main settlements are very different in nature and economic structure. . Oxford has the oldest university in the world (dating back at least to the 11th Century), which is now ranked no1 in the latest Times Higher Education World University Rankings[9], and one of the best new universities in the country – Oxford Brookes. In contrast, Swindon was a small settlement until it was made a repair and maintenance centre for the railways in the 1840s, and it was then transformed in scale again by its designation as an Expanded Town under the Town Development Act 1952. There are similarities, including their current size (185,000 population in Swindon, 171,000 in Oxford) and the fact that both cities accommodate large and highly successful motor manufacturing plants: BMW Mini in Oxford, and Honda in Swindon, however with limited interaction between them.

Surrounding Oxford is a ring of small market towns, including Abingdon, Didcot, Bicester, Banbury, Witney, Wallingford and Wantage, each with their distinctive local economic characteristics. However, from the perspective of knowledge based growth, the key factors in addition to the two universities are the two research and teaching hospitals in Oxford (John Radcliffe and Churchill) and the presence in southern Oxfordshire of two major government research centres, at Harwell and Culham. These two centres house some of the most important facilities for basic and applied scientific research in the country, including the UK Atomic Energy Authority Culham Centre for Fusion Energy; the Science and Technology Facilities Council (STFC) Rutherford Appleton Laboratory; Diamond Light Source, the national synchrotron facility; the Medical Research Council's facilities at Harwell, and the Satellite Applications Catapult Centre.

Despite the scale and quality of Oxford University and the national research centres at Culham and Harwell, their impact on the local knowledge based economy was relatively limited until recently. While the 'Cambridge Phenomenon' of high-tech growth became world famous from the 1980s, the growth of science and technology based clusters in Oxfordshire developed more slowly and largely unnoticed. Now, however, the scale and diversity of knowledge based employment in and around Oxford and Cambridge is similar, and the growth potential of both is very strong. In both cases, processes of commercialisation are now well established; international collaborations are significant; and the specialist local provision to support these processes is in place.

In Oxfordshire, the key knowledge based clusters are: bioscience and medical technologies; physics related activities (cryogenics, instruments and magnets);

---

[9] https://www.timeshighereducation.com/world-university-rankings/2017/world-ranking#!/

telecommunications, computer hardware and software; and engineering and electronics, including motorsport[10]. Some of these clusters extend well beyond Oxfordshire: for example, motorsport and advanced engineering into Northamptonshire and the south Midlands, and computer hardware and software into the Thames Valley. They include some long-established companies (e.g. Oxford University Press was established in 1586, Oxford Instruments was founded in 1959), some very high profile ones (e.g. Williams F1) and some relatively new companies experiencing very rapid growth (e.g. Immunocore) and developing technologies which could have global impact (e.g. Tokamak Energy, focusing on developing small commercially viable nuclear fusion devices).

Local Policy Context However, the local policy context in Oxfordshire is complex and in many respects the knowledge based economic growth has occurred despite rather than because of policies for planning and development. Oxford City has common boundaries with each of the other four local authorities, which in general have strongly opposed the outward expansion of the city – supported by the fact that it is surrounded by Green Belt and underbounded, therefore has limited scope within its own boundaries for growth. Significant progress has been made in recent years in agreeing priorities for growth and also in providing specialist facilities for knowledge based firms. These include the Begbroke and Oxford Science Parks to the north and south of the city respectively, and Milton Park and Harwell Campus in southern Oxfordshire (within the area now called 'Science Vale'). Oxfordshire also benefitted from the early provision of incubator and innovation centres[11], which have continued to grow in number and scope (including, for example, the planned bioescalator next to the University Medical Faculty and Churchill Hospital). In addition, funding for research based businesses has improved hugely with the establishment in 2015 of the £320m Oxford Sciences Innovation Fund by the University and Oxford University Innovation (formerly ISIS), which complements existing business angel networks and investment funds. However, current arguments over competing devolution proposals for Oxfordshire threaten to disrupt previously hard earned progress on local governance arrangements.

Swindon In contrast to Oxfordshire, the policy context for economic and population growth of Swindon has been consistently positive. The Expanded Town designation stimulated both housing development and inward investment by some major companies. For example, Plessey first established a factory in Swindon in 1940, but following the Expanded Town designation Plessey's presence in the town grew dramatically (eventually to over 5,000 employees in the 1970s) and it became one of the main semiconductor manufacturers in the UK. Plessey's success helped attract other major electronics companies such as Intel, Motorola, Mitel, Raychem & Tyco, such that Swindon became the fastest growing town in Europe by the 1980s[12]. More recently Swindon has

---

[10] Oxfordshire Innovation Engine, 2013, SQW on behalf of the University of Oxford, The Oxford Trust and Oxfordshire Local Enterprise Partnership

[11] Initially stimulated by the Oxford Trust, which was established by Sir Martin and Lady Audrey Wood, co-founders of Oxford Instruments, to support science education and science based business in Oxfordshire

[12] See http://www.swindonweb.com/index.asp?m=8&s=116&ss=396

continued to attract major companies – most notably Honda in 1989, which now employs 3,400 people at its engine and vehicle assembly plants in the town. However, functionally, Swindon is more closely linked with Bristol and Bath than with Oxford: although Swindon is almost equidistant between all three, it is much quicker by both train and road to get to Bristol and Bath than to Oxford.

Insights from the data

While Oxford City may have been constrained in terms of population growth during the decades, the overall Greater Oxford area was not. Between 1981 and 2014, the population increased from just under 700,000 to just under 900,000 people, twice as fast as the national average (Chart A). Employment growth was also high during the period, the total number of employed growing by over 50%, from around 340,000 to 525,000 employees. The average annual increase in employment was considerably higher than the average population growth, and the sub-area has therefore increasingly started to rely on workers from surrounding areas.

The top 10 sectors by employment (Chart B) are similar in structure to the national average; the Education, Health, and Retail and Business Support Services sectors being the largest. Two knowledge intensive sectors do appear on the list as they did in the Greater Cambridge - northern Herts area: the more numerous Other Professional Services and the slightly smaller IT Services sector.

Looking at the top 10 sectors by net additional jobs created between 1990 and 2014 (Chart C), the most noticeable fact is the emergence of the Head Offices and Management Consultancy sector, with over 10,000 jobs created between 1990 and 2014, representing an almost four-fold increase in just under 25 years.

Figure 3-5 Average employment in all private sectors between 2011 and 2015 by medium level super output area. Complete maps, with key, can be found in Appendix B
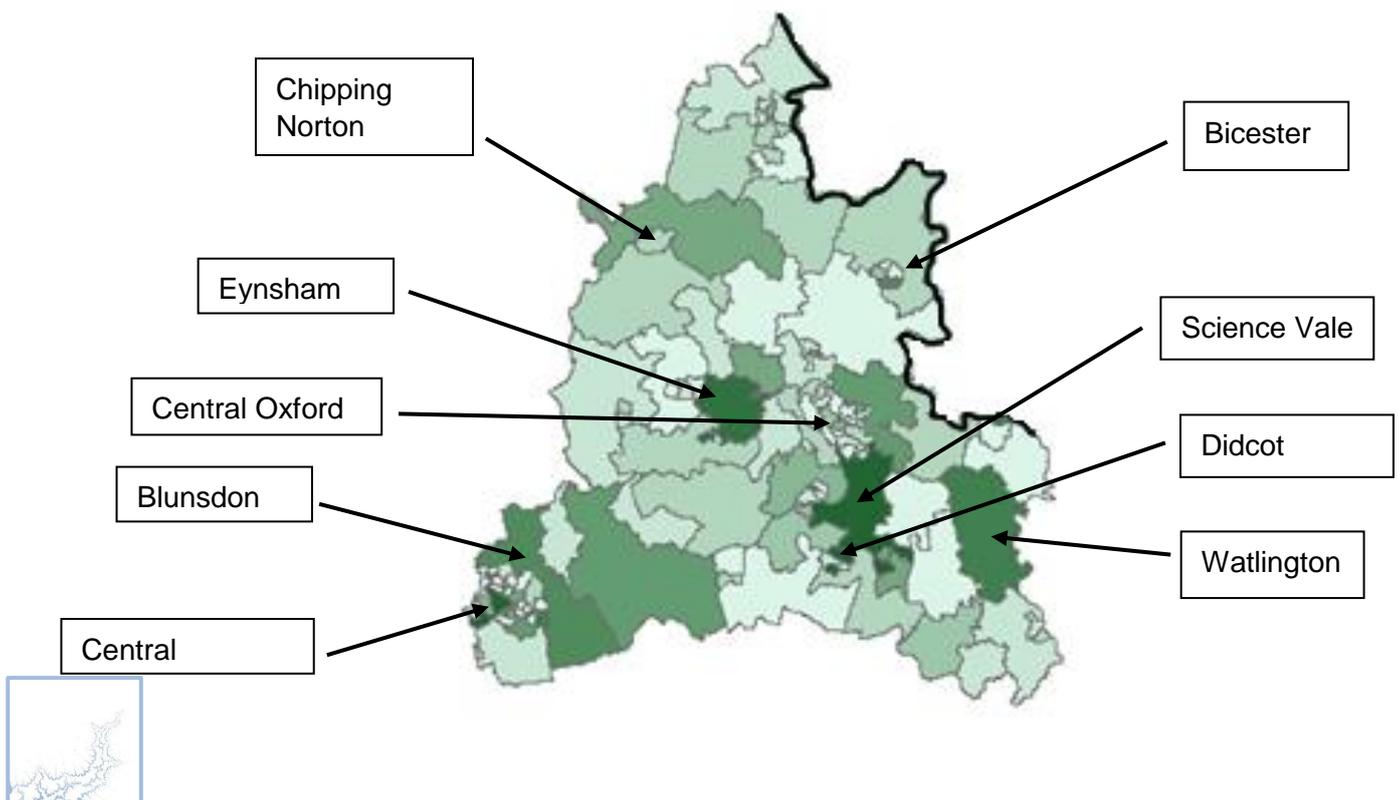
Figure 3.5 shows the average distribution if private sector employment within Greater Oxford-Swindon area between 2011 and 2015. As well as central Oxford, there are high levels of employment in the areas surrounding the city, in Eynsham to the north and west, and the Oxford and Abingdon Science Parks to the south of the city. There are also high levels of employment in Watlington and around Chipping Norton, and also in central Swindon and Blunsdon.

Knowledge Intensive Sectors Digging deeper into the specifics in terms of knowledge based sectors and their effects on the area's economy, we find that the total net change in knowledge intensive jobs was approximately 50,000 over this time-period, which represents approximately one quarter of all employment growth. Therefore, the Oxfordshire-Swindon area's jobs growth was not as directly knowledge intensive as was the case with the Cambridgeshire sub-area.

The number of people employed in the KIBS sectors rose steadily from 62,000 persons to more than 108,000. In contrast, the number employed within the HTM sectors declined marginally by around 15% during the period, going from 24,000 persons to around 20,000.

However, as with Cambridge, the real impact of the HTM sectors are seen in the productivity figures, where productivity growth in HTM manufacturing tripled over the time-period in question to hit a figure of approximately £120,000 per worker, similar to the rate seen in Cambridge, whereas the KIBS productivity rates grew slowly and steadily to reach £60,000 per worker by 2014.

KIBS sub-sectors As with Cambridge, Oxford is underbounded and for the purposes of comparison, we have included both South Oxfordshire and the Vale of White Horse when considering its economic history and current industrial profile. Compared to this are the Cherwell and West Oxfordshire area, and Swindon, which is treated separately. Over 50% of KIBS employment is within this Greater Oxford designation, with similar amounts in each of the three constituent LADs. However, the largest single district for KIBS employment is Swindon. All districts in this sub-area show a history of positive growth in KIBS.

The nature of KIBS employment seen in Oxford is of a wider variety that that of Cambridge, which specialises more strongly in Science and Technology sectors, whereas Oxford has a more business and market focused orientation.

In Oxford, the largest KIBS sectors in terms of employment were Head Offices & Management Consultancies, IT services, Financial & Insurance and Other Professional Services. As well as being amongst the largest sectors, the Head Offices & Management Consultancies sector was also by far the fastest growing sector during the last twenty years, growing by more than from 1990-2014. This was split roughly 40% head offices and 60% management consultancies. Unlike in Cambridge, where Other Professional Services was composed 80% by scientific R&D, in the Oxford area that figure is a lot lower, at only 40%, with other prominent sub-sectors being Advertising and PR agencies in South Oxfordshire.

Overall the KIBS sectors were well dispersed around the area. The most important areas were Swindon, Oxford City and the Science Vale area, which lies on the border of the Vale of White Horse and South Oxfordshire districts. However, there were some specific KIBS sectors which were especially prevalent in some of the areas. The Media sector was mostly contained within Oxford City and so was the Head Office & Management Consulting sector, although some of the latter could also be found in the Science Vale area and Swindon. The Legal and Accounting sector was mostly represented by Swindon and Oxford, and a great majority of the greater area's Finance and Insurance sector was located in Swindon. Interestingly, the IT Services sector was dispersed across the area, although the Science Vale, Oxford and Swindon were the largest centres of activity. In terms of the activities of the firms within it, the IT Services sector was also rather diverse, producing a variety of different products such as video games and web based solutions.

The map in figure 3. shows the average distribution of KIBS employment between 2011 and 2015. The employment is not concentrated in Oxford city centre, rather it is distributed around South and West Oxfordshire and the Vale of White Horse to the west, east and south of the city. Other high concentrations can be seen in central Swindon and Wallingford.

Figure 3-6 Average employment in KIBS Sectors between 2011 and 2015 by medium level super output area. Complete maps, with key, can be found in Appendix B
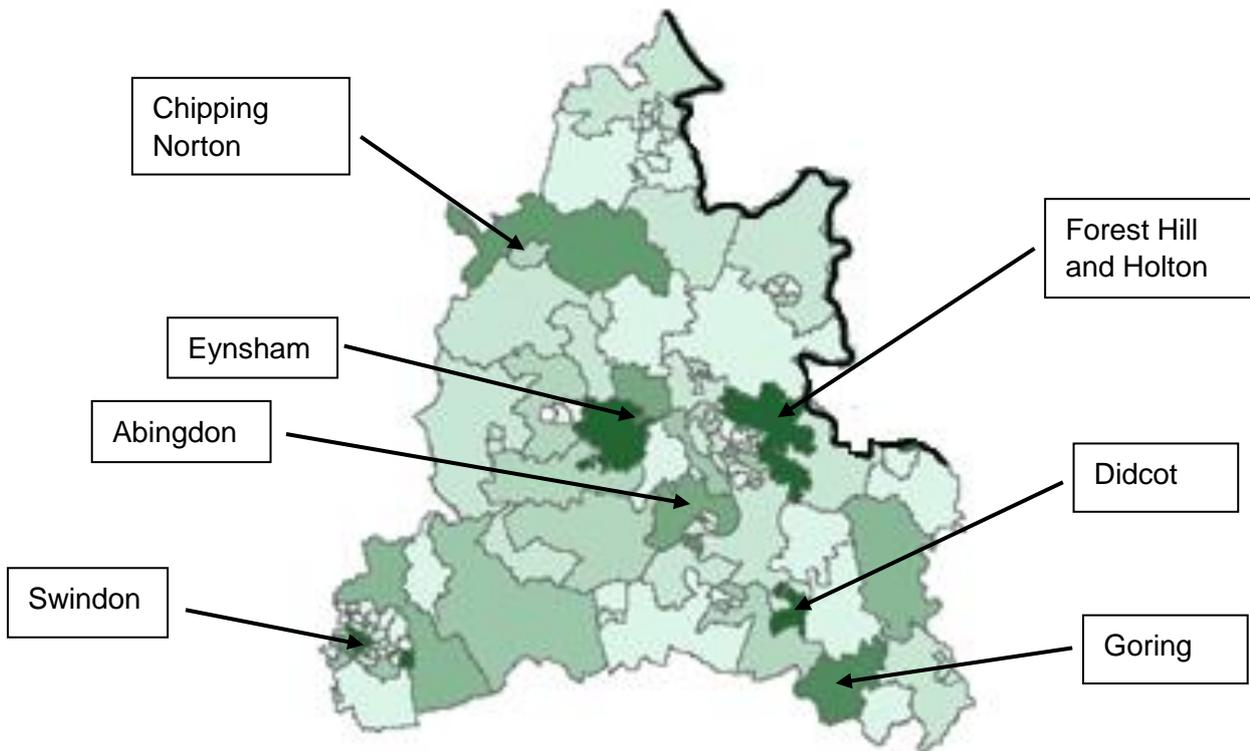
HTM Sub-sectors Whilst Greater Oxford and Swindon have shown a large amount of employment fluctuation since 1990, there is no noticeable trend, either positive or negative. However, there is a negative trend visible in the Cherwell and West Oxfordshire aggregation.

By far the largest HTM sector across the sub-area was the Motor Vehicles sector, alone having almost as many employees as most of the other sectors put together, reflecting the two large plants in Swindon (Honda) and Oxford (BMW Mini). The second and third largest sectors were Electronics, mainly based in the districts to the south of Oxford, and Machinery, centred around Swindon.

The Pharmaceuticals sector has also grown significantly in Swindon, with employment growth rates of over 5% pa. Along with Motor Vehicles, this was the standout sector in terms of productivity, with rates of over £180,000 per worker in 2014.

By itself, Swindon had almost as many HTM sector employees as all the other areas do together. This is in large part because of the Honda manufacturing plant situated there, as well as the area's numerous pharmaceutical firms. However, Oxford also has a motor vehicle manufacturing plant, Plant Oxford, owned by BMW. Furthermore, there were also a number of pharmaceutical firms in the Science Vale area. The Science Vale also had several computer part and electric instruments manufactories as well as a large biochemical sector. Looking at the other areas, West Oxfordshire had a sizable electromedical sector while Cherwell had some electronics instruments and chemical manufacturers.

The map shown in figure 3.7 is incomplete as several MSOAs have been supressed by the UK data service. However, from those areas that are visible, we see HTM concentrations in Blunsdon to the north east of Swindon, to the north-west of Oxford, in the "science vale area" between Oxford and Didcot,

Figure 3-7 Average employment in HTM Sectors between 2011 and 2015 by medium level super output area. Complete maps, with key, can be found in Appendix B
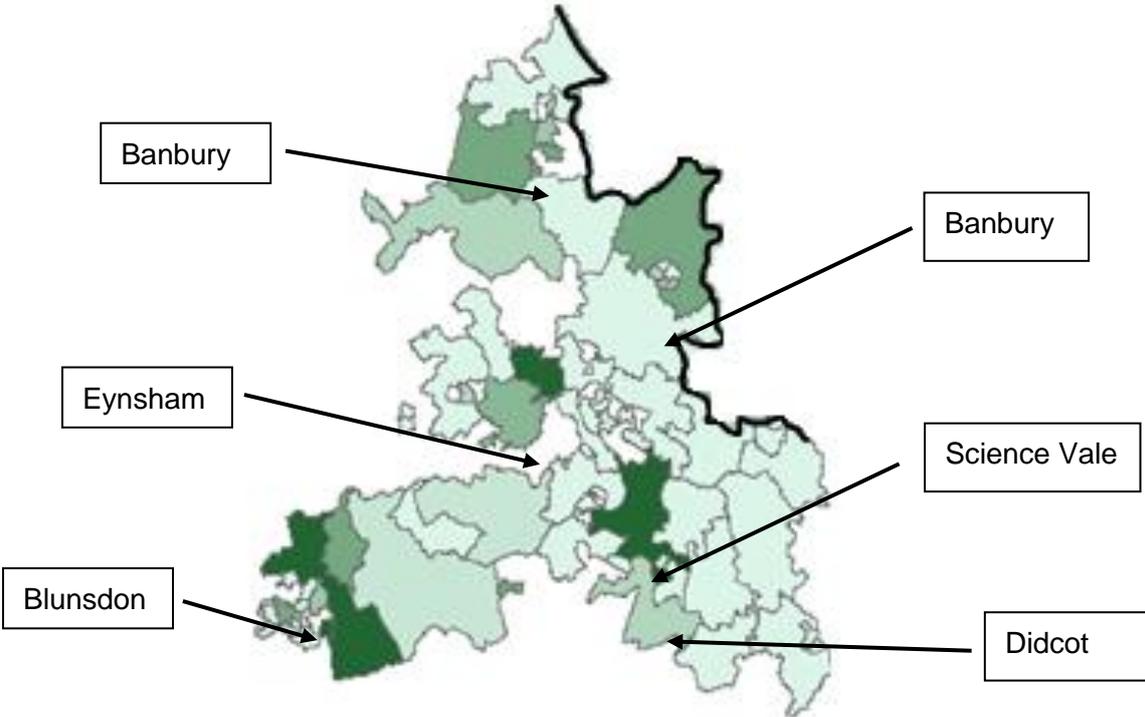
and in the areas around Bicester and Banbury, which form part of the Motorsport Cluster with areas in South Northamptonshire and north Buckinghamshire.

Figure 3-8 Data-based economic profile of Oxford-Swindon

A: Population and Employment Growth, 1981-2014	B: Top 10 sectors by employment, 2014
C: Top 10 sectors by absolute employment growth, 1990 - 2014	D: Employment in Knowledge-Based Sectors
E: Productivity in Knowledge-Based Sectors	F: Employment Time Series in KIBS across the sub-area
G: Employment in KIBS sub-sectors across the sub-area	H: Productivity in KIBS sub-sectors in Oxford-Swindon sub-area in 2014

I: Employment Time Series in HTM across the sub-area

J: Employment in HTM sub-sectors across the sub-area

K: Productivity in HTM sub-sectors in Oxford-Swindon in 2014

3.4 The Milton Keynes/Luton/Bedfordshire/Aylesbury Vale sub-area

For the purposes of this study, the "Milton Keynes/Luton/Bedfordshire/ Aylesbury Vale sub-area" is defined as the local authority/unitary areas of Milton Keynes, Bedford, Aylesbury Vale, Luton and Central Bedfordshire. Although Milton Keynes itself is central to the area's growth narrative, the growth histories of Luton, Bedford and Aylesbury are all also significant. The area as a whole – but particularly the towns – has been a focus for planned growth over many years.

Policy Narrative

Milton Keynes Milton Keynes was designated as a third wave New Town in 1967, and it benefited from the work of the Milton Keynes Development Corporation for the following 25 years (see Chapter 4). It was identified at the heart of the Milton Keynes South Midlands Growth Area in the era of regional spatial strategies. Its future plans are also ambitious. The Spatial Vision for Milton Keynes in 2026 – published within the Adopted Core Strategy – is for a city of 300,000 people. To this end, plans are set out for 28,000 additional homes and over 40,000 additional jobs in the period to 2026[13]. Early work is already underway on a new Local Plan ("Plan:MK") which will consider growth into the 2030s. Looking further ahead, Milton Keynes Council initiated the MK Futures 2050 Commission with a view to exploring what makes a great city. The Commission concluded that a formal Strategy for 2050 was required which made provision for continuing rapid growth (of c. 4,000 people per annum) and supported the delivery of six major projects (one of which was identified in relation to the Oxford-Milton Keynes-Cambridge Arc)[14].

Of all the New Towns – most of which are in the Greater South East – Milton Keynes has been the most successful, in part because of its scale. By the time of the 2011 Census, the "*usual resident population*" of the Milton Keynes Built Up Area (which approximates to the urban footprint) was about 230,000[15]; this was larger than either of the cities of Cambridge and Oxford (on a similar built up area definition).

Over the last two decades, Milton Keynes has become a major sub-national economic hub which is functionally a city. Located near to the M1 motorway and on the West Coast Main Line (with fast rail services to London Euston, Birmingham and Manchester), it is extremely well connected. This has led to significant growth in logistics. It is home to the Open University and now University Campus Milton Keynes (backed by the University of Bedfordshire and Milton Keynes Council); it is also important to recognise that Cranfield University – with a significant knowledge base and home to Cranfield University Technology Park – is nearby. Milton Keynes has attracted major financial and professional services companies; for example, PwC, Santander and Mazars all have a presence. In addition, Milton Keynes hosts the global/European/national headquarters of major companies including

---

[13] *Milton Keynes Council Core Strategy (Adopted July 2013)*

[14] "*Milton Keynes: Making a great city greater*" Milton Keynes Futures 2050 Commission, 2016

[15] Note that this includes Bletchley, Newport Pagnell and Woburn Sands

Mercedes Benz, Suzuki, Volkswagen AG and Nissan's European Research and Development HQ. In addition, Milton Keynes is home to some major high performance technology and motorsport companies, notably Red Bull Racing and Prodrive Composites.

This dynamism is captured in all sorts of economic indicators. Milton Keynes has a high business start-up rate, a high density of SMEs (per head of population) and within the SME community, a very high incidence of both high-tech and digital businesses (ranked 2nd amongst 64 UK cities) and those in professional services (ranked 10th)[16,]. In its *Cities Outlook (2015)*, Centre for Cities identifies Milton Keynes as the fastest growing city nationally on indicators relating to population, housing and jobs.

It faces some challenges. The MK Futures 2050 Commission identified three issues in particular: schools-level attainment is identified as a problem; the need for further university provision is recognised; and the risk of grid-lock on the road system is identified as a threat[17]. Nevertheless, Milton Keynes is likely to continue to be a strong focus for growth.

Luton
Luton is a sizeable settlement and – like many others – it is substantially under-bounded. The urban area has a population of over 250,000 people and is substantially bigger than that administered by the Borough Council such that Luton's current economic footprint – and much of its planned growth – is seen in neighbouring areas, particularly Central Bedfordshire (and, to a lesser extent, North Hertfordshire). In economic terms, Luton has had two particularly distinctive roles: one linked to its airport (and Luton is home to a number of airlines (e.g. Monarch Airlines and Easyjet)) and a second linked to automotive manufacturing. In terms of the latter, Vauxhall (owned by General Motors) has long had a substantial bearing on the town's economy. At its peak it accounted for 30,000 jobs. Today the scale of the operation is very much smaller. Nevertheless, its legacy in terms of the local skills base remains.

Luton has been a focus for regeneration and growth for many years. Within the (now revoked) Milton Keynes and South Midlands Sub-Regional Strategy[18], the plan (from 2001-21) was for 26,300 additional homes and 12,600 jobs across Luton/Dunstable/Houghton Regis. Currently the local planning framework is complicated. Both Central Bedfordshire and North Hertfordshire are developing new Local Plans to replace existing (very elderly) Local Plans. Following approval by full council, Luton's Local Plan (2011-31) was submitted to the Secretary of State for Communities and Local Government in 2016. However, the clear intent continues to be one of growth across the urban area as whole.

Bedford
Bedford has a population of about 80,000 people. Its economy is quite diverse and, in some respects, similar to that of Northampton. It has some knowledge-based activity. The borough is home to Unilever's R&D activity

---

[16] Centre for Cities (2015), *Small Business Outlook*

[17] "*Milton Keynes: Making a great city greater*" Milton Keynes Futures 2050 Commission, 2016 – page 23

[18] *Milton Keynes and South Midlands Sub-Regional Strategy,* published in 2005 by the Government Offices for the East of England, East Midlands and South East. Page 12

and Colworth Science Park has developed as a focus for innovation. Equally though, there is significant logistics activity within the area and the distribution centres for Argos and Asda are identified in the borough's Economic Development Strategy as two of the five largest five private sector employers. Within this context, the Borough Council identifies workforce skills and the low wage economy as particular challenges[19].

In relation to growth, the existing Core Strategy was adopted in 2008. Following the then-extant Milton Keynes and South Midlands Sub-Regional Strategy, it commits to 16,270 new houses in that part of the Growth Area (defined around Bedford, Kempston and northern Marston Vale) which is in Bedford Borough; and in addition, provision is made for 16,000 jobs. A new Local Plan – looking out to 2035 – is under development.

Aylesbury   Aylesbury – in Buckinghamshire – has a population of about 75,000 people. It is an historic centre and its early industries included printing and publishing, and food processing. Today, Aylesbury is dominated by local service activities – although a mapping study across Buckinghamshire identified a number of both fabricated metal product manufacturers and medical, precision and optical instruments firms within the town[20].

Work is underway currently on the preparation of a Vale of Aylesbury Local Plan and a consultation draft was published earlier in 2016. This makes provision for over 30,000 houses in the period to 2033 (reflecting the district's own housing needs and also unmet need from adjacent areas). Aylesbury is identified as the principal focus for growth, with substantial growth also identified for sites adjacent to Milton Keynes, for a new settlement (at a location that is yet to be identified) and – on a smaller scale – for other existing settlements in the district.

Insights from the data   The sub-area's population grew from under 800,000 to approximately 1.1m in 2014, with employment increasing to 550,000, making it comfortably the largest sub-region within the study-area by both population and employment. (Chart A)

The economic profile of the area mirrors that of the nation as a whole, with high levels of employment in Business Support Services, Education, Retail, Health and Construction making up the 5 largest sectors by employment. Also prominent is Wholesale Trade, potentially reflecting the area's strong connectivity and transport links.

When considering which sectors have been the major contributors to employment growth over the past 24 years, Business Support Services, Education, and Health have seen the most net additional jobs, but three knowledge intensive sectors: Head Offices and Management Consultancies, IT Services and Other Professional Services, have all seen significant job growth over this period. Whilst these are three sectors that have grown strongly across the UK, Milton Keynes has been particularly successful in

---

[19] Economic Development: Shaping Bedford Borough's Economy – Strategy 2011-2014. Bedford Borough Council

[20] *Buckinghamshire High Performance Engineering Industry Report, 2010,* Prepared by Buckinghamshire Economic and Learning Partnership – see Map 1-2

capturing a significant proportion of this growth, tripling its employment levels in IT Services and Other Professional Services, and increasing its level of employment in the Head Offices and Management Consultancy sector from 1,300 to just under 9,000 people.

Figure 3.9 shows the average distribution of private sector employment around the sub-area between 2011 and 2015. The major employment centres of the area are seen in Milton Keynes and Bletchley, Bedford, Aylesbury, Haddenham, Dunstable and Luton.

Figure 3-9 Average employment in all private sectors between 2011 and 2015 by medium level super output area. Complete maps, with key, can be found in Appendix B
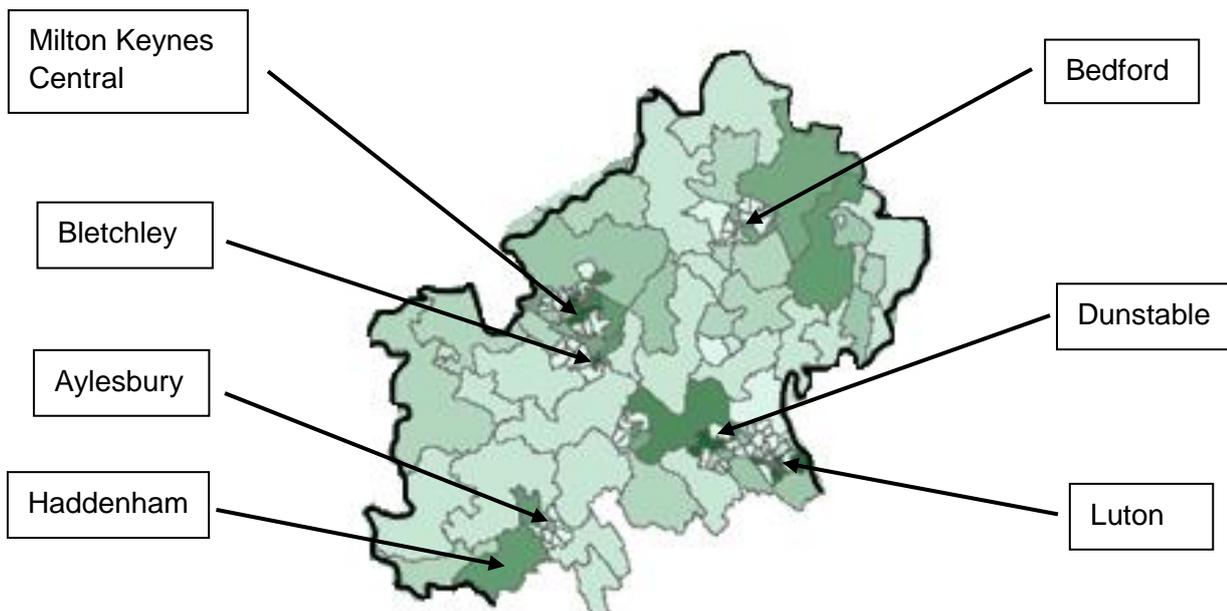
Knowledge Intensive Sectors Against a total employment growth figure of almost 200,000 additional net jobs by 2014, the growth in KIBS of approximately 40,000 additional jobs, some 20% of the total employment in the region is unremarkable. Furthermore, over this same time-period employment in HTM has fallen by almost 20,000 jobs, meaning that only 1 in 10 additional jobs generated over this time-frame was in a knowledge intensive industry. (Chart D)

The rise in KIBS employment has also been matched by a rise in productivity, to just over £60,000 per worker, however this has been outstripped by the growth in HTM, which is currently just below £100,000 per worker. (Chart E)

KIBS sub-sectors The growth rates of the two main cities within the sub-area have followed distinctly different paths; whereas the City of Milton Keynes has seen significant and persistent growth in these sectors, approaching 40,000 employees by 2014, Luton has remained stationary at around 10,000 employees over the time-period. The remainder of the sub-area, namely Bedford, Central Bedfordshire and Aylesbury Vale, have seen modest, positive growth. (Chart F)

The growth in KIBS in Milton Keynes has been largely in the IT sector, particularly Computer Consulting and Software Development; Finance and Insurance, particularly Banking; and Head Offices and Management Consultancies sectors, with almost two thirds of this in Head Offices.

The remainder of the study area has a relatively diverse range of KIBS sectors, with no significant element of specialisation apparent from the data.

Figure 3-10 Average employment in KIBS sectors between 2011 and 2015 by medium level super output area. Complete maps, with key, can be found in Appendix B
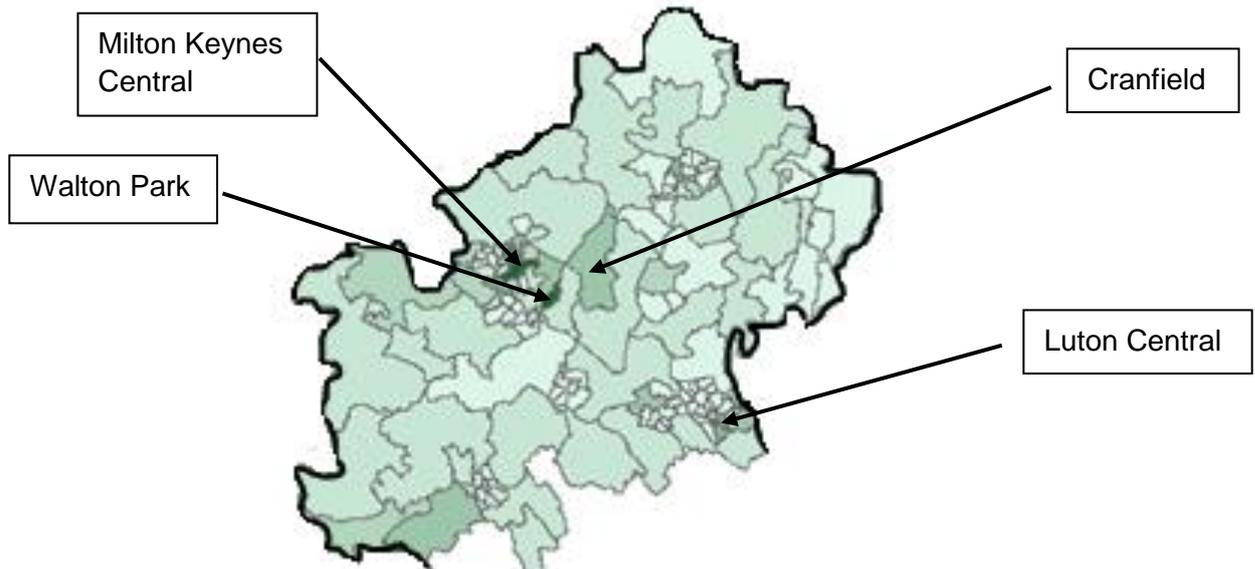
The map in figure 3.10 shows strong KIBS concentrations within Milton Keynes, in the Central Business District and the Walton Park ward to the south of the city, and to a lesser extent to the east of the city in Cranfield. There are also smaller patches of KIBS employment n the rest of the sub-area, in Bedford, Aylesbury, Haddenham, Luton and Dunstable, but nothing that compares in scale to the KIBS sectors in Milton Keynes.

HTM Sub-sectors Hi-Tech Manufacturing employment has a noticeably different distribution across the sub-area. Whereas Milton Keynes was the centre of employment for KIBS, for historical reasons it has had very little manufacturing industry whatsoever and currently only has 3,000 jobs in HTM. Employment in HTM in Luton has also fallen, and currently sits at around 6,000, with the remainder of the study area holding 7,500 jobs. All three time-series show a prominent downward trend.

HTM Employment across the entire sub-area is based largely around Electronics and Machinery, although Luton also has high levels of employment in Air and Spacecraft and Motor Vehicles, and a smaller Other Transport Equipment employment base in Central Bedfordshire, partly due to the Lockheed Martin site at Ampthill, and in Aylesbury Vale, where Moog Westcott are based.

Figure 3.11 shows the average HTM employment distribution between 2011 and 2015. HTM employment is less strongly concentrated within the Milton

Keynes LAD than KIBS. There are HTM sites at Queens Park and South Kempston in Bedford, in Sundon Park and central Luton, and in Newport Pagnell and Central and SW Milton Keynes. Central Bedfordshire also has several HTM sites, in Biggleswade, Ampthill, Leighton Buzzard and Dunstable. We also see the edge of the South Northamptonshire Motorsport Cluster in North Buckinghamshire.

Figure 3-11 Average employment in HTM Sectors between 2011 and 2015 by medium level super output area. Complete maps, with key, can be found in Appendix B
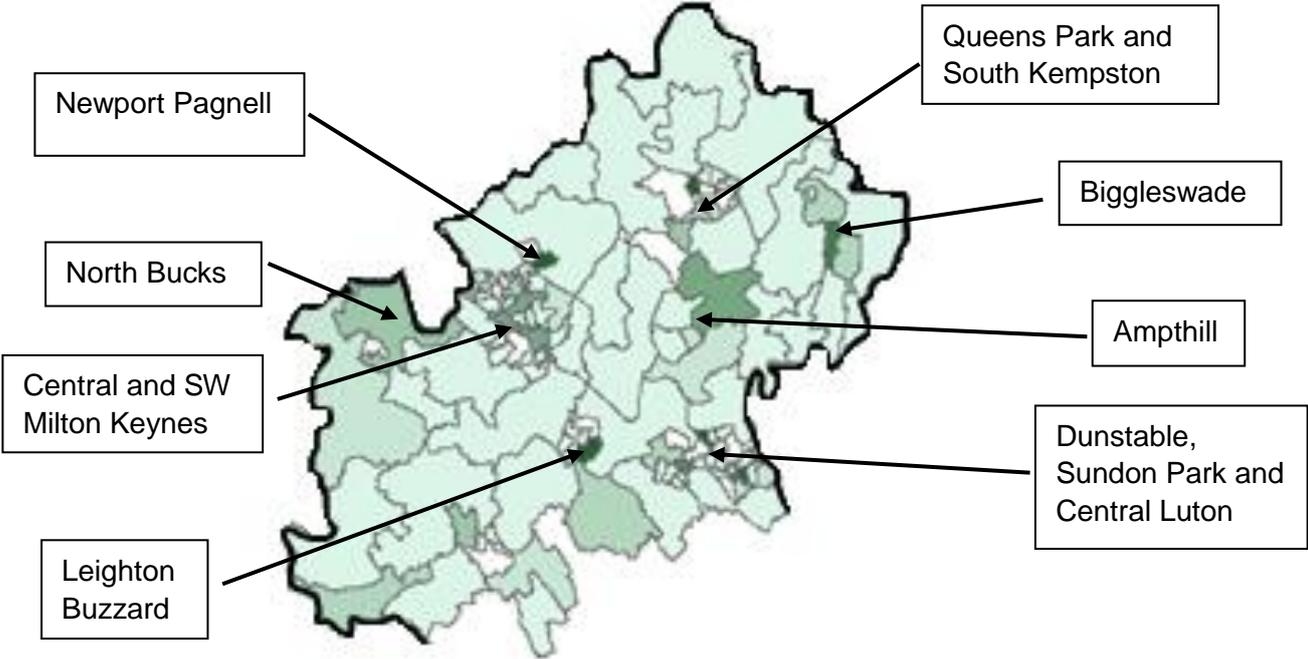
Figure 3-12 Data-based economic profile of Milton Keynes-Bedfordshire-Aylesbury Vale

A: Population and Employment Growth, 1981-2014	B: Top 10 sectors by employment, 2014

C: Top 10 sectors by absolute employment growth, 1990 - 2014	D: Employment in Knowledge-Based Sectors

E: Productivity in Knowledge-Based Sectors	F: Employment Time Series in KIBS across the sub-area

G: Employment in KIBS sub-sectors across the sub-area	H: Productivity in KIBS sub-sectors in Milton Keynes-Bedfordshire-Aylesbury Vale sub-area in 2014

I: Employment Time Series in HTM across the sub-area	J: Employment in HTM sub-sectors across the sub-area

| K: Productivity in HTM sub-sectors in Milton Keynes-Bedfordshire-Aylesbury Vale sub-area in 2014 | |

3.5 The Greater Northampton Area

For analytical purposes, this area is defined in relation to four local authority districts: Northampton, and the three, predominantly rural, districts which surround it (Wellingborough, South Northamptonshire and Daventry). Three of the four districts (excluding Wellingborough) comprise "West Northamptonshire" which is significant insofar as they have developed and adopted (in December 2014) a Joint Core Strategy (which in turn is guiding more detailed Local Plans). Wellingborough is part of the North Northamptonshire planning process.

Policy Narrative

Northampton   Northampton is a historic county town, and it has long fulfilled many of the associated local service functions. However, Northampton has also consistently been a focus for planned growth. It was designated as a New Town in 1965 and planned expansion was carried out between 1968 and 1985 by Northampton Development Corporation. Following the government's *Sustainable Communities Plan* (published in 2003), Northampton was identified as a substantial hub within the Milton Keynes South Midlands (MKSM) Growth Area. As an "alteration" to the regional spatial strategies for the East of England, South East and East Midlands, the Milton Keynes and South Midlands Sub-Regional Strategy was published in 2005. This asserted that Northampton would "*continue to grow in stature as an important regional centre with a key emphasis on renaissance of the town centre and major enhancement of the public transport network*"[21]. It included provision for 30,000 additional homes in the urban area of Northampton over the period 2001-2021, and 37,200 additional jobs (across three local authority districts that form West Northamptonshire). In practice, between 2001 and 2011, about 10,800 dwellings were constructed in the Northampton Related Development Area. The regional spatial strategies were revoked following the change of government in 2010. However, the commitment to growth was retained locally. The Joint Core Strategy for West Northamptonshire (adopted in 2014) set out plans to deliver 42,620 net additional dwellings in the period 2011-2029 (of which 28,470 are in the Northampton Related Development Area and just under 19,000 are in the Borough of Northampton) and 28,500 jobs (2008-2029), with "*the majority to be concentrated within the principal urban area of Northampton*".

In the 1960s, the population of Northampton was about 100,000. By the time of the 2011 Census, the "*usual resident population*" of Northampton – on a Built Up Area definition – was around 215,000. It was therefore notably bigger than either Cambridge or Oxford (on the same definition) and similar in scale to Milton Keynes. The implication of current planning policy is that Northampton will grow significantly in the years ahead.

Northampton's economic character and assets are, however, really quite distinctive. Historically, Northampton had a distinctive and well-known leather and footwear cluster. It subsequently evolved as a major hub for engineering.

---

[21] *Milton Keynes and South Midlands Sub-Regional Strategy,* published in 2005 by the Government Offices for the East of England, East Midlands and South East. Page 12

Major players currently include Cosworth and MAHLE Powertrain, both of which are located in the area which is now Northampton Waterside Enterprise Zone. However, overall, engineering employment in Northampton has declined over time, and distribution and finance now account for a greater share of the local economy. Major firms operating in Northampton include Dalepak, Carlsberg, St Andrew's Healthcare and Belmont Press. Further and higher education in or near the town includes that provided by the University of Northampton, Northampton College, and Moulton College.

Northampton however has a series of regeneration challenges, not least linked to the town centre. Moreover, Centre for Cities' *Cities Outlook* (2015) identified Northampton as a weak city economy in terms of patents and it presented Northampton alongside Burnley and Wigan in terms of declining wage levels. But Northampton is growing quickly in population terms. In addition, it was identified by Centre for Cities as the third best performing city nationally (behind London and Milton Keynes) in terms of rates of new business starts – so it fares well in terms of enterprise. Compared to the other main centres within the CaMKOx-N area, its overall growth narrative is therefore much more mixed and Northampton has many of the attributes of a "Midlands town". Certainly, historically, it had a strong manufacturing/ engineering focus. This legacy continues to be important and, used appropriately, it ought to be a real asset to both Northamptonshire and the wider study area.

Wider Area Outside of Northampton itself, there are a number of other notable settlements within the area that is being defined for the purposes of this study as "Greater Northampton".

The town of Wellingborough – to the east – has a population of about 50,000. It grew in the 1970s as a London overspill town; it featured as a growth location within the (now revoked) Milton Keynes and South Midlands Sub-Regional Strategy; and looking ahead, significant further growth is planned. In broad terms, the plan for growth is set out in the North Northamptonshire Joint Core Strategy (adopted in July 2016), and the local authority is in the process of developing the more detailed Plan for the Borough of Wellingborough. However, over the last decade, the rate of achieved growth has been slower than that which was planned and Wellingborough (both town and borough) has seen economic restructuring. Historically the area had a strong manufacturing and engineering presence – much like Northampton – but employment in these sectors has fallen.

Daventry – to the north west of Northampton – has a population of around 25,000 people. It grew in the 1960s and 1970s as an overspill town for Birmingham. It continues to have links to the Midlands, and it has strong engineering-related specialisms. Reflecting both its location and connectivity, it has seen significant growth related to logistics. Nearby, Daventry International Rail Freight Terminal (DIRFT) – located six miles to the north of the town – is of national importance. This first became operational in the 1990s and it has gone through various phases of expansion with more in the pipeline.

Elsewhere, there is a series of smaller settlements – including Towcester and Brackley to the south of Northampton and Brixworth to the north. Relative to their size, these are seeing significant housing, population and jobs growth. These towns are small, but they are home to some businesses within the high performance technology and motorsport cluster which are well known and genuinely world class (see the case study in Chapter 4). In this context, it is important also to note the significance of Silverstone. It is located on the border between Northamptonshire and Buckinghamshire (and in terms of the four areas used in this study, on the border between Greater Northampton and Milton Keynes). The British Grand Prix takes place at Silverstone Circuit – which means that it is a major destination for tourists. But in addition, major development is planned at Silverstone Park, including provision for 8,000 jobs. Silverstone Park is already a major focus for the high performance technology and motorsport cluster (with over 70 organisations on the Park), and this role is likely to increase substantially over the next period. It was included within the new Aylesbury Vale Enterprise Zone in 2015.

Insights from the data

Chart A shows growth in employment in relation to population growth in the area over 1981-2014. Compared to 1981, the resident population has grown from 350,000 to 460,000 people, more than doubling the national rate of growth. This is partly attributable to Northampton's new town designation and the work of the Northampton Development Corporation in the previous decade that succeeded in attracting economic migrants to the town and surrounding areas. Growth in employment over the whole period was strong, at 1.5% pa and generally in line with population growth.

The ten largest employment sectors in Northampton are shown in Chart B, showing the same nationally dominant sectors such as Education, Health, Retail trade and Construction that were seen in the other key cities in the study area. The prominent position of Business Support Services reflects the supply chain effect of a growing business environment in the area, the sizes of Wholesale trade and Warehousing & Postal also illustrate its strength in distribution thanks to its easy access to the M1 and other major motorways. There are no knowledge intensive sectors in the top 10.

When looking at recent growth, Business Support Services retains its prominent position, with over half of its total 27,000 jobs having been generated in the past 24 years, suggesting Northampton's growing function as a provider of back-end support services for other sectors within the region. As with Oxford and Milton Keynes, the Head Offices and Management Consultancies sector has also seen strong growth in Northampton. In total, there are three knowledge intensive industries amongst the top 10. (Chart C)

Figure 3.13 shows average private sector employment distribution within Greater Northampton. We see areas of employment in central Northampton and a variety of city fringe sites, and also in the area around Silverstone Racecourse and in the Wardoun ward to the west of South Northamptonshire.

Figure 3-13 Average employment in HTM Sectors between 2011 and 2015 by medium level super output area. Complete maps, with key, can be found in Appendix B
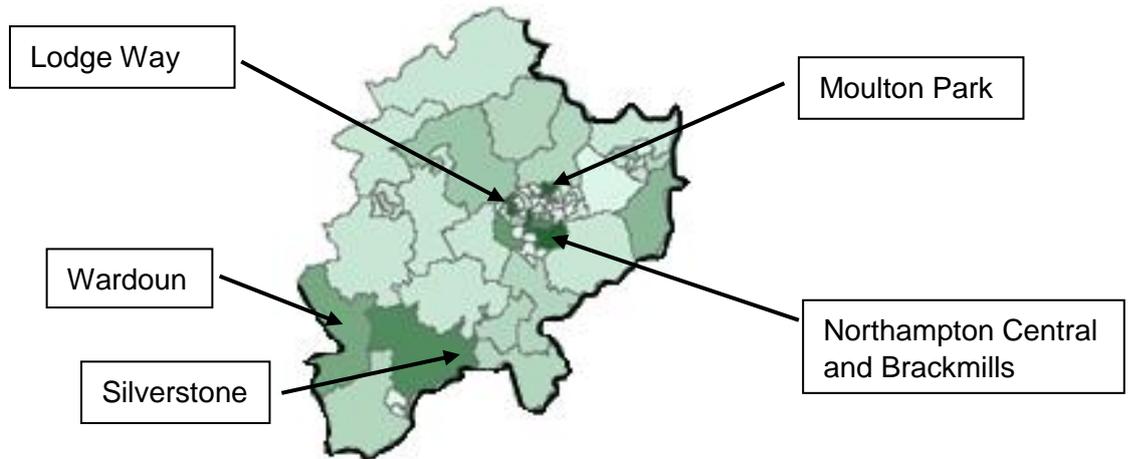
Knowledge Intensive Sectors This story is reiterated in Chart D, which shows the rate of growth of KIBS and HTM across the sub-area. We find that the number of KIBS jobs has risen from 25,000 to just over 40,000, whilst the number of HTM jobs has fallen from 15,000 to 9,000. In an area that has experienced overall employment growth of 100,000 additional jobs between 1990 and 2014, less than 10% of those additional jobs have been created in knowledge intensive sectors.

Whilst employment in KIBS has increased, its productivity has remained largely flat, growing 10% overall since 1990 to just over £40,000 per worker as of 2014. In line with wider national trends, HTM productivity has grown more significantly, albeit from a low base of under £30,000 per worker, to a figure of £90,000 in 2014.

KIBS sub-sectors 60% of KIBS employment within the region is contained within the city of Northampton itself, and almost half of this within a single sector, Finance and Insurance, with employment centred around banks and building societies in Northampton. Other prominent KIBS sectors, including IT, Legal and Accounting and Head Offices and Management Consulting, are spread more evenly between Northampton and its surrounding districts.

Other professional services and Financial & insurance services are the most productive KIBS sub-sectors. (Chart H) However, it is IT services that have seen productivity grow the fastest, averaging 4.9% pa over 1981-2014. This strong growth is likely to have been driven by increased Computer Consultancy activities in Northampton and South Northamptonshire and Software development in Northampton, where most of the employment is located.

Figure 3.14 shows KIBS employment concentrated in Brackmills and Moulton business parks to the north and south of Northampton city centre. We also see some KIBS employment in Chase and Yardley area to the SE of the city, and in the Wardoun area on the border with Oxfordshire.

Figure 3-14 Average employment in KIBS Sectors between 2011 and 2015 by medium level super output area. Complete maps, with key, can be found in Appendix B
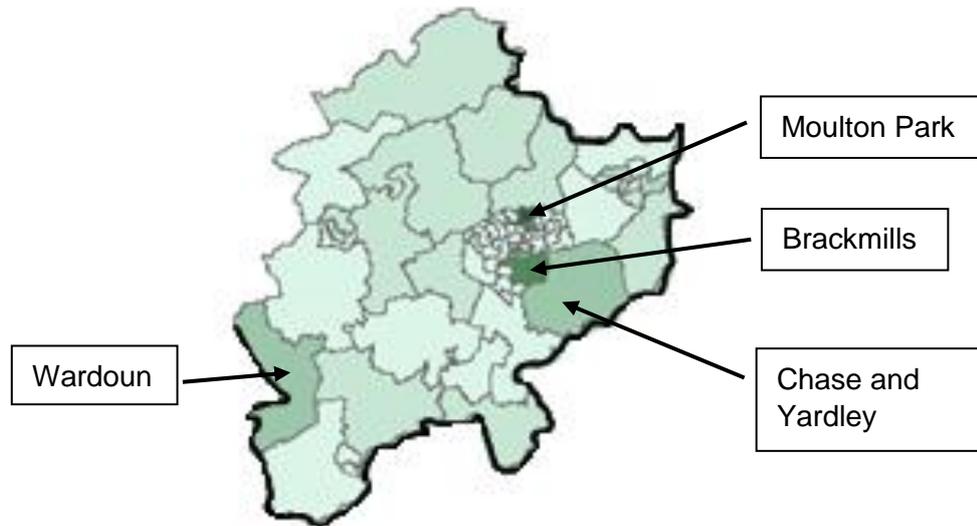
HTM sub-sectors HTM Employment in Greater Northampton Region is dominated by the Chemicals, Machinery and Motor vehicles sectors, with very little Pharmaceuticals employment at all.

Unlike the distribution of KIBS employment, there is a strong specialisation of one or two HTM sub-sectors in particular districts within the region. The majority of the jobs in Machinery are in Engines and Turbines Manufacturing in Daventry where a plant of the diesel engine manufacturer Cummins is based, as well as a Mercedes plant in Brixworth. Similarly, there is a large proportion of Motor Vehicles employees Daventry and Northampton. Chemicals employment is distributed between Northampton and Wellingborough.

HTM employment in the city of Northampton has fallen significantly over the past 24 years, from approximately 10,000 employees to under 3,000. Employment outside of the city has remained roughly flat, and is currently at around 6,000 workers.

The regional success story in terms of productivity has been the Motor Vehicles industry, which has seen growth in both employment and productivity, and currently stands at around £160,000 per worker.

Figure 3.15 shows the distribution of HTM jobs around Greater Northampton. We see concentrations on the industrial estates to the north and south of the city centre, in Brixworth in Daventry, and in Wardoun and Silverstone in South Northamptonshire.

Figure 3-15 Average employment in HTM Sectors between 2011 and 2015 by medium level super output area. Complete maps, with key, can be found in Appendix B
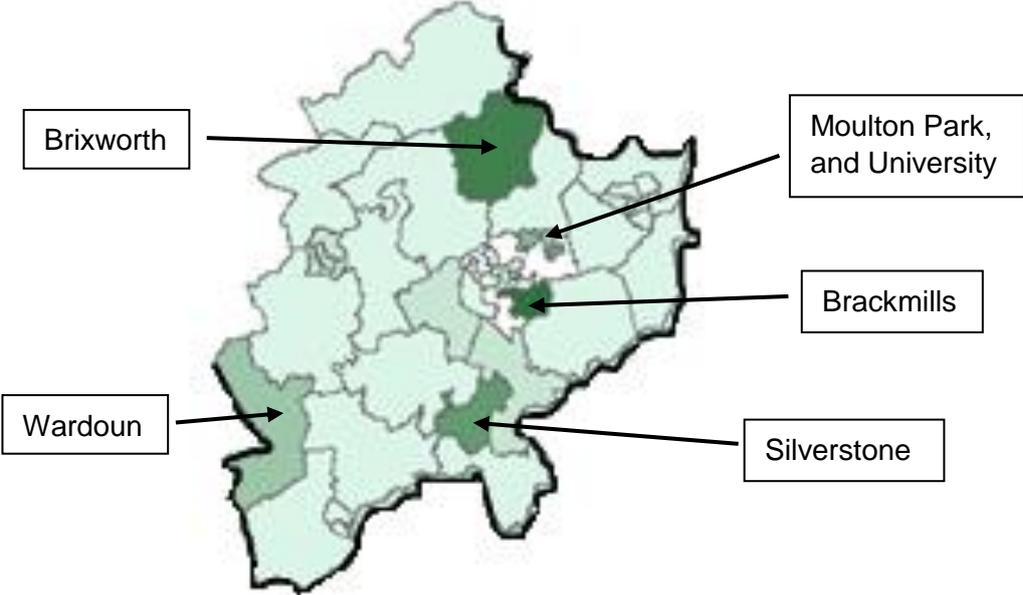
Figure 3-16 Data-based economic profile of Greater Northampton
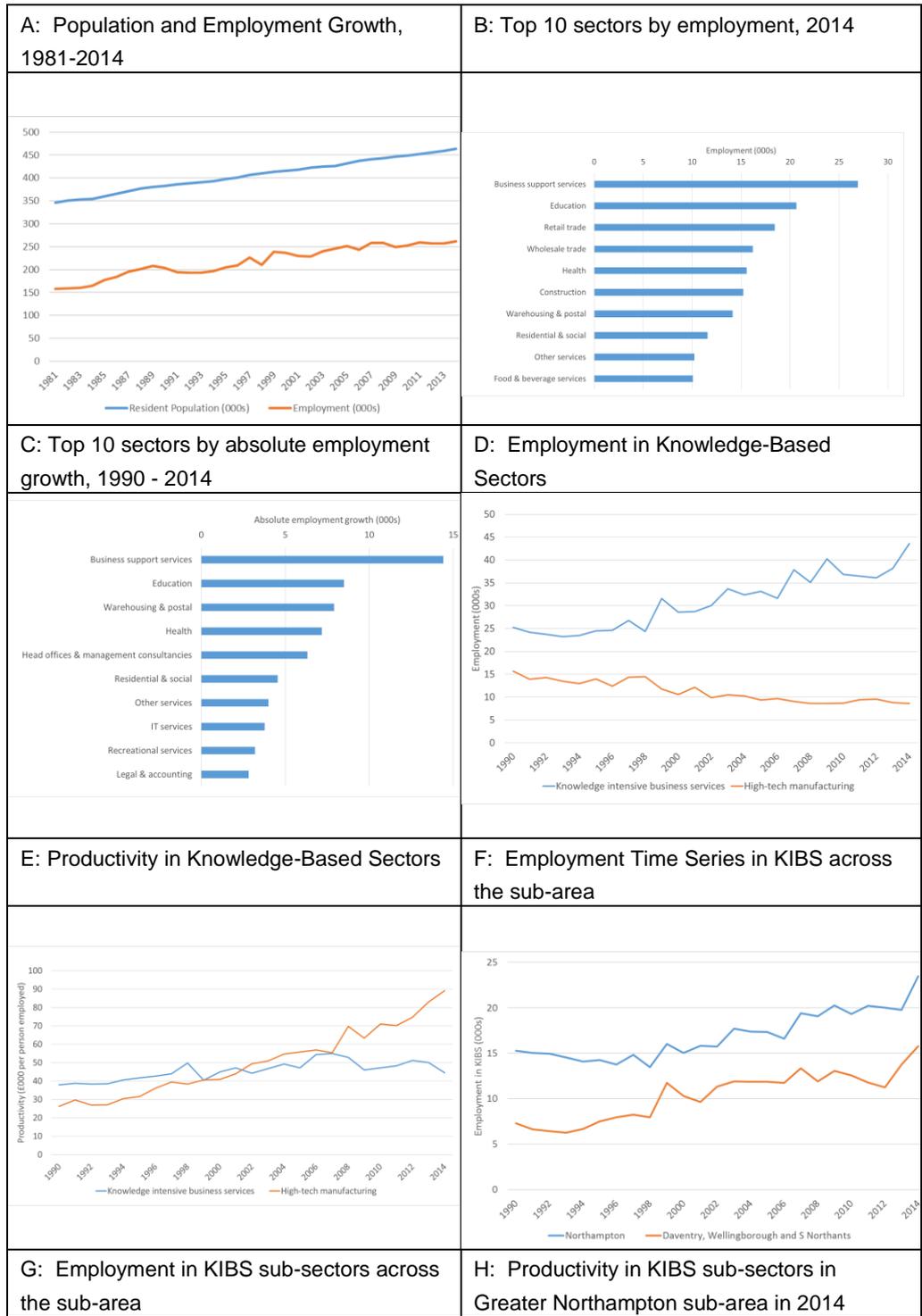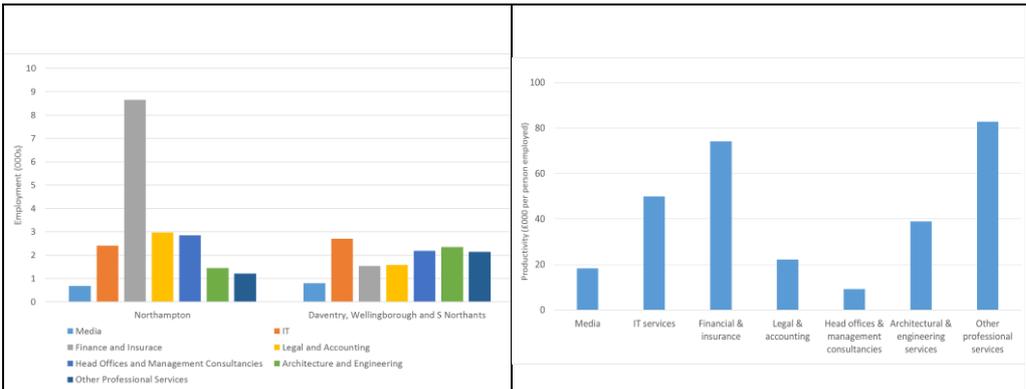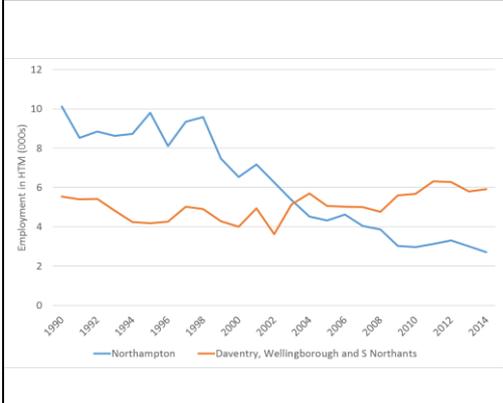
A: Population and Employment Growth, 1981-2014	B: Top 10 sectors by employment, 2014
C: Top 10 sectors by absolute employment growth, 1990 - 2014	D: Employment in Knowledge-Based Sectors
E: Productivity in Knowledge-Based Sectors	F: Employment Time Series in KIBS across the sub-area
G: Employment in KIBS sub-sectors across the sub-area	H: Productivity in KIBS sub-sectors in Greater Northampton sub-area in 2014

I: Employment Time Series in HTM across the sub-area	J: Employment in HTM sub-sectors across the sub-area
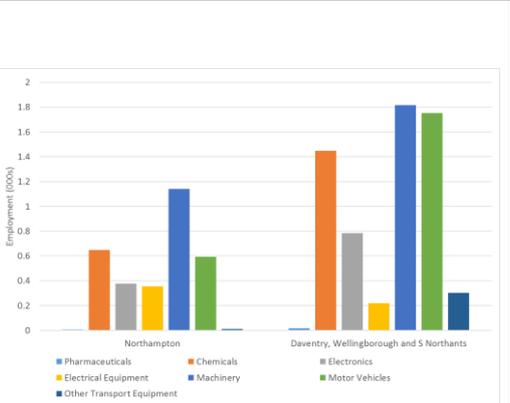
| K: Productivity in HTM sub-sectors in Greater Northampton sub-area in 2014 | |
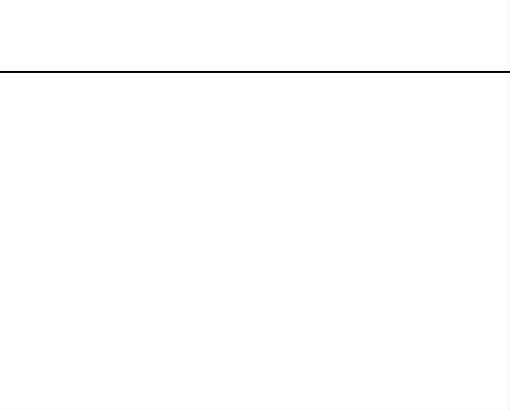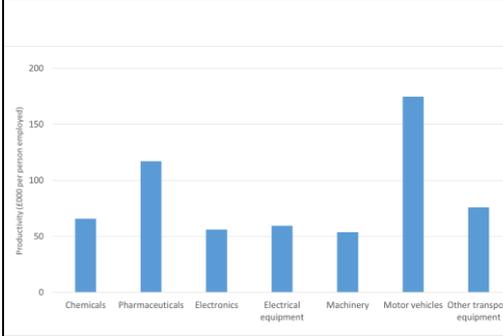
3.6   City Comparisons

This section compares the four key economic areas defined in the above narratives. We move away from the analysis of the larger sub-areas, and focus on the four key settlements and their functional economic areas. These do not necessarily correspond to local authority boundaries, so some level of approximation must be made. These are Cambridge & South Cambridgeshire ("Cambridge FEA"); Oxford, Vale of White Horse & South Oxfordshire ("Oxford FEA"), Milton Keynes, and Northampton.

Employment Growth Their employment growth rates, indexed to 100 in 1990, are displayed below, and compared to the national average growth rate. Whilst Cambridge FEA, Oxford FEA and Northampton have all grown at rates significantly higher than the national employment growth rate over this period, Milton Keynes stands out as an outlier, achieving 60% in just 24 years.

Figure 3-17 Employment growth index (1990=100) over 1990-2014
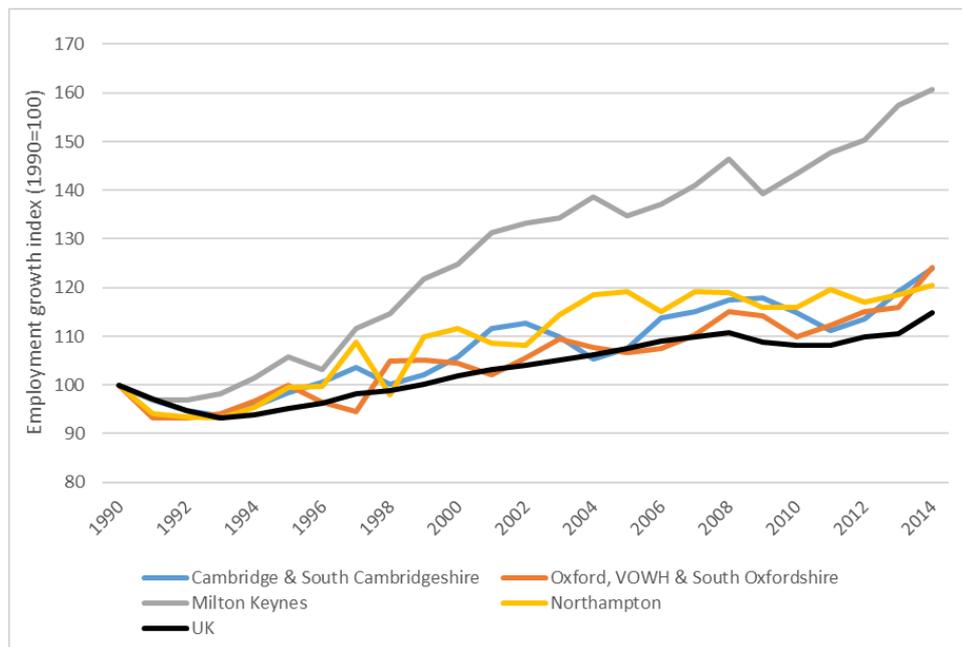
The second figure shows the percentage ratio of workplace employment to resident working age population for each key city. The national average ratio is around 80%. All four cities are significantly above this figure, and in places are above 100%, implying that not only does that area provide a job for every member of its population of working age, but it also provides employment for in-commuters into the area. It not surprising to find the more tightly bounded urban areas of Milton Keynes and Northampton with ratios of close to 100%, but for large areas covering multiple LADs, this is a significant indicator of the extent to which the Cambridge FEA and Oxford FEA economic areas provide employment for their areas of rural hinterland, with their respective city centres providing job densities of 119% and 116% respectively.

Figure 3-18 Job density in the UK and key cities over 1990-2014
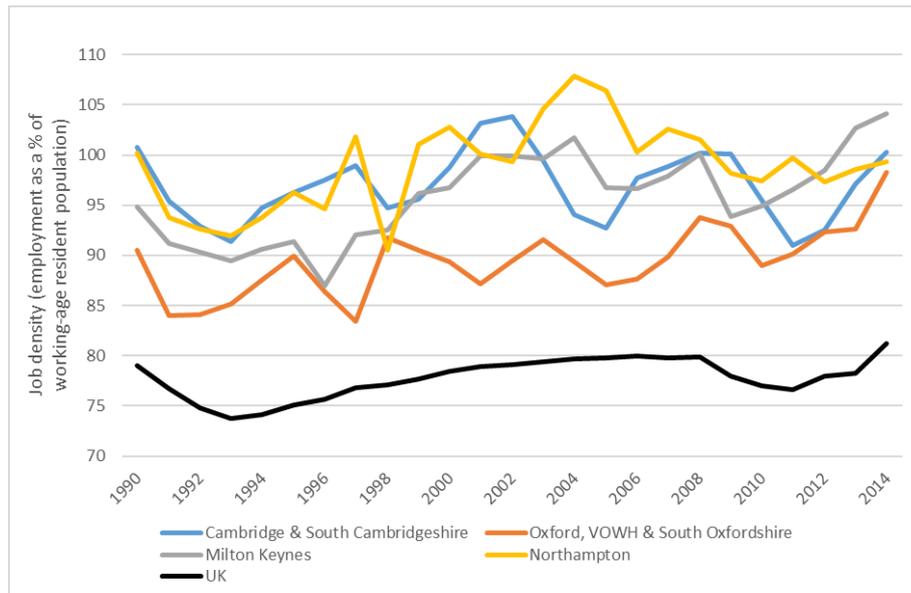
Skills and earnings The cycle of self-reinforcement that was identified in chapter 2 as a major cause of high quality employment growth detailed the symbiotic relationship between a highly skilled and well-educated labour force, the proportion of knowledge intensive firms in the economy, and the provision of high pay, high skill jobs. If this theory holds, then it would be expected that the time-series of education levels, wage levels and knowledge intensive jobs should all exhibit a similar positive trend.

Figure 3.7 shows the growth in the % of the working age population who possess NVQ level 4 qualifications or above. Whilst Milton Keynes and Northampton have tracked the positive growth seen across the whole of the UK, growing from approximately 20% in 1990 to 25% in 2014, the Cambridge and Oxford FEAs have qualification levels significantly above this, with over 50% of working age population having level 4 qualifications by 2014.

Figure 3-19 Working age population with NVQ4+ (%) over 1990-2014

Note: National average is GB before 2004.
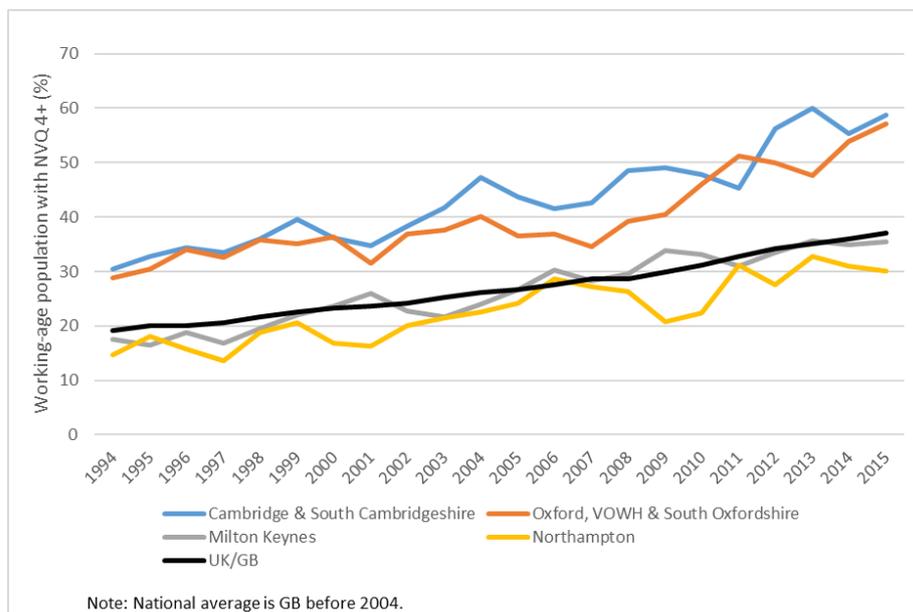
Correspondingly, we see an increase in highly skilled positions, with the % of employment in Cambridge FEA, Oxford FEA and Milton Keynes all above the national average and showing signs of growth, whilst the % of knowledge intensive jobs in Northampton actually decreased between 1990 and 2014. It is informative to note, however, that the national proportion of employment in knowledge intensive sectors has remained virtually flat over the past 24 years.

Figure 3-20 Employment in Knowledge Intensive Sectors (%) over 1990-2014
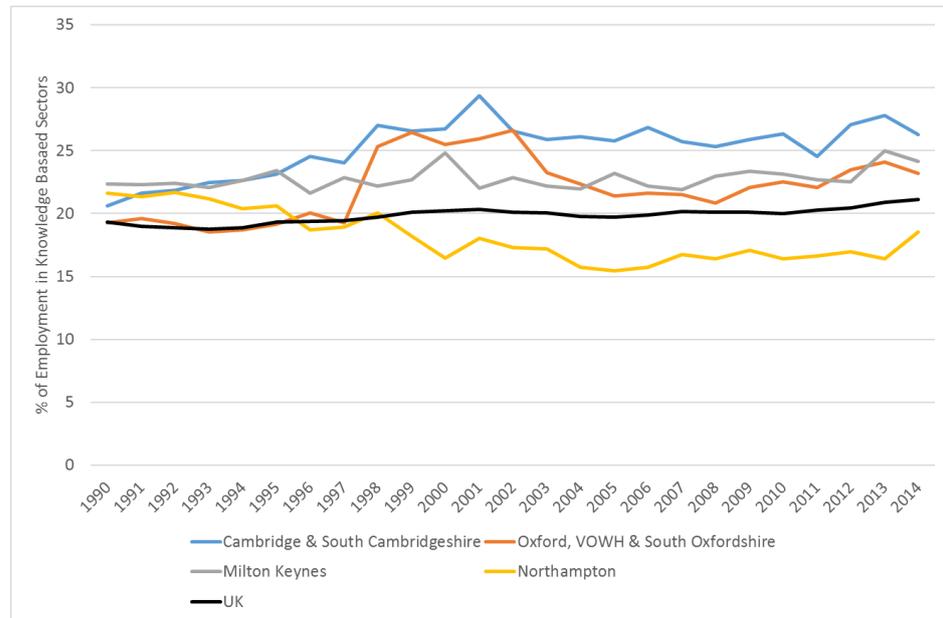
Unsurprisingly, the time-series of wages show a similar story, with Cambridge FEA, Oxford FEA, and Milton Keynes all seeing wage rates above that of the national average, whilst Northampton sees both wage levels and wage growth that match the national average. The data therefore offers some supporting evidence to the theory of economic growth suggested in chapter 2.

Figure 3-21 Median gross weekly pay (£) over 2000-2015
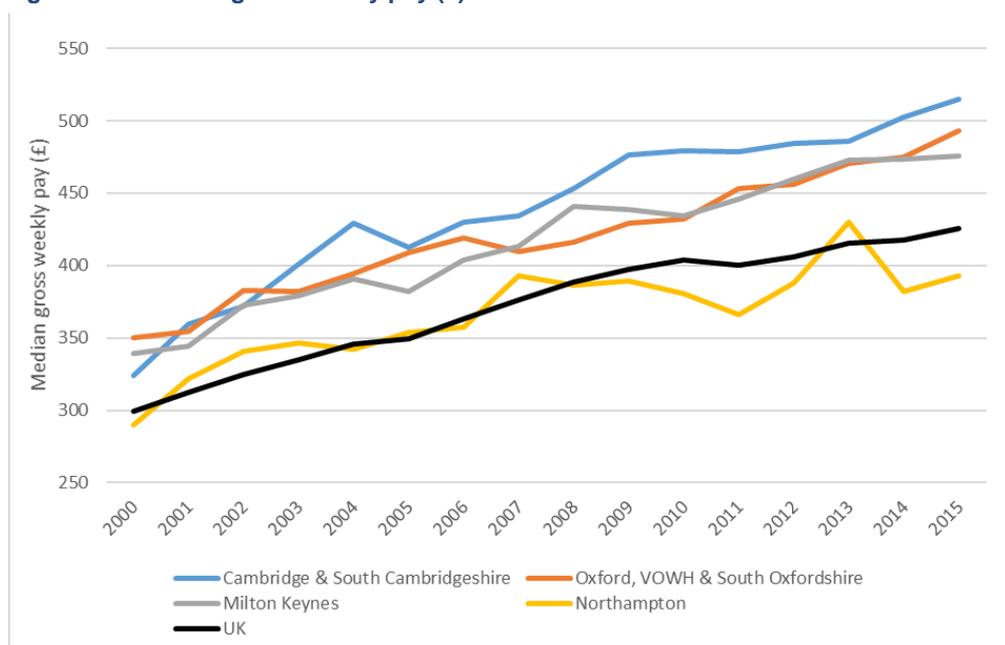
Knowledge-based sectors The following figure shows the proportion of employment in knowledge intensive business services, high-tech manufacturing, other tradeables, and other services. In the absence of district level trade data, the aggregation of KIBS, HTM and other tradeables functions as a rough approximation for total tradeables sector, and from this it can be seen from this that Cambridge FEA and Milton Keynes both have tradeables sector above the national average, whereas Oxford FEA and Northampton have smaller than average tradeables sectors.

Figure 3-22 Share of employment in KIBS, HTM, Other tradeables and Other services in 2014
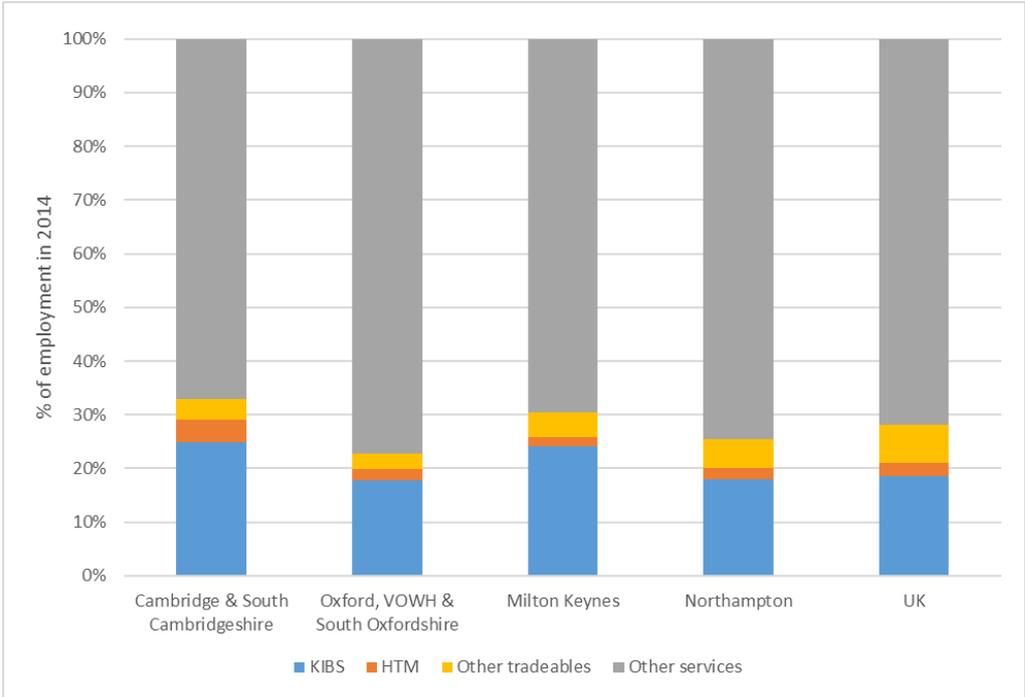
4 Case Studies

4.1 Introduction

As a core part of the evidence base for the Economic Framework, eleven case studies have been completed by SQW. Alongside the secondary data analysis and literature review, the case studies were intended to add greater explanatory depth. By their nature, they are neither comprehensive nor, in any sense, "*representative*" but they are helpful in shedding some light on underlying causal processes, both in terms of the processes of economic growth and the nature of constraints to growth across the CaMKOx-N area, particularly in relation to knowledge-based activities.

Three groups of case studies have been completed. These consider:

- Historic perspectives on growth within the CaMKOx-N area

- Evidence of the potential for a "single knowledge-based cluster that can compete on a global stage" across the geography of the area

- Examples from elsewhere of economic corridors and/or attempts to create them.

4.2 Historic perspectives

For the most part, the Economic Framework is concerned with examining past growth and developing plausible medium-long term growth scenarios. In this context, there are important lessons from history – particularly in terms of what was planned (or anticipated), what actually happened, and the reasons for any difference between the two.

A starting point in this context is the report of the Royal Commission on Local Government in England, 1966-69. As explained in Case Study 1, this set out to generate a new spatial basis for local government in England, based on "*city-regions*". It looked across England as a whole, both to understand sub-national patterns of economic activity and to anticipate future change. From 50 years ago, it provides a fascinating insight – on a consistent basis – into "*what was expected*".

Case Study 1: Headline findings from the Royal Commission on Local Government in England, 1966-69

Planning for "unprecedented change" through city-regions

The Royal Commission on Local Government in England, 1966-69, was chaired by the Rt. Hon. Lord Redcliffe-Maud. It observed that the pattern and character of local government must be such as to enable it to do four things – two of which were to "*develop enough inherent strength to deal with national authorities in a valid partnership*" and "*adapt itself without disruption to the present unprecedented process of change in the way people live, work, move, shop and enjoy themselves*". On this basis, it

concluded that *"we are unanimous in our conviction that local government in England needs a new structure and a new map".*

Core to the Commission's thinking was the delivery of two groups of local services: *environmental services* (planning, transportation and major development) and *personal services* (education, personal social services, health and housing). It argued that these should be in the hands of the same authority because *"the influence of one on the other is great and likely to increase"*[22]. In general terms, personal services were considered to be most effectively delivered across small areas whereas environmental services required a broader geographical canvass. The Commission concluded that the size-range in which both service functions could be delivered effectively was between 250,000 and 1,000,000 people.

Within this framework, the idea of the "city-region" came to provide the defining feature of the new map. This was identified as the *"geographical form taken by modern socio-economic activity"*[23] and – at root – it reflected a strong and growing level of interdependence between rural and urban areas. Its significance had been previously advocated by the Ministry of Housing and Local Government which had argued (a) that it ought to be the planning unit of the future and (b) that the structure of local government should be founded on it: the point, in essence, was that the same authority should be responsible for where people live, where they work and where they enjoy recreation.

The Commission considered a wide range of evidence in order to populate this argument. The evidence included[24]:

- migration of people from urban to rural areas, together with patterns of commuting from rural to urban areas

- patterns of service provision

- shopping surveys

- circulation of provincial daily and local weekly newspapers

- district or regional organisation of professional bodies

- regional and local organisation of the General Post Office

- groupings of hospitals under hospital management committees

- areas covered by independent television companies.

---

[22] Royal Commission on Local Government in England, 1966-69, Chaired by Lord Redcliffe-Maud Volume 1 Report – page 3

[23] *ibid.* page 35

[24] *ibid.* page 53

Proposals relating to our study area

On the basis of the evidence that was gathered, ten of the eleven Commission members concluded that the solution was 61 new local government areas across England: in 58, a single authority would be responsible for all services while in Birmingham, Liverpool and Manchester, there would be two levels of local government[25]. In addition, the Commission argued for eight provincial authorities whose principal responsibility would be to provide – in collaboration with central government – a strategy and planning framework in which the unitary authorities might operate.

Had the Commission's proposals been implemented, the core part of our study area would now be administered by four unitary authorities:

- **Cambridge-South Fens** was identified as one Unit. It included Cambridge and was bounded by Saffron Walden (Essex), Royston (Hertfordshire), Huntingdon (Cambridgeshire), St Neots, Haverhill (Suffolk) and Newmarket (Suffolk). It was described as "*predominantly rural*". Cambridge was identified as the main focus for "*shopping, entertainment, many varied professional services and much employment*".

- **Oxford and Oxfordshire** was identified as focusing on Oxford and it mapped onto what is now Oxfordshire although the area around Brackley (Northamptonshire) was included while Henley (and its environs) was excluded (because its links with Reading were stronger). Oxford was identified as the main focus, but the importance of market towns (of which the largest was Banbury) was also noted.

- **Northampton and Northamptonshire** was defined, for the most part, as the county of Northamptonshire (although the areas around Brackley and Oundle, and some rural parishes in the Daventry-Brixworth area, were excluded). The narrative described the importance of iron and steel in Corby; footwear manufacture across much of the geography; and the importance of agricultural land. It noted further that "*Northampton is a designated New Town and its population is expected to double to well over 200,000 by 1981*".

- **Bedford and North Buckinghamshire** included the Borough of Bedford and its surroundings; the New Town of Milton Keynes; and the area around Bletchley, Newport Pagnell and Wolverton. The description of its economy emphasised the role of Bedford for shopping and urban services; the rural nature of north Buckinghamshire; and industrial and railway interests in Bletchley and Wolverton. The narrative noted further that "*The whole unit is likely to be transformed by the growth of Milton Keynes. The population of the designated area is expected to increase from 40,000 in 1968 to 290,000 just after the turn of the century*".

---

[25] London was outside the Terms of Reference

The main report of the Commission presents relatively few data[26]. Nevertheless, the table below presents the data that were included for the four Units of most relevance to our study area.

Table 4-1: Key statistics from the Redcliffe-Maud report relating to Units within the study area

Unit	Population (1968)	Anticipated population (1981)	% growth, 1968-1981	Rateable value	Rateable value per head
Cambridge – South Fens (42)	380,000	445,000	+17%	£15.2m	£40.00
Oxford and Oxfordshire (45)	461,000	596,000	+29%	£19.3m	£41.90
Northampton and Northamptonshire (46)	409,000	603,000	+47%	£16.9m	£41.20
Bedford and North Buckinghamshire (47)	223,000	359,000	+61%	£10.5m	£47.10

Source: Royal Commission on Local Government in England, 1966-69, Chaired by Lord Redcliffe-Maud Volume 1 Report

Looking back on the analysis – and implications for the Cambridge-Milton Keynes-Oxford and Northampton Growth Area

Both the narrative (from the late 1960s) and the then-forward projections (through to 1981) make fascinating reading in terms of the functional economic areas that were recognised, and the process and rate of growth that was anticipated. Three observations are important:

- **The Royal Commission evidently placed great weight on the New Town designations and the consequences that might follow in <u>transforming</u> patterns of growth**. Both Milton Keynes and Northampton were designated as New Towns whilst the work of the Royal Commission was underway – so presumably the potential significance of New Towns was highly topical at the time. Albeit from a modest base, the rates of growth that were projected – for both Milton Keynes and Northampton – were high, and well in excess of those that are routinely discussed today. In relation to scenarios for future growth, this in itself is important to note.

- **However, the achieved rate of growth in the two Units with New Towns – Northampton and Northamptonshire, and Bedford and North Buckinghamshire – was, in practice, lower than what was anticipated**. As noted above, the population of Milton Keynes was expected to reach 290,000 people by "*just after the turn of the century*". Although there is a need for some caution around the comparability of boundaries, at the time of the last Census, the population of Milton Keynes (borough) was about 240,000. Moreover, the Core Strategy

---

[26] Although reference is made to a number of annexes which appear to contain more data. However, we have not been able to locate the annexed material

reports that population growth of 19% was achieved between 1995 and 2010[27] (compared to the 61% that was projected between 1968 and 1981 (albeit from a much lower base)).

- **The Royal Commission had very modest expectations of Cambridge in relation to the pace of future growth.** The report essentially refers to Cambridge as a town in the Fens – and there is no mention at all of the University of Cambridge or growth that might, plausibly, be linked to it. At the time, the reasons for overlooking its potential are not hard to find. Cambridge was a small, isolated town. The M11 motorway was not constructed until a decade after the work of the Royal Commission was complete; in the late 1960s, there were no direct rail services between London King's Cross and Cambridge; and it wasn't until 1969 that the Mott Report was published, recommending an expansion of science-based industry in Cambridge and leading to the decision (in 1970) to take the first steps to develop Cambridge Science Park.

Source: SQW – based on a review of Royal Commission on Local Government in England, 1966-69, Chaired by Lord Redcliffe-Maud Volume 1 Report

From Case Study 1, it is apparent that – with the considerable benefit of hindsight – the Royal Commission over-estimated the pace at which the New Towns would in practice grow, and under-estimated the potential for growth elsewhere, particularly in the Cambridge area.

The role of Development Corporations has been central to the "growth narrative" of both Milton Keynes and Northampton. Case Study 2 explores the role played by these bodies.

Case Study 2: The role of Development Corporations in Milton Keynes and Northampton

Introduction

The CaMKOx-N area contains two of Britain's largest New Towns, at Milton Keynes and Northampton. Both were developed from the 1960s by powerful and relatively well-resourced New Town Development Corporations (NTDCs). Drawing mainly on an important review that was published by the Department of Communities and Local Government in 2006[28], this case study summarises some important insights.

New Towns, Milton Keynes and Northampton

The 1946 New Towns Act led to the creation of 32 New Towns, in one of the most significant postwar town planning programmes. For the most part, designation occurred

---

[27] *Milton Keynes Core Strategy: Adopted July 2013* – para 2.3

[28] DCLG/ Oxford Brookes University (2006), *Transferable Lessons from the New Towns*

in three phases: first under the Attlee government in the late 1940s, which saw the creation of most of the South East 'overspill' settlements; second in the early 1960s in the North and Midlands; and third in the larger New Towns developed from the late 1960s. Both Milton Keynes and Northampton were designated as New Towns in the third phase.

The plan for Milton Keynes envisaged a city of 250,000, encompassing the existing towns of Bletchley, Wolverton and Stony Stratford, with a major new centre – substantially larger than the earlier New Towns and centrally located between London, Birmingham, Oxford and Cambridge. In contrast, Northampton was already a county town with a population of around 100,000 by 1960. The New Town designation sought to expand this, linked with the opening of the M1 motorway and new rail connections to London.

New Town Development Corporations

The development of the later New Towns – including Milton Keynes and Northampton – evolved somewhat differently from that of the first wave. In particular, the private sector, largely confined to the development of employment land in the early New Towns, played a progressively greater role from the 1960s in house-building and retail development.

However, throughout the period of New Town growth, New Town Development Corporations' roles were pivotal. The New Towns Act granted the Corporations planning and financial powers to '*do all that was necessary to bring the town into being*'[29]. The Corporations were created and funded by central government and had very extensive mandates. They had compulsory purchase powers and were able to purchase land at virtually existing use value and empowered to build; run utilities; and take over many of the planning and infrastructure functions of local government[30]. At Milton Keynes, where the New Town development zone spanned several local authorities, the Development Corporation took over planning control at the outset. However, while Development Corporations were 'top-down' initiatives, they were not all – or always – remote: Northampton, with its large existing population and established borough council, was designated a 'partnership New Town', with a stronger role for local government, an approach which became more common over time as the New Towns evolved[31].

What worked, what didn't and what can we learn?

The Development Corporations were successful in delivering growth, at least in the South East. By the time the Milton Keynes Corporation was wound up in 1992, the city had a

---

[29] TCPA (2014), *New Towns Act 2015?*

[30] The main differences between Development Corporations and district councils related to the acquisition of land at existing (agricultural) use value, which was hugely important, and the scale of funding available from government for infrastructure investment. The fact that they were the planning authority also speeded up development and reduced conflicts

[31] DCLG/ Oxford Brookes University (2006), *Transferable Lessons from the New Towns*, 23

population of nearly 150,000 – and it reached its original 250,000 target in about 2011. Some of the factors facilitating this included:

- **Land acquisition at existing use values**, and consolidated land ownership, which made it possible to greatly reduce housing and community infrastructure costs (in the 1960s, the unserviced land cost element of new houses in Milton Keynes was estimated to have been around 1% of housing costs at the time[32]). This also of course supported New Town profitability.

- **Central government funding and consensus** over the long term (MKDC for example existed for 25 years).

- **Public-sector led delivery**, which was especially effective in delivering good quality affordable housing. Even in Milton Keynes and Northampton, where the private sector played a much greater role than it did in the early New Towns, public housebuilding was important in building up a critical mass of delivery, although over time, the southern New Towns became attractive to private developers[33].

- **High quality staff**, attracted by the New Towns' prestige and the very substantial and stable delivery resources.

- Particularly in the case of Milton Keynes, radical **urban design**, attracting international attention.

Set against this, two further observations are important.

First, analyses have suggested that the cost of the later New Towns – Milton Keynes in particular – was high over the medium term, partly because of the upfront infrastructure costs. By 1993, when MKDC had just been wound up, it was estimated that the New Towns programme overall had cost the government around £7.6 billion, with around 57% of costs recovered. Obviously, returns continued beyond that date – but the New Towns were a long term investment.

Second, growth was easier to deliver in Milton Keynes and Northampton than in New Towns in less buoyant parts of the UK. The resources and powers of the Development Corporations facilitated delivery in the CaMKOx-N area, helped by broadly positive economic circumstances.

Looking to the future, the overview of lessons from the New Towns, published a decade ago by DCLG, noted the comparability of (then) current growth ambitions with those at the time of the creation of the New Towns – and the recognition that infrastructure constraints and fragmented planning continued to be a challenge. It also noted that many "growth areas" (as they were at the time) – including Milton Keynes and Northampton – were former New Towns; but that this needed to be weighed against the government's appetite for high medium-to-long term cost and direct intervention.

Source: SQW, based on a review of literature (sources cited in the text)

---

[32] Thomas, R. (1997), 'The new towns: Taking a long-term view', *Town and Country Planning* 66/5, 138-9

[33] DCLG/ Oxford Brookes (2006), 25

Alongside the significance of the New Towns, a second insight from Case Study 1 surrounded the Royal Commission's relatively cautious assessment with regard to the growth of Cambridge. This was – at the time – perfectly logical. In practice, one of the principal reasons why the Cambridge area has grown more quickly than was expected fifty years ago relates to the pattern and process of governance. Case Study 3 explores this issue, focusing particularly on the last twenty years.

Case Study 3: The development of governance arrangements in the Cambridge area

Introduction

A key factor in the scale and quality of the growth of jobs and housing in the Cambridge area over the last 20 years has been the strength of local governance and the complementary roles played by public and private sectors. Local governance is far from perfect, and is hindered by the structure of local government in the area. Nevertheless, the governance structures that have evolved have enabled a consistent and enduring approach to managing growth which continues – albeit with many stresses and strains – today. This case study explores some of the key factors explaining this success.

The Cambridge economy today

The Cambridge economy – defined to include Cambridge City and South Cambridgeshire District – is highly competitive and productive, and it contains institutions and firms of national, and in some cases global, significance. Based on the draft Local Plans for Cambridge City and South Cambridgeshire, by 2031 there are likely to be another 65,000 people living locally, in 31,000 more homes, and 44,000 more jobs.

The primary cause of Cambridge's strong economy is the high-tech business cluster, combined with the scale, strength and diversity of the research and education base. Since 1984, the number of high-tech firms has grown from around 300 employing 14,000 people, to 1,000 firms employing over 40,000 jobs currently[34]. The cluster is also very diverse, including globally significant strengths in bioscience and healthcare, IT/telecoms, printing technologies, engineering, cleantech, nanotechnology and advanced materials, and R&D consultancy.

Supporting the high-tech cluster, and Cambridge's role as a regional service centre, is a range of business, financial and professional services, which are also growing in number and scale. In addition, Cambridge is a major visitor destination: it receives over 5 million visitors a year, which has a huge impact on spending in the city centre and on the types of retail, leisure and cultural facilities that Cambridge can offer. Cambridge is also significantly influenced by a strong – and growing – relationship with London (with implications, in particular, for the nature and strength of its labour market).

---

[34] Sources: 1984 figures taken from the Cambridge Phenomenon report, SQW 1985; current figures taken from the Cambridge Phenomenon website - http://www.cambridgephenomenon.com/phenomenon/

Strategic planning and development in the Cambridge area

Strategic planning policy for Cambridgeshire was determined by successive Structure Plans, the latest of which was approved in 2003, and by the East of England Plan (the 2008 Regional Spatial Strategy (RSS)), which preserved most of the key spatial policies of the 2003 Structure Plan. Both Structure Plans and Regional Spatial Strategies are now defunct, the strategic tier of planning having been abolished by the coalition Government in 2010. However, so far the district councils have supported local plans which maintain the scale and location of growth set out in the Structure Plan and RSS.

The 2003 Structure Plan gave much greater recognition than previously to the importance of supporting the growth of the high-tech cluster, and of the consequences for the scale of new housing. It also involved a significant change in spatial strategy, towards a more concentrated form of development in and around the city, and in two new settlements – at Cambourne (which was already underway), and Northstowe. Previously, the strategy was to accommodate the population and employment growth related to Cambridge as far as possible in the market towns and main villages of South and East Cambridgeshire beyond the greenbelt. This strategy, which was operational for several decades, led to a dispersed pattern of settlement which had various advantages (e.g. it helped the larger villages to retain a good mix of services), but it also resulted in an unsustainable increase in commuting, mainly by car, from the surrounding towns and villages into Cambridge.

Related leadership and governance factors

Approval of the 2003 Structure Plan, and the subsequent support for the strategy of concentrated growth, required a change in attitudes among many local politicians. This was stimulated by:

- **sustained pressure from the business community on both local and central government, particularly to address congestion and housing shortages**

- **the creation in 1996 of 'Cambridge Futures' a private sector led organisation to stimulate thinking about the future development of Cambridge, and to influence policy decisions.** The work for Cambridge Futures was led by Marcial Echenique, the Professor of Architecture in the University of Cambridge, and involved a wide range of senior people in private, public and third sectors. It provided an excellent non-political forum in which to discuss controversial issues about the future scale and pattern of development. Marcial also ran a transport consultancy, which undertook a range of modelling exercises for Cambridge Futures to demonstrate the impacts of different future settlement patterns on sustainability and congestion. These provided a focus for a consultation exercise, the outcome of which suggested that the public were more positive about growth than had previously been assumed

- **in the early stages of the Greater Cambridge Partnership, the formation of four working groups – including planning brought together local authority officers, professionals and businessmen from the private sector**. The planning working group and Cambridge Futures both made inputs to the 2003 Structure Plan, which helped officers steer through the policy changes

- **the fact that the second Cambridge Phenomenon report, published in 2000, identified significant infrastructure constraints to the future growth of the high-tech cluster**

- **the influence of some key people in pushing for change, including some senior officers in the County and City councils, and some in the private sector and from the University of Cambridge.**

In addition to the Structure Plan, a key outcome of this process was the creation of Cambridgeshire Horizons, which was formed in 2004 to manage the delivery of the growth strategy for Cambridgeshire. Horizons was a company limited by guarantee and did not have statutory planning powers, which remained the preserve of the local authorities. Horizons had a high profile chairman (Sir David Trippier), a highly effective chief executive (Alex Plant), and a budget provided primarily by central government[35], EEDA and the local authorities. It was closed in September 2011 as a result of withdrawal of government funding and the closure of EEDA, but Alex Plant transferred to Cambridgeshire County Council as Executive Director of Environmental Services, including planning and transportation. He is currently a Director of Anglia Water and is playing a key role in Cambridge Ahead (see below). The successes of Cambridgeshire Horizons included securing £100 million from Government for various infrastructure and related projects to support sustainable growth, including forward funding for the link road from the M11 to Addenbrooke's, which enabled development of land for housing and employment on the southern edge of Cambridge, and involved a novel funding mechanism supported by the government[36]. Working particularly closely with Cambridgeshire County Council, Cambridgeshire Horizons also helped secure funding for the guided busway and a £1.5bn upgrade of the A14 between Cambridge and the A1 at Huntingdon[37].

Following the closure of Horizons, the impetus for strategic thinking about the future of Cambridge involving public and private sectors was maintained temporarily by Cambridge Past Present and Future (previously Cambridge Preservation Society), which led a visioning exercise involving a series of seminars over the following two years on various strategic development issues (e.g. transport, planning, city centre, etc.).

Most recently, Cambridge Ahead was established in late 2013 as a business and academic member group dedicated to the successful growth of Cambridge and its region in the long term. The group's vision is ambitious: for Cambridge to be the pre-eminent small city in the world. It aims to represent the business community and partners in the Cambridge city region by offering soundly-based opinion and being an advocate for Cambridge to local and national governments about the opportunities and needs of the

---

[35] Cambridgeshire Horizons was almost entirely funded by CLG through Housing Growth Fund, which was grant funding available to growth areas and growth points, and provided both revenue funding for staff and capital to support housing delivery

[36] The novelty was not in the funding source, which was CLG/Housing Growth Fund, but in the HGF was used. Following the financial crisis in 2008 banks refused to extend credit for development, hence work on sites throughout the country stopped. Horizons decided to use HGF for a mix of equity and loan in the development on the southern fringe of Cambridge, which funded the basic infrastructure including the link road from the M11, and therefore allowed building to proceed. The way in which Horizons structured the deal ensured that funds from repayment of both loan and equity go to the local authorities for further support to housing growth, rather than being returned to CLG

[37] The A14 serves a very similar set of multiple roles to the A43, including as a major trunk road between one of the largest ports in the country (Felixstowe) and the Midlands, a local commuter route, and a bypass to Cambridge

region. It is politically non-aligned. Currently it has 40 member organisations and five individual members. The model adopted by Cambridge Ahead is to establish a number of thematic task and finish groups on topics such as promoting Cambridge, improving the quality of life, connecting Cambridge, housing and transport.

Cambridge Ahead works in collaboration with, but separately from, the Greater Cambridgeshire Greater Peterborough Local Enterprise Partnership and the local authorities. It has supported the LEP and local authorities in securing substantial funding through the City Deal and in shaping the resulting investment programme. This includes some controversial measures such as workplace parking and limiting vehicular access to the city centre. It has also supported initiatives such as new stations on the northern and southern edges of the city, and has sought to inform the planning process by doing work on future growth of the local economy, although this may result in some conflict with the provision for growth in the draft local plans that are being produced in parallel (and examined by the Planning Inspectorate together) by Cambridge City and South Cambridgeshire Councils.

Conclusions

There is no doubt that governance and leadership have played a crucial part in enabling the growth of the Cambridge sub region over the last 10 years in particular.

Governance arrangements have worked as a result of close interaction between public and private sectors, despite local government structures and some differences of opinion and tensions. Collaborative arrangements have strengthened and evolved over the last 20 years. Cambridge has benefitted particularly from the creation of forums in which controversial issues about growth have been discussed in a politically neutral environment, before resulting proposals required political support.

The area has also benefitted from strong leadership, in both public and private sectors. The long term role of a group of individuals from the private sector has been particularly notable and beneficial. Some – such as Hermann Hauser and David Cleevley – have been influential in Cambridge for over 30 years; others have become key players more recently. They have influenced central government policies and funding, and helped to attract inward investment. They have also contributed to strategies for growth and to supporting local firms (e.g. through venture funding and mentoring).

The continued political commitment to economic and housing growth is fragile because of the strains it places on infrastructure, and particularly the controversial measures proposed through City Deal to managing congestion in the city and raise funding to improve public transport.

Source: SQW – based on consultations and a document review

From the previous two case studies, it is apparent that the growth narratives relating to different areas within the overall Corridor have differed substantially from each other. Nevertheless, the possibilities linked to a "Varsity Corridor" – defined essentially around two of the world's leading universities – have long captured the imagination. Over past decades, there have been several attempts to make it happen. Case Study 4 (below) draws out some lessons.

Case Study 4: Oxford-Cambridge Arc

Origins

The concept of the Oxford to Cambridge Arc originated in a number of parallel initiatives in the late 1990s. These included:

- the inclusion by the South East of England Development Agency (SEEDA) of the Oxfordshire-Milton Keynes/Luton/Bedfordshire/Aylesbury Vale sub-area as one of seven sub-regional drivers within the original Regional Economic Strategy for the South East, which led the Economic Partnerships for Oxfordshire and Milton Keynes to develop the concept of the "Technology Arc" in response

- the Bedford Convention and Cranfield University together funded and developed a website (Oxford2Cambridge.com) which sought to demonstrate the breadth and depth of technological expertise across the geography of the Arc

- the "Central Innovation Network", encompassing both Bedfordshire and Milton Keynes, was formed to promote the centre of the Arc.

One consequence of these various initiatives was the commissioning of a study of the Oxford-Cambridge Arc by a consortium of regional and sub-regional organisations[38], and undertaken by SQW in 2000/01. Its purpose was to "*contribute in a significant way to realising the vision of an Oxford-Cambridge Arc*" by "*investigating the current configurations of the Arc and then to explore the practical steps that might be undertaken to enhance its full economic potential*".

The study concluded that there are clearly some complementarities across the different local economies of the Arc, and that "*the essence of the Arc is about relationships through which economic, social and environmental benefits might be nurtured*" (2001 report, para 1.8). The study proposed the establishment of a permanent Steering Group to take forward the strategy and "*identify key actions, and resources and responsibilities to implement those actions*". The Group was to comprise five sub regional partnerships (Greater Cambridge, Beds & Luton, Milton Keynes, Buckinghamshire, Oxfordshire and Northamptonshire) and five thematic working groups (for branding and marketing, land and property, communication and networking, commercialisation, and skills and workforce culture).

Subsequent initiatives

It would be fair to say that throughout the early stages of the O2C Arc initiative, the organisations in the centre of the area were more enthusiastic about, and felt they had

---

[38] The consortium included Milton Keynes Economic Partnership, Bedfordshire and Luton Economic Partnership, and Oxfordshire Economic Partnership, the East of England and South East of England Regional Development Agencies and BT

more to gain from, the concept of the O2C Arc than those in either Oxford or Cambridge. This was reflected in the limited progress made after the 2000/01 study was completed, and the eventual commissioning, in 2006, of another study by the three Regional Development Agencies which included in their geographies parts of the O2C Arc: SEEDA, the East of England Development Agency (EEDA) and the East Midlands Development Agency (EMDA). The 2006 study was undertaken by Deloitte, and was entitled "*Strategies and Solutions for an economically successful and innovative Oxford to Cambridge Arc*". The resulting report made no reference at all to the previous study, although it reached similar conclusions. It did, however, propose the recruitment of an Executive Director for the O2C Arc and a detailed action plan focused on five areas:

- a 'smart growth coalition' to build relationships, with the leading knowledge based businesses, the key people at the HEIs and policy makers at national and regional level

- an ARC Asset Register, to get "a clearer fix on what exists in the ARC area as well as current plans and programmes among partners"

- refining the case for the ARC and producing an ARC prospectus

- agreeing the organisational design and forward resourcing for the ARC, and

- developing priority initiatives further and supporting their delivery.

An Executive Director was duly appointed later in 2006 for a two-year term, funded jointly by the three RDAs – SEEDA, EEDA and EMDA. He was based in the Milton Keynes Economic Partnership and had some part time professional and administrative support. His initial remit was to take forward the action plan, and also to identify suitable private sector appointments to a Board for the O2C Arc organisation.

The early stages of the appointment proved frustrating. According to the former Executive Director, his efforts to move the strategy document on received very little feedback from any of the RDAs, and the interest of potential private sector Board members fell away when they realised the organisation would have very limited resources and public sector support to do anything of substance. After several months, he therefore decided to focus on developing networking across the Arc (including through a series of O2C dinners for public and private sector representatives) and links to other similar organisations overseas, such as Research Triangle (South Carolina, USA), the Leuven Triangle (Belgium and Netherlands), and the strengthening links between Copenhagen and Malmo. The O2C Arc website was developed to include data on firms to stimulate B2B brokerage, and presentations were made to raise the profile of the Arc and to promote improved communications – particularly East-West rail.

However, despite stimulating a considerable amount of publicity and some improved linkages – particularly between universities and firms within the Arc - the initiative was generally seen as a failure (both by the Director and its sponsors) and was closed after the two-year contract was complete.

Conclusions

The concept of the O2C Arc was based on a clear view from parts of the area that there were economic benefits to be gained – both locally and for the UK economy as a whole – from better linkages across the Arc. This view was confirmed by both the 2001 and 2006 studies. However, by 2008 the initiative had foundered, for a variety of reasons including:

- **Disjointed leadership**: the chief executive was not able to establish strong relationships with the sponsoring RDAs, and partly as a result of personnel changes the RDAs themselves lost interest.

- **Boundaries**: the Arc was on the edge of the three RDA regions, and was not a major spatial priority for any of them

- **Resources**: There was a lack of resources to achieve substantial changes (for example, infrastructure improvements) which would have attracted firms to become involved

- **The interest of "the two ends"**: There was limited interest from the two main centres of research and commercialisation – Oxford and Cambridge – who at the time saw more benefit in developing links with London than with other parts of the Arc.

The various O2C Arc initiatives were therefore widely seen as attempts by public sector organisations in the centre to raise their profile for business investment through association with Oxford and Cambridge. There were organisations – including high-tech firms in Oxford and Cambridge - that saw the benefits of 'space for expansion' in the fast-growing urban areas in the centre of the Arc – but they did not see the Arc organisation as a body that could deliver the kind of investments that would help deliver those benefits.

Source: SQW – based on consultations and a review of documentary material

4.3   Evidence of the latent potential of the Corridor

To some extent, the conclusion that the area between Cambridge and Oxford displays little obvious sign of operating as a functional Corridor is entirely unsurprising. The only reliable way of travelling the 90-odd miles between Cambridge and Oxford in less than three hours at peak times is by train, via London, and the cost of a day return ticket is currently £85.50: it takes too long and costs too much to be viable on anything other than an occasional basis, and none of this lends itself to collaborative links between businesses and other organisations, or to commuting. From this premise it would, in some respects, be surprising if there were any real links at all: the transport infrastructure has made them difficult.

Insights from two key sectors within the knowledge economy today

The two case studies which follow consider two of the area's major knowledge-based sectors – bioscience and high performance technology and motorsport. Their purpose is to consider the extent to which clustering and agglomeration appears to take place currently, and the potential that might exist, if the infrastructure challenges could be solved. Both case studies draw on published reports and some consultations conducted by SQW over the course of this study.

Case Study 5: Bioscience clusters in the CaMKOx-N area

Introduction

As host to two of the world's leading, research-intensive universities – Oxford is ranked 1st in Life Sciences and 2nd overall in the world, while Cambridge is ranked 2nd in Life Sciences and 4th overall[39] – and as the location of choice for many of the largest and most innovation-intensive companies – particularly in pharmaceuticals, biotech and life-sciences – the prize that might be gained if Oxford and Cambridge could meaningfully collaborate and generate durable synergies is tantalising. In reality, however, while both operate as world-leading innovation systems individually, evidence on the current extent of collaboration is scant. Yet as recent studies into the biopharma clusters of Oxford and Cambridge show, both are substantial, and they face similar opportunities and challenges.[40]

The Cambridge bioscience cluster has considerable strength along the greater Cambridge-London axis (including Stevenage) which is now home to an estimated 350 bioscience companies (around 25% of the UK total), almost half located on the area's network of science parks and incubators (including, for example, Babraham Research Campus). Oxford's bioscience cluster similarly extends along the "Oxfordshire Knowledge Spine", which runs from the Thames Valley, through Science Vale to Oxford and Bicester in north Oxfordshire, and consists of an estimated 250 biopharma firms.

At the same time, it is important to recognise that many of the firms in both clusters are global in outlook[41]. The science is evolving rapidly and collaborations are often global.

Evidence of linkages and potentials

Strong and deepening interactions with London have been important in relation to the strength and vitality of the Cambridge bioscience cluster. This growing integration broadly aligns with the significant upgrades to rail inter-connections between the two cities. Travels times have been cut to a reliable 45 minutes, which has facilitated access

---

[39] According to the Times Higher Education World University Rankings 2015-2016

[40] *Cambridge BioPharma Cluster*, LetsCellit/Bidwells (2016); *Oxford BioPharma Cluster*, LetsCellit/Bidwells (2016)

[41] The Oxfordshire Innovation Engine: realising the growth potential, SQW (2013)

to, and the sharing of, local expertise (particularly London's financial prowess), specialist labour markets, and research institutions[42].

Several organisations are involved in promoting collaboration and research across the "Golden Triangle". These include One Nucleus (based near Cambridge), OBN (based in Oxford) and MedCity (based in London). In the main though, these bodies tend to focus on established corridors. There is little evidence of work across the wider Golden Triangle, particularly on the east-west axis.

However there are some examples of individual companies operating across the east-west axis. Oxford Nanopore Technologies, for example, has a presence in both Oxford and Cambridge.[43] Moreover the Oxford Tissue Bank has recently installed a large, new state-of-the-art facility for storing and analysing large volumes of tissue in Milton Keynes, with the expectation of durable linkages with their research headquarters in Oxford[44].

Outside of bioscience, but with important complementarities, is the strong relationship between Harwell (south of Oxford) and Cambridge, built on the specialisms of each in physical sciences.[45] Evidence from interviews with key figures in both clusters suggest that cross-cluster connections among the directors of major bioscience and technology companies in Oxford and Cambridge are relatively rare. At a non-executive level, however, there is considerably more activity, with evidence of connections between firms operating in each cluster. This suggests that, should accessibility prove a less formidable barrier, increased networking across the two clusters would follow. This point applies more broadly. As has been seen along the Cambridge-London axis, transport improvements have increased the possibility of living in one place and working in the other. Not only does this have benefits for recruitment, in terms of a larger, specialist labour pool, but also for retaining talent within the broader cluster by enabling the development of careers across multiple employers.

Conclusions

In principle, Oxford and Cambridge have potential to generate research and commercial synergies, particularly in the field of bioscience. In reality, however, although a number of relationships do exist, the challenges associated with limited physical connectivity are significant. The Golden Triangle constitutes a globally significant concentration of research, specialist funding, and business in bioscience. However, while it remains connected across only two of its three sides, the "Triangle" is fragmented as a cluster. Just as increases in connectivity between, for example, Cambridge and London, has led to real growth and strengthening across this axis, similar expectations could be set for

---

[42] SQW (2010) The Cambridge Cluster at 50. The Cambridge economy: retrospect and prospect

[43] SQW (2013) The Oxfordshire Innovation Engine: realising the growth potential, (p.44)

[44] OAHSN (2015) Addressing the 21st Century Healthcare Challenges in Precision Medicine, Oxford Academic Health Science Network

[45] Harwell Science and Innovation Campus, for example, includes the UK's only synchrotron (a diamond light source), "which has accelerated advances in structural biology and in the use of infrared spectroscopy to establish markers for drug action and biomarkers for cancer." See OAHSN (2015) Addressing the 21st Century Healthcare Challenges in Precision Medicine

enhanced Oxford-Cambridge links. As evidenced in the mobility of non-executive directors across the two clusters, improving access has real potential to expand the functional labour market.

Source: SQW – based on consultations with Sir John Bell, Regius Professor of Medicine at Oxford University; Harriet Fear, Chief Executive, One Nucleus and UK Business Ambassador for Life Sciences and Healthcare; Dr Nick Scott-Ram, Director of Commercial Development, Oxford Academic Health Science Network; and Jim Kinnear Wilson, Partner and Head of Bioscience Practice, Pennington Manches Solicitors; and a review of documentary material

Case Study 6: High performance technology and motorsport cluster, and evidence of collaboration across the CaMKOx-N area

Introducing the cluster

The area around Silverstone is home to significant business activity across the field of high performance technology and motorsport (HPTM). As well as Formula One teams (including Red Bull Racing (in Milton Keynes), MERCEDES AMG PETRONAS/Mercedes-Benz Grand Prix Ltd (Brackley, Northamptonshire) and Sahara Force India (based at Silverstone itself)), Cosworth (Northampton) and Prodrive (Banbury and Milton Keynes) are household names. However, there are many more HPTM firms which are less visible (and less well known), operating within supply chains for motorsport series and/or – and increasingly – developing products, services and know-how across the spectrum of high performance technology. This cluster was the focus of a major research project which was commissioned by MEPC; the findings from it were published in May 2016[46].

Silverstone is located in the central part of the Cambridge-Milton Keynes-Oxford Growth Corridor. Connectivity north-south (broadly from London to Birmingham) is good, but on the east-west axis, it is currently poor. It is within this context that relationships within the cluster need to be understood.

Examples of collaborative activity

Through detailed company case studies, the study found several instances of collaborative relationships, of different forms, extending across parts of this wider geography *despite* the limitations of the transport infrastructure.

For example:

- Early on in its development, Delta Motorsport – located at Silverstone – developed a very important collaborative relationship with YASA Motors, a spin-out from the University of Oxford. This collaboration really anticipated the emergence of electric cars and the mechanical engineering excellence of Delta complemented YASA Motors' expertise in relation to electric motors. Both companies have grown subsequently and they continue to collaborate

- KW Special Projects (KWSP) was formed from KW Motorsport to focus on non-motorsport business (and is itself illustrative of the increasing transfer of know-

---

[46] SQW (2016) The Evolution of the High Performance Technology and Motorsport Cluster Report

how from competitive motorsport to other, wider applications). This grew from collaborative relationships with an ink-jet printing business which was part of the Cambridge ink-jet printing cluster. This stream of work led to the growth of KWSP and links across this geography continue

- Cosworth – a high performance engineering company which is known internationally for its engines – is one of the most iconic businesses in the cluster. It has been substantially based in Northampton for over fifty years. Through a complex series of ownership changes, it was acquired by Ford in the late 1990s. Recognising the growing importance of software systems and data, Ford also acquired Cambridge-based Pi Research. The two companies subsequently became Cosworth Group and further ownership changes followed. Today, Cosworth has two major UK sites – one in Northampton and one in Cambridge. They tap into very different labour markets and provide complementary specialisms, all of which are branded as "Cosworth".

The HPTM activity in and around Silverstone displays many of the attributes of a cluster. These examples of collaboration and synergy have not been engineered through policy and they certainly have not been facilitated by connectivity, but they have been powerful and effective nevertheless. They point to the latent potential that could exist across this wider geography – some of it founded in the research institutions and universities, and some of it generated firmly from within genuinely world class businesses.

Future potential

Looking ahead, there are various reasons to suggest that the strength and coherence of the HPTM cluster could grow. Cranfield University – and the adjacent Cranfield University Technology Park – is seeing significant investment; the Transport Systems Catapult has recently been established in Milton Keynes (with some links across the cluster and the potential for more); ambitious plans are being advanced at Silverstone Park for significant employment growth linked to the HPTM cluster; and a cluster organisation is planned to help animate the cluster and support its growth.

Source: SQW – based on a review of "The evolution of the high performance, technology and motorsport cluster" Report completed by SQW for a group of partners led by MEPC, May 2016

Although the evidence is – inevitably – fragmented, these recent analyses of bioscience and high performance technology and motorsport are tantalising insofar as they hint at what *might* be achievable across the broader geography. None of this can be "proved" definitively – and nor will it be evident through any form of linear extrapolation – but the fact that there is some evidence of collaborations across two very important parts of the economy should be acknowledged.

An emerging infrastructure for collaboration?

As intimated above, the reasons why early attempts to forge greater collaboration largely failed related in part to poor connectivity compounded by the fact that the two "ends" considered that "the middle" had relatively little to offer. This may have been the case a decade ago, but there have been important recent developments in "the middle" which ought, broadly, to be supportive of processes of collaboration – with consequences for both agglomeration and the growth of knowledge-based sectors – particularly given the evidence of actual collaborations summarised in Case Study 6. Case Study 7 considers some of the assets in "the centre" that could, potentially, support this process.

Case Study 7: Bridging the gap?: Knowledge economy assets in "the centre" of the Corridor

Context

The local economies in the centre of the CaMKOx-N area have grown quickly, including in knowledge-based sectors, over recent years (see, for example, reports by the Centre for Cities[47] and The Work Foundation[48]). The big question, from the perspective of the broader area, is whether the emerging assets of the "centre" might provide a "stepping stone" towards the development of a single knowledge-based cluster.

Milton Keynes

Milton Keynes is one of the UK's fastest growing cities, and has ambitious targets for continued growth. Its development story as one of a growing competence in high-skill, high productivity economic activities, particularly in professional, scientific and technical activities (17% of businesses) and ICT (15%).[49]

Several reports highlight core, high-skill strengths in terms of ICT, Software and Digital Media[50], as well as Financial Services, Consulting, and Security Related Services[51]. The city is also a major centre of the logistics and distribution sectors. Further local knowledge-assets include several science parks nearby, including Cranfield University Technology Park[52], Bletchley Park Science and Innovation Centre, Millbrook Technology Park, and

---

[47] CfC (2016, March) Fast Growth Cities: The opportunities and challenges ahead

[48] Adam, D. et al. (2014, February) Cities, growth and poverty (Evidence Paper 3: Case studies), commissioned by the Work Foundation

[49] Milton Keynes - Local Economic Assessment 2016

[50] SEEDA (2010, March) The impact of the recession on Milton Keynes

[51] GVA (2015, November) Milton Keynes Council and Milton Keynes Development Partnership: Employment Land Review and Economic Growth Study Phase 1

[52] Established in 1989 in order to strengthen Cranfield University's linkages to industry. The site hosts Nissan's Technical Centre for Europe.

Caswell Science & Technology Park (located mid-way between Milton Keynes and Northampton), in addition to a number of large multinational companies.[53]

Over recent years, Milton Keynes Council has promoted Milton Keynes as a "Smart City" – in part through the £18 million MK:Smart initiative – with the objective of trialling new transport innovations and act as testbed for new, "smart" technologies. In a similar vein, Milton Keynes is also involved in several of Innovate UKs Catapult Centres (Future Cities; Digital; Satellite Applications, and Transport).

Milton Keynes is home to the Open University and Cranfield University (which specialises in science, engineering, technology and management) is nearby. In addition, University Campus Milton Keynes – a satellite to the University of Bedfordshire – has been in operation since 2013, and the aim is to develop the institution into a new, independent university.

Northamptonshire

There is a network of innovation and enterprise centres in Northamptonshire, which include:

- Corby Enterprise Centre

- Daventry iCon innovation centre

- Portfolio Innovation Centre [Northampton]

- Rockingham Park and UK Centre for future vehicle technologies

- Satra Innovation Park [Kettering]

- Scott Bader Innovation Centre [Wollaston]

- Silverstone Innovation Centre

- Waterside Enterprise Zone

- Wellingborough Innovation Centre

Northampton is home to the University of Northampton, and University of Warwick is not far away.

Source: SQW – based on consultations and a review of documentary material

---

[53] Including Santander, GE Healthcare, Volkswagen UK, Mercedes Benz, the Home Retail Group, and Red Bull Racing.

The changing geography of fast growth tech businesses – in the CaMKOx/ Northampton area and beyond

A final set of observations on the nature of the knowledge economy in the study area, its comparative performance and its changing characteristics is set out in Case Study 8. This derives from a database that is compiled annually to record the fastest growing tech businesses nationally. It is one perspective only on how the sector is changing – both locally and nationally – but the insights it provides are interesting, particularly when our focus is long term processes of change and evolving economic geographies.

Case Study 8: Insights from Tech Track 100

Introduction

There is a strong policy consensus that economic growth depends on the ability of firms to exploit technological innovation. In recent years, there has also been an increased focus on the importance on the role of a relatively limited number of 'high growth' firms in accounting for new job creation[54].

This case study looks at high growth businesses within the CaMKOx-N area in the wider national context and over time, and it does so with reference to data from the Sunday Times Hiscox Tech Track 100 league table of Britain's fastest-growing private technology, media and telecoms companies[55]. Established sixteen years ago, Tech Track provides annual insights into high performing businesses in the UK technology sector. In 2001, total sales of all firms on the list were £414 million. By 2016, total sales had risen to £2.2 billion.

Comparing the league tables from 2001, 2008 and 2016, we consider how the incidence of these businesses has changed, where they are located and the sectors in which they work. We also consider how some early high growth firms have fared over time.

---

[54] NESTA (2009), *The Vital 6 per cent: How high-growth innovative businesses generate prosperity and jobs*

[55] See http://www.fasttrack.co.uk/league-tables/tech-track-100/league-table/. Figures and information quoted in this case study are sourced from Tech Track, unless stated otherwise. Note that Tech Track 100 uses the London Stock Exchange's techMARK definition of a technology company as one that 'shows a commitment to innovation, research and product development' and operates in sectors including software, internet, telecoms and biotech'. Companies providing media and telecoms goods and services are also assessed. For the Tech Track list, companies were ranked by growth in sales over their last three years of available accounts. To qualify for inclusion on the list, firms must be independent, unquoted and with annualised sales of at least £250k in the base year and at least £5m in the final year. Payday lenders and pure computer sellers are excluded.

What the Tech Track data tell us…

The Tech Track database is small in scale, but it does provide a consistent "window" on growth businesses in a key part of the economy (and arguably that part of the economy which provided the rationale for identifying the CaMKOx-N area in the first place).

Reviewing the longitudinal time series, a number of observations may be made:

- **First, nationally, London and the Greater South East[56] dominate** (see Map 1). Some 70 of the firms on the 2016 Tech Track league table are located in London or the Greater South East, with 42 located in London itself. Since 2001, when it accounted for 63 of the top 100 firms, the Greater South East's dominance appears to have increased. What is also notable is the increasing apparent significance of firms located close to the major cities (such as Manchester and Newcastle, in addition to London)

- **Second, there is strong representation on the league table from the CaMKOx-N area.** Nine of the 2016 top 100 high growth tech firms (and two of the top 10) are located within the study area. This level of representation has remained broadly constant over time: the 2001 league table also included nine firms in the Corridor.

It should also be noted that there are also several high growth tech businesses just outside of the CaMKOx-N area, in Berkshire, Buckinghamshire and Hertfordshire, some of which have a strong functional relationship with institutions within study area. For example, Roc Technologies, the fastest growing firm on the 2016 national league table, is based in Newbury, and is engaged in an IT joint venture with Oxford University.

[56] 'Greater South East' comprises three former Government Office Regions – East of England, South East and London.

Map 1: Distribution of Tech Track 100 businesses in 2001, 2008 and 2016[57]
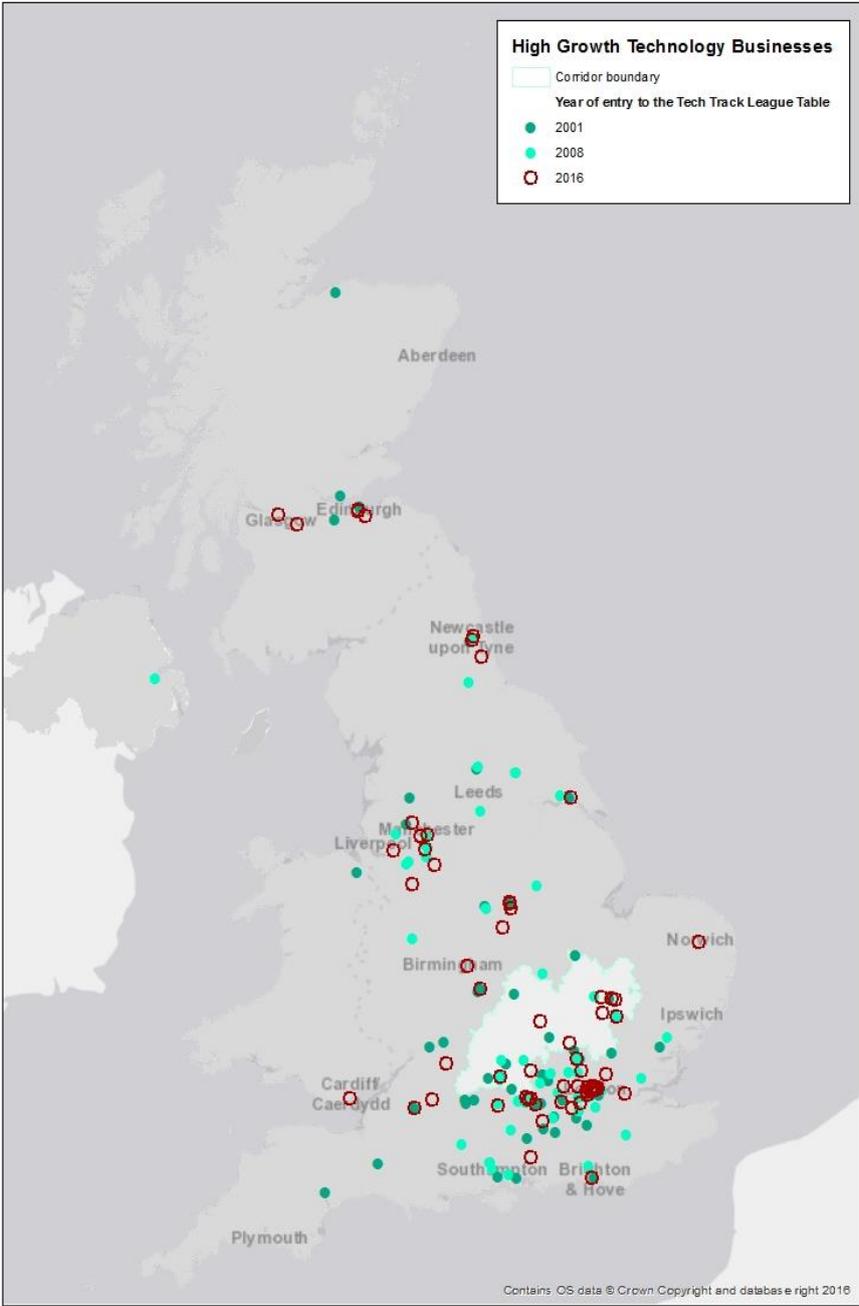
Source: Produced by SQW 2016. Licence 100030994. Contains National Statistics data (Code Point) © Crown copyright and database right [2016]

- **Third, within the study area, high-growth tech firms tend to concentrate**, particularly around Cambridge, which is especially well-represented on the 2016 league table. Over time, the representation of firms based in or near Oxford has

---

[57] Note that we were not able to identify current postcodes for some (although not many) of the Tech Track businesses from the earlier years. This may have been because of ownership (and name) changes.

been rather more erratic. In 2016, Oxfordshire claimed the fastest growing firm in the study area: Immunocore, a biotech firm based at Milton Park near Didcot, which last year raised £205 million from private investors – the largest financing for a private life sciences company in Europe so far[58]. However, fewer Oxfordshire firms made it onto the list in 2016 than in previous years, an observation consistent with research on recent changes in the distribution of high growth businesses across all sectors[59]. However, there is a need to be cautious in interpreting these data, given the number of emerging tech businesses in the area.

Representation in the central Milton Keynes-Northampton part of the Corridor has generally been lower, although in the 2016 league table, two businesses (in Luton and Milton Keynes) are among the top 100.

Map 2: Tech Track 100 businesses in the Cambridge, Milton Keynes and Oxford Growth Corridor
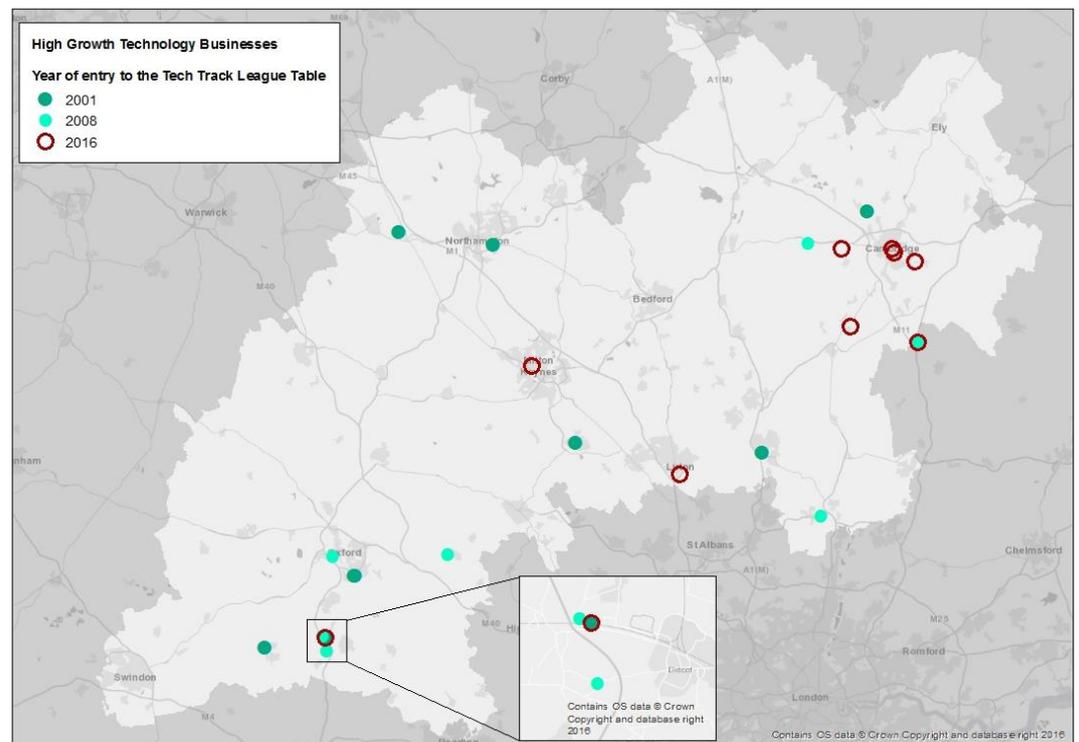
Source: Produced by SQW 2016. Licence 100030994. Contains National Statistics data (Code Point) © Crown copyright and database right [2016]

- **Fourth, the sectoral distribution has changed over time.** In 2008, all the 'top 100' firms in the study area were in the IT and software sector. In 2016, the composition of the list is more diverse, with four engaged in manufacturing or

---

[58] Tech Track 100, Research Report 2016, p.14

[59] Enterprise Research Centre (2016), *ERC Insight: Spatial Incidence of High Growth Firms*; *Financial Times* (2016), 'High growth companies create jobs and wealth. How can we create more of them?', 4 October

product design, perhaps reflecting the increasing blurring of the division between manufacturing, digital and service activity.

- **Fifth, most high-growth firms are young.** On the national league table, 97 of the 100 firms on the 2016 were founded after 2000; in the Corridor, all were established in 2002 or later, with the two fastest growing established in 2008.

Firm growth over the long term

Periods of high growth tend to be time-limited, and firms that exhibit high growth at one point in time frequently grow more slowly in the next period[60]. However, we do have evidence from *Tech Track 100* of firms have consolidated their early growth and expanded substantially. In all cases, these firms have seen recent changes in ownership. For example:

- **ARM**, the Cambridge-based company, appeared on Tech Track's predecessor list[61] in 1997 with sales of £16.5 million. It is now the world's leading silicon chip technology company – still based in Cambridge – and was sold to SoftBank in 2016 for £24.3 billion[62].

- **Cambridge Silicon Radio** appeared on the league table in 2003, initially developing new applications for Bluetooth technologies before expanding into connected vehicle and wearable devices and other 'internet of everything' products. It was sold to Qualcomm in 2015 for $2.2 billion[63].

- **Sophos**, the Oxford-based IT security firm, appeared on the league table in 2002. It was floated in 2015, valued at £1 billion[64].

Implications for the Growth Corridor – and for the UK

Although *Tech Track* 100 is one data source, and it does have limitations, it provides an important perspective on high growth (and one that is very influential, given its prominence within the *Sunday Times).* A review of three years of data suggests that overall, the CaMKOx-N area has maintained its position as an attractive place in which relatively young tech firms can grow. Indeed, the Greater South East generally, despite relatively high prices and infrastructure constraints, has become relatively more important over time. Looking to the future, four other observations are important:

- First, *Tech Track 100* hints at a possible **divergence between Cambridge and Oxford (and their environs)**, with the former providing progressively more examples of high growth businesses. This should be treated with caution

---

[60] Coad, Alex *et al* (2014), *UK Innovation Survey: Innovative Firms and Growth*, BIS

[61] Fast Track: the separate Tech Track list was not published until 2001.

[62] Tech Track 100, Research Report 2016, p.8

[63] Ibid.

[64] Ibid.

however – and the current fastest-growing firm listed in the area is Oxford-based.

- Second, **the sectoral distribution** of high-growth tech firms is changing, with increasing representation from firms in the manufacturing sector and greater challenge to conventional sector definitions.

- Third, this blurring of sector definitions may present **opportunities for new growth in areas of 'traditional' sector strength**. For example, Chargemaster, based in Luton, designs and manufactures electric vehicle charging solutions, working with a number of leading manufacturers and building on Luton's strong automotive heritage

- Fourth, even from within the "ivy league" of *Tech Track 100,* it is striking how **few of the firms identified in the early years have really grown to global significance**. ARM is one exception from the early years of the index, Sophos is very significant from the middle years and Immunocore seems to be well on its way to becoming a third – but for others, an impressive period of growth has not been consolidated. The reasons for this are many and varied, and they have been a focus for substantial research, but in considering the potential of the study area as a "*single knowledge-based cluster that can compete on a global stage*", they are important.

Source: SQW – based on an analysis of data from the Tech Track 100 database

Broadly, the analysis from Case Study 8 confirms that the CaMKOx-N area is home to some fast growth businesses; that these are changing in sectoral mix; and that the area's role in these terms is not unrelated to a wider phenomenon across London and the greater south east. It is very hard to review these data and conclude that there is a *single* knowledge-based cluster in the CaMKOx-N area. On the other hand, the fact that all parts of the area have some *Tech Track 100* business suggests that all have "something *to offer*". Ten years ago, the contribution of "the middle" was less in evidence as the findings from Case Study 4 bear out.

4.4   Evidence from elsewhere

Our final group of case studies looks outside the UK for examples of economic corridors. The three we have considered vary substantially from each other and all are substantially bigger in scale than our study area. Nevertheless, read together they provide some important insights.

Case study from China
Case Study 9 (below) is from China. It demonstrates what can be achieved through transformational investment in infrastructure at scale. The scale and pace of change are very significant indeed.

Case Study 9: Guangzhou-Hong Kong Corridor

Introduction

The Guangzhou to Hong Kong corridor is located on the eastern side of the Pearl River Delta in southern China. It covers an area approximately 100 miles north to south, and 30 miles east-west. It is now home to a population of around 50 million, including over 30 million in the three main cities of Hong Kong (7.3m), Shenzhen (10.7m) and Guangzhou (12.5m), and has become one of the most important concentrations of export oriented industrial production in the world.

There have been river trade links between Guangzhou (formerly Canton) and Hong Kong since the founding of Hong Kong in 1842, and the first rail link between Hong Kong and Guangzhou was completed in 1911. However, the Communist revolution closed external communications, which were not fully restored until the instigation of China's "Open Door Policy" by Deng Xiaoping in 1978. A through-train service was re-started in 1979, and this, together with the establishment of a 'Special Economic Zone' across the border in Shenzhen (offering substantial benefits to foreign export oriented firms) stimulated a wave of investment by Hong Kong firms. Initially this involved moving manufacturing activities from flatted factories in Hong Kong to larger, more modern industrial buildings just across the border to Shenzhen, and then further north to Dongguan and Guangzhou. The principal manufacturing focus was clothing and textiles, plastics and electronic and electrical consumer goods.

This stimulated a huge influx of migrant labour from elsewhere in China, and a mass migration from rural to urban areas within the Pearl River delta. It also stimulated a gradual improvement in basic infrastructure, including transport – initially playing catch up to the scale and pace of growth, but over time helping to stimulate and shape further growth.

Over time, investment diversified and shifted from basic assembly operations in low value sectors such as clothing into sectors and activities requiring higher skill levels. Rapidly increasing costs led to much of the low value activity moving further north to lower cost locations elsewhere in China. Guangzhou, Dongguan and Shenzhen also became major cities in their own right, rivalling Hong Kong in the scale and sophistication of services to support industrial growth. Shenzhen hosted China's first stock exchange on which foreign owned shares could be traded, and Guangzhou - already the administrative capital of Guangdong Province – became in addition the commercial capital of the northern part of the Pearl River Delta. The western side of the river lagged behind the eastern side because there was no direct land link from Hong Kong, but the creation of fast road and rail routes between Macau, Zongshan and Guangzhou, together with fast water transport to Hong Kong from the western side of the delta, stimulated growth on both sides of the river.

The role of Infrastructure investments

The Pearl River Delta required huge investment in all forms of infrastructure, as before the Open Door Policy it was almost entirely agricultural, with very basic infrastructure. Both public and private sectors invested in the supply of power, clean water, sewerage, ports, and all forms of river and land transport. The road network density in the corridor grew four fold in the 20 years 1980 to 2000, including a new dualled highway between Guangzhou and Shenzhen, on the border with Hong Kong (there was already a highway from the urban area of Hong Kong to the border). In addition, by the early 2000s there were 12 express trains a day each way between Hong Kong and Guangzhou, and 60 in total between Shenzhen and Guangzhou.

The dramatic improvements in transport infrastructure enabled an equally dramatic increase in urbanisation and industrialisation. The built up area within the corridor increased by nearly 60% 1990 to 2005, most of it within one kilometre of the main highway between Guangdong and Shenzhen. Similarly, there has been very high density development around the main rail stations on the line between Hong Kong and Guangzhou, and a much greater integration of economic activity along the corridor. For example, the role of Hong Kong Productivity Council changed dramatically during the 1980s and 1990s from an exclusive focus on providing technology and management support to firms in Hong Kong to supporting many firms operating in the Pearl River Delta. HKPC would not have been able to do this without the dramatic improvement in transport along the corridor, particularly the rail services. The broader integrative effect is noted in a 2005 article in the Chinese Geographical Science journal: the rail line between Hong Kong and Guangzhou has "tended to integrate part of central and northern Shenzhen and Dongguan and the western and southern part of Guangzhou, and including a number of new towns as well as rapid expansion of existing urban areas along the routes"[65].

Future development

China has made huge investment in high speed rail over the last 10 years. This includes a new dedicated track between Beijing and Hong Kong, which is being opened in stages between 2011 and 2018. The Shenzhen to Guangzhou section opened in 2011, and the final section between West Kowloon (in the centre of Hong Kong) and Shenzhen (including 26 km of dedicated underground track) will be completed in 2018. Once the high speed line is fully open, the fastest journey times between Hong Kong and Guangzhou will reduce from 1 hour 53 minutes to 48 minutes, and between Hong Kong and Beijing from 24 hours to just over 8 hours.

Source: SQW – based on experience of SQW projects undertaken in Hong Kong and the Pearl River delta, on the references article in Chinese Geographical Science, and on various press releases and other publications on the rail and road links between Guangzhou and Hong Kong

---

[65] Evolution and development of the Guangzhou-Hong Kong Corridor; LI Ping, Cao Xiao-shu; Chinese Geographical Science, Volume 15, Number 3, pp. 206-211, 2005

The circumstances leading to the extraordinarily rapid development of the Pearl River Delta as a globally significant industrial and urban area are obviously very different from those pertaining in the CaMKOx-N area. However, it is of more general relevance that the two most important factors leading to the development of the corridor between Hong Kong and Guangzhou concerned the institutional and incentive framework, and infrastructure investment:

- China's Open Door Policy, part of which was the designation of Special Economic Zones, was fundamentally different from previous government policies towards foreign direct investment and enabled Hong Kong businesses to expand dramatically into neighbouring areas which were much lower cost and less space constrained

- Investment in basic infrastructure, particularly road and rail links, enabled this expansion: without the huge investment in infrastructure by national and provincial governments in China, and by the private sector, it is very unlikely that the Open Door policy would have worked as effectively and rapidly as it did.

In addition, even allowing for the significant differences, the development of the Hong Kong to Guangzhou corridor raises some important issues:

- The inter-relationships between transport infrastructure, urbanisation and economic development in the Pearl River Delta are very strong. Industrialisation, population growth and economic growth was dependent on, and stimulated by, investment in good road and rail links along the Guangzhou – Hong Kong corridor. There is extreme clustering of urban development around the transport nodes and along the road corridor, whilst industrial activities have tended to be displaced to suburban areas by rapid inflation in land values

- A current conundrum is how to coordinate long-distance transport and short-distance transport. Whilst there has been huge investment in inter-urban transport, many of the towns and cities along the corridor suffer from inadequate local transport infrastructure, serious congestion, and poor connectivity with the inter-urban road and rail networks

- The problems of coordinating investment in strategic and local infrastructure is accentuated by the fragmented local government structure along the corridor. The Chinese Geographical Sciences journal article points out (in imperfect English) that "*the corridor will have to cross several different administrative municipalities. In order to realize the smooth development of the whole corridor, compromises have to be reached among different administrative bodies, municipal government of different levels as well as all kinds of government policies*".

Case studies from continental Europe

Case Studies 10 and 11 are, perhaps, more familiar. Both involve national boundaries. The first, focusing on the Eindhoven-Leuven-Aachen Triangle, has been a long term project to effect genuine co-operation across national boundaries in order to try and realise some potential synergies linked to innovation. Significant resource has been devoted to it over a fifty-year period

and its sustainability is still a matter of discussion. The second is concerned with the Øresund and it provides a real insight into the consequences of a major change in connectivity between two cities which are separated not only by a national boundary, but also by a seven-mile stretch of sea (the Øresund strait).

Case Study 10: The Eindhoven-Leuven-Aachen Triangle (ELAt)

Map 3: The ELAt area

Source: Produced by SQW 2016. Licence 100030994. Includes National Geographic, Esri, DeLorme, HERE, UNEP-WCMC, USCS, NASA, ESA, METI, NRCAN, GEBCO, NOAA, and increment P Corp data

Context

The cross-border area that connects three leading centres of economic activity in Europe – the Randstad (the Netherlands), the Flemish Diamond (Belgium), and the Ruhr Valley (Germany) – has long been a source of political and economic interest. Depending on the definition[66], the region is home to more than 8 million people distributed across a number of medium-sized cities – including, among others, Eindhoven, Leuven and Aachen (the "corners" of the Eindhoven, Leuven and Aachen triangle, henceforth ELAt). The cross-border area is relatively compact, has a high population density, and enjoys relatively good interconnectivity by road and rail[67]. It is home to 7 universities, a host of innovation and technology-transfer organisations and a great number of R&D intensive multinational companies.

---

[66] These figures are based on the TTR-ELAt geography

[67] While some areas could benefit from improved accessibility, it is by no means regarded as a significant hindrance to the region's ongoing development

The major motivation for cross-border cooperation has been to promote processes of integration and cooperation in order to create a functional geography with the critical mass required to compete as an innovation leader in Europe. As a result, since at least the mid-1950s, initiatives have been pursued in order to promote and coordinate activity across the region. These include:

- **Meuse–Rhine Euregio**, one of the first examples of cross-border cooperation in Europe. It was founded in 1976 (with judicial status achieved in 1991), with the objective of reducing barriers to the flow of people, goods and services across borders. It now forms part of the EU Interreg programme (see below).

- **TTR (Top Technology Region)**, which was formed in 2004. This was led by the province of Limburg (the Netherlands) and Vlaams-Brabant and Limburg (Belgium), along with Catholic University Leuven (K.U. Leuven), Hasselt University (UH), Maastricht University (UM) and Maastricht UMCT+ in order to promote cross-border innovation and technology transfer (principally in healthcare, materials and clean tech).

- **ELAt (Eindhoven-Leuven-Aachen triangle)**, which was established in 2004 largely through the efforts of the city mayors. It was subsequently led by the Eindhoven Regional Government (SRE), alongside Aachen's Regional Development Agency (AGIT), the authorities in each city (Eindhoven, Leuven and Aachen) and one university, KU Leuven Research & Development.

- **The TTR-ELAt initiative**, formed in 2009 as a merger of the TTR and ELAt projects. The ambition was to continue to "*foster, with a bottom-up approach, a 'technology hotspot' in a knowledge-rich functional region*", as enshrined in the Liège Communiqué of 2008.[68]

Many of these programmes have received some level of EU funding, particularly as part of the Interreg programme. This currently includes three major cross-border, territorial cooperation projects under the Europe 2020 Strategy.[69]

Realising the potential of the cross-border area

The conclusions of a recent OECD (2013) report suggest that the strength, ambition and quality of the key agents from the public, private and third sectors involved in the promotion of cross-border region are as much a feature of the region's success as they are of the challenges it faces to genuine integration. Perhaps the most significant challenge is the presence of competing institutional structures (TTR-ELAt and the Euregio Meuse-Rhine areas), strategies, and financing arrangements. The lack of a powerful, coordinating body has resulted in a range of fragmented, ad-hoc projects that have proved difficult to monitor and sustain, each having additional implications in terms of

---

[68] OECD (2013) The Case of the Top Technology Region/Eindhoven-Leuven-Aachen Triangle (TTR-ELAt) – Regions and Innovation: Collaborating Across Borders

[69] Germany-The Netherlands (Deutschland-Nederland), Belgium-Germany-The Netherlands (Euregio Meuse-Rhine), and Belgium-The Netherlands (Vlaanderen-Nederland).

building a regional "brand". The result has been a plethora of projects, rather than any sense of a sustained initiative to promote the ELAt.

A related issue is that of financing. There are no dedicated public funds supporting cross-border initiatives, with a considerable reliance on EU Interreg funds for catalysing projects (including ELAt in 2004, and TTR-ELAt in 2009).

There is some evidence of competition across regional public bodies. This means that opportunities to align policymaking and financing are not always realised. One example is the recent development of "smart specialisation" strategies where very few connections across the ELAt area were, and are being, made. However individual areas are moving forward. In Eindhoven, for example, "Brainport Eindhoven" suggests that local governance structures and relationships across public institutions are strengthening the city's knowledge economy.[70]

Initiatives (such as EURES, a provider of cross-border labour market information, and the University of Maastricht's Knowledge Centre for International Staff) provide examples of projects designed to effect integration, but more is needed to have major impacts. Moreover, unlike some other cross-border areas (for example, the Oresund), few data are collected on measures of cross-border integration across ELAt. This applies in general terms – for those interested in the performance of the area – but also in practical terms.[71]

Nevertheless, it is self-evident that ELAt contains a great number of significant assets, spread across universities, research institutions, networks of science parks, as well as major multinational companies. There is some evidence to suggest dense cross-border inter-firm, labour market and knowledge flows, and ELAt's constituent parts do represent "innovation leaders" within Europe. For example, data on EU-subsidised innovation and R&D projects (under the FP7 scheme) suggests that between a fifth and a quarter of such projects involved at least two different areas within the TTR-ELAt.[72] Another example is an Interreg-supported cross-border Innovation Voucher scheme that was able to support 21 projects (comprised of 69 cross-border organisations).[73] Moreover, companies like Philips (the technology firm with several locations across ELAt area[74]) play an active role in promoting (and in several cases acting as the forerunner to) cross-border projects. Several other firms, including Ford, DSM and SABIC, also operate in at least two of the ELAt countries, each actively pursuing policies of open innovation.

---

[70] Horlings, L. G. (2013). Leadership, governance and place in the knowledge economy: the case of Brainport Eindhoven in the Netherlands, Paper for the Regional Studies Association European Conference.

[71] OECD (2013) p.28

[72] See http://helios-eie.ekt.gr/EIE/bitstream/10442/14075/1/Session4-D-KINDEREN.pdf (slide 7, accessed 7/10/2016)

[73] See the Top Technology Cluster (TTC) Innovation voucher scheme, in operations between 2010-2014, see http://www.ttc-innovation.eu/fileadmin/ttc/media/download/Booklet_TTC_closing_conference.pdf

[74] Including the Philips High-tech Campus in Eindhoven, Philips Research Eindhoven, and Philips Research Aachen.

Conclusions

Parts of the area thrive, with only limited evidence of the area functioning as a broader functional region, particularly in strategic and policy terms. Eindhoven has, for example, been singled out by some as "the smartest region in the world"[75], but initiatives that have supported the development of the city's knowledge economy (such as Brainport Eindhoven) are only very loosely linked to other parts of the ELAt. The OECD's (2013) review of the ELAt echoes this point, highlighting the need for greater resources for cross-border governance – an issue that has been known for some time but remains a persistent challenge to realising the ELAt's full potential.

Source: SQW, based largely on an OECD review of the "Top Technology Region/Eindhoven-Leuven-Aachen Triangle", published in 2013, and supplemented with additional documentary material (sources cited in the text)

Case Study 11: The Øresund

Map 4: The Øresund

Source: Produced by SQW 2016. Licence 100030994. Includes National Geographic, Esri, DeLorme, HERE, UNEP-WCMC, USCS, NASA, ESA, METI, NRCAN, GEBCO, NOAA, and increment P Corp data

Origins

The Øresund is a transnational area that spans parts of Denmark and Sweden. It covers an area of 21,000km^2 and is bisected by the Øresund strait with separates the regions of Sjælland (Denmark) from Skåne (Sweden). Despite the lack of a direct connection or land border, the Øresund has a long history of cross-border interaction[76]. It is home to 3.8 million inhabitants – equivalent to 25% of the combined population of Denmark and Sweden – of which approximately two thirds live on the Danish side. The area is largely

---

[75] As declared by the Intelligent Community Forum – a think tank and network organisations - in 2011

[76] Nordic countries have historically drawn up a range of agreements, treaties and conventions to support cross-border trade and integration. More specifically, until the mid-17th century the region of Skane (the Swedish part of the Oresund) was part of the Danish Kingdom, and recognised Danish as its official language until the early-19th century.

specialised in services (78% of jobs), but sizeable pockets of manufacturing still exist outside of the metropolitan areas.

The idea of a connection across the strait was conceived as early as the end of the 19th century[77], but was realised in July 2000 with the opening of the Øresund Fixed Link. The Link comprises a 16km bridge and tunnel connecting Denmark's capital, Copenhagen, with Sweden's third largest city, Malmo. Its completion provided the first reliable, direct connection between the two metropolitan areas and reduced travel times between each city centre to 35 minutes by rail, replacing ferry services which took in excess of an hour (including checking in and boarding the ferries)[78].

Impact

The Øresund Fixed Link has been described as a "*textbook example of successful cross-border regionalization and integration processes*".[79] In the immediate years following its opening, levels of integration (commuting and collaboration) increased significantly, albeit initially more slowly than expected. Prior to the opening of the Bridge, approximately 2,600 commuters made the ferry journey across the Danish-Swedish border daily[80]. By 2008, commuting peaked at around 20,000 people daily with approximately 19,100 from the Swedish Øresund to the Danish side, and 700 in the opposite direction. Since 2008 – as a consequence of financial crisis, as well as processes of convergence – integration has slowed. For example, the majority of commuting flows from Sweden to Copenhagen reflected wage and cost of living differentials (especially in housing), both considerably higher in the latter. As these markets have adjusted and as prices have somewhat converged, these processes have naturally slowed.[81] More recent data, from 2014, suggests that around 15,000 people commute across the strait daily, around 14,400 (or 3% of the region's 600,000 employees) from Sweden-Denmark, and 1,000 (fewer than 0.1% of the region's 1,300,000 employees) in the other direction[82].

---

[77] Nauwelaers, C., K. Maguire and G. Ajmone Marsan (2013) The case of Øresund (Denmark-Sweden) – Regions and Innovation: Collaborating Across Borders, OECD Regional Development Working Papers 2013/21, OECD Publishing

[78] Möller, K. (2010), "Ex-post evaluation of the Interreg III Community initiative funded by the ERDF: Evaluation of the Interreg IIIA Øresund (Denmark/Sweden)", report to the European Commission, Brussels.

[79] Metzger and Olesen (2016) The Region is Dead, Long Live the Region: the Øresund Region 15 years after the Bridge, in Albrechts, L., Balducci, A., Hillier, J. (eds.). Strategic planning: an international perspective, Routledge, London.

[80] McEwan, N. and Petersohn, B. (2014) Spotlight on Borders: Insights from the border between Sweden and Denmark, Scottish Centre on Constitutional Change

[81] While house prices have declined by around 12% since 2006 in Greater Copenhagen, prices in Greater Malmo have increased by 20% according to data on one-family homes collected by the Øresund Databank.

[82] Statistics derived from the Oresund databank, see http://www.orestat.dk/ (accessed 4/10/2016)

Figure 4-3: Changing patterns of commuting (between the Danish and Swedish parts of the Øresund)
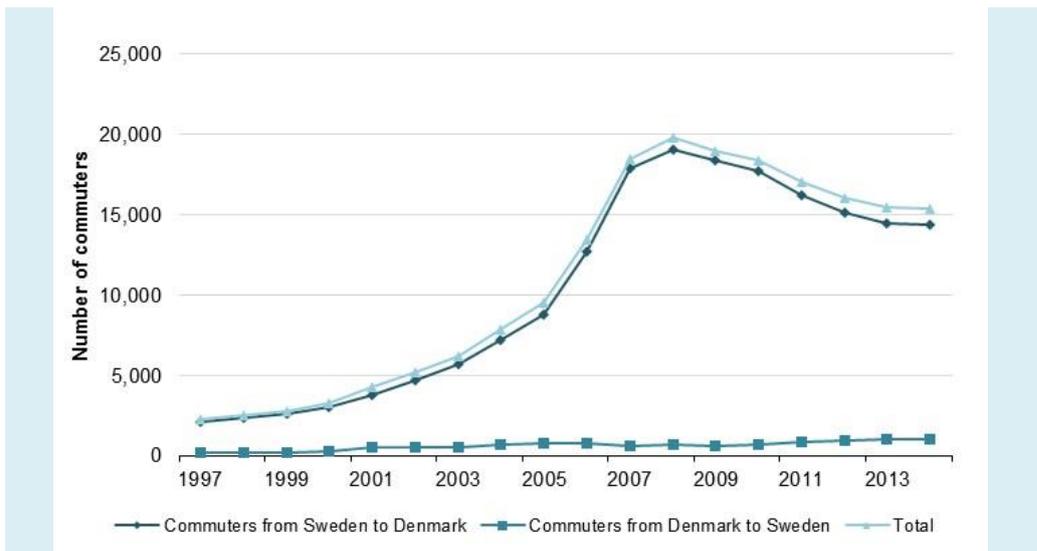
(Source: Øresund Statbank (http://oresund.statbank.dk/)

The Øresund has long had a reputation as a European leader in biotechnology. Since the founding of the Carlsberg Laboratory in 1875[83], the Øresund has developed a range of competencies in, inter alia, high-technology services, life sciences, biotechnology, pharmaceuticals and electro-medical equipment. Collaborations among the area's 14 universities have played significant roles in this process, and continue to do so today. The area is also home to a number of long-standing research-intensive centres and large, research-intensive pharmaceutical MNEs (including Novo Nordisk, LEO Pharma, Lundbeck, and, until recently, Astra-Zeneca).

While collaboration between the universities, in particular, as well as businesses in the Øresund existed prior to the bridge's construction, the new link increased cross border collaborations. This has most clearly been seen in scientific research, which was supported by existing initiatives to promote linkages across Nordic Universities, as well as the activities of new institutions founded to complement the Øresund Fixed Link. The public, private and academic sectors all have roles in contributing to supporting integration and promoting cross border collaboration, of which the principal organisations include:

- The **Øresund Committee** – established in 1993 as the decision to build the bridge was formalised, and replaced two pre-existing cross-border organisations – was a voluntary political forum charged with, among other things, promoting cooperation at all levels across the sound and safeguard the interests of the region before the national governments of Denmark and Sweden.

- The **Øresund Institute** is an independent centre that analyses and promotes knowledge-based developments across the region. In partnership with the

---

[83] Established by the famous brewery, the Carlsberg Laboratory was tasked with advancing biochemical knowledge. It can be credited, for example, with the invention of the pH scale by Danish chemist Søren Peder Lauritz Sørense.

region's 14 universities, the Institute publishes a range of research to stimulate debate and promote the Øresund internationally.

- The **Medicon Valley Alliance** was founded in 1997 (originally as the Medicon Valley Academy) following informal discussions in 1992 as construction on the Fixed Link took off. Primarily an initiative of the Universities of Lund and Copenhagen, as well as large pharmaceutical companies in the region, its objective is to promote and develop the region's knowledge and talent base, with an emphasis on life sciences.

- The **Øresund University** was network organisation founded in 1993 and comprised of 12 Øresund higher education institutions. It was tasked with promoting cooperation between the local universities, as well as linkages between industry and society and the regional "Øresund" brand until it ceased to operate in 2012.

- The **Øresund Science Region**, created in 2001, is a not-for-profit organisation focussed on promoting networking between companies, universities, and public intuitions across a range of thematic areas.

There have, in addition, been a number of businesses relocating to the area since the opening of the fixed link, including the location of IKEA's global strategic head office, as well as Mercedes-Benz, Honda, Peugeot and Orkla.[84] Other significant developments include the construction of two world-class scientific infrastructures: the MAX IV laboratory (completed in June 2016) and the European Spallation Source (ESS).[85] Both are located in proximity to Lund University, where there is significant expertise in the relevant fields. Also important is the connectivity to, and presence of, major research-intensive institutions in the Øresund area, which in combination played a major role in the location decisions.[86]

More generally, the impact of the bridge in socio-economic terms has been estimated, from the Danish perspective, at contributing around EUR 740 million in value added as a result of commuting annually.[87] Moreover, a recent evaluation suggests that more than half of the construction costs were already recouped within the first 10 years of

---

[84] See http://www.malmobusiness.com/en/articles/head-offices (accessed 5/10/2016)

[85] While the ESS facility is being constructed in Lund, the ESS Data Management and Software Centre (DMSC) is to be located in Copenhagen, illustrating the linkages across the Øresund. The project, costing EUR 1.8 billion, is set to become the world's largest and most advanced research facility for neutron-based research.

[86] Nauwelaers, C., K. Maguire and G. Ajmone Marsan (2013) The case of Oresund (Denmark-Sweden) – Regions and Innovation: Collaborating Across Borders, OECD Regional Development Working Papers 2013/21, OECD Publishing

[87] McEwan, N. and Petersohn, B. (2014) Spotlight on Borders: Insights from the border between Sweden and Denmark, Scottish Centre on Constitutional Change

operation, and over a 50-year period using a medium growth scenario, a cost-benefit ratio of 2.2 (an internal rate of return of 9%) is set to be realised.[88]

Lessons

An important foundation for the successes of the Øresund Fixed Link was the strong (local) political backing received from both Danish and Swedish policymakers. This was supported by higher education and research institutions, and to a lesser extent by multinational companies (largely in pharmaceuticals and biotech) and the EU (through the Interreg programme). An interesting feature in this respect is the increase in local policy-making capacity, particularly in Sweden, that occurred in parallel to the opening of the Link. The development of "regional growth strategies" in Sweden in the early 2000s, also seen more recently in Denmark, served to further empower local actors to support the range networking institutions active in the area, as well as allowing for more locally-driven strategies to promote economic development in the wider Øresund area.[89]

Another important feature of the project was, and remains, its high visibility, based on a clear functional, efficiency-driven, rationale to achieve a greater critical mass in the Øresund, as well as to elevate a united "Øresund identity" – one that maximises the benefits of integration and cross-border dynamics – in order to "stand out as the most attractive and climate-smart region in Europe" (Øresund Committee, 2010a – in OECD).

More recently, the evidence suggests that levels of local public commitment have not always been matched by strong bottom-up engagement or financing from the private sector. This has led to some sense that as levels of integration have slowed, momentum has been lost. An indication of this is the replacement of the "Øresund brand" by something new, based on the reputation of the area's core city, "Greater Copenhagen". This is seen as an attempt to create a brand more efficient in attracting investments, visitors and new residents in order to reinvigorate integration processes within the Øresund.[90] Nevertheless, it is clear that the combination of public, private and academic actors engaged in the Øresund integration project, linked via loose network organisations, have been are a real source of its success, and have supported the development of a flexible and adaptable institutional setting.[91]

Source: SQW – based on a review of documentary material (references in the text)

The Case Study of the Øresund – in particular – raises some important insights in relation to the principal levers which might create a functional economic area from (in this case) two city economies that have "grown up"

---

[88] Knudsen, MA. and Rich, J. (2013) Ex post socio-economic assessment of the Oresund Bridge, Transport policy, Vol. 27, pp. 53-65

[89] Technopolis (2005) Public policies to support "Hot spots" in Europe (Volume II: Quick scan)

[90] Metzger and Olesen (2016) The Region is Dead, Long Live the Region: the Øresund Region 15 years after the Bridge, in Albrechts, L., Balducci, A., Hillier, J. (eds.). Strategic planning: an international perspective, Routledge, London.

[91] Collinge, C. and Gibrey, J. (2010) Place-making and the limitations of spatial leadership, *Policy Studies, 31 (4), pp. 475-489*

independently. It suggests, first, that a step change in connectivity does affect patterns of commuting in a reasonably significant way, particularly if there are differences in house prices. Second, however, although wider changes consistent with two city economies effectively functioning as one take longer to emerge, they do eventually happen. Third, it points to the importance of building up institutional capital – and effectively investing in the relationships on which effective collaboration depends. This third dimension is important and it is often overlooked. It suggests that connectivity is important, but it is not sufficient.

4.5   Conclusions

The case studies presented in this chapter provide a complex mix of insights that are impossible to summarise simply. A few concluding observations however can be made. All five are of wider importance:

1. **First, scale and connectivity are important in developing specialist labour markets which support excellent research and the growth of knowledge-intensive companies.**

   The case study on bioscience makes this point, but so do the case studies on high performance technology and motorsport and on Øresund. The experience of changes in Cambridge/London links once transport between the two was improved shows just how much can be achieved and how important it is. Also the failure of many high potential companies in Cambridge and Oxford to really scale up can be attributed – in part – to scale of the specialist labour markets. Whilst some companies have grown successfully, their business models have often been adapted to reflect local conditions (ARM in Cambridge and both Sophos and Evotec in Oxfordshire are all examples[92]).

2. **The scale and quality of research, tech business activity and specialist funding and business services in the CaMKOx-N area is huge (and the area has two of the top four universities world-wide), but it is currently very disjointed compared with international comparators.**

   Although impossible to "prove", the international competitiveness of the whole area would be increased by greater connectivity, and international competitiveness is extremely important for the future of the UK economy. The Hong Kong-Guangzhou and Øresund case studies show just how much difference high quality transport infrastructure makes to economic integration.

3. **Governance is critical in relation to the scale and pattern of growth.**

   The growth of the Cambridge area owes much to strong and effective governance in a growth context which was and is intrinsically challenging: an underbounded city, with strong heritage assets and surrounded by green belt. Equally the role and legacy of the

---

[92] See Oxfordshire Innovation Engine. Report by SQW (2013) to the University of Oxford and Oxford Trust

Development Corporations – particularly that of Milton Keynes – are important.

4. **Although the transformational impact of the infrastructure required to create a functional corridor is impossible to demonstrate conclusively *ex ante*, "the middle" of the CaMKOx-N area has "matured" as a partner in this endeavour, and the potential benefits to the two "ends" have become clearer.**

   This contrasts somewhat with the last big initiative in this domain, which was launched well over a decade ago. In important respects, this at least needs to be seen as "de-risking" the investment required to create a single, globally competitive, knowledge-based cluster.

5. **It would be folly to assume that long term economic growth can only be incremental (and therefore reasonably predictable) in both geography and composition.**

   The Redcliffe-Maud Report from the late 1960s did not really anticipate the potential growth that could be generated through the commercialisation of world class knowledge. While any foresighting process is inevitably fraught, it needs to be recognised that there are also risks linked to solutions which are only ever incremental. This is particularly the case in the context of increasing global competition which is increasingly inconstant in both form and source.

5   Projections and Scenarios

5.1   Introduction

This chapter describes the process of scenario development and presents the results for population, employment, and productivity across the study area.

There are three scenarios developed as part of this process, based on the following assumptions:

Business as usual   Existing levels of housing delivery are maintained (which are below those required to address the level of housing need identified in Strategic Housing Market Assessments (SMHAs)). The ONS principal population projection is realised. Existing infrastructure commitments and plans from CP5 and CP6 are carried through, with basic infrastructure improvement and maintenance carried out but no further ambitious schemes realised.

Incremental Enhancements   The requirements identified in SMHAs are met. An increase in population is realised in line with the ONS high migration projection. Transport infrastructure investments are made above and beyond the existing plans. Several existing constraints to economic growth are relieved.

Transformational Enhancements   Housing investment is such that population grows well above the ONS high migration scenario. A high level of transport investment is realised, allowing an increase in economic integration. The study area moves towards the vision of becoming a functional economic corridor and a *globally competitive knowledge cluster.*

Effort has been made to ensure the scenarios are constructed in a robust and methodological manner, but the resulting numbers should not be interpreted as a prediction or projection as to what we think will happen. They are merely constructed to serve as the starting point in a "what if" assessment.

The results for each scenario will be described consecutively in sections 5.3 to 5.5, before being analysed and compared in section 5.6.

5.2   Scenario development

The economic scenario development process is an iterative one. Initially, basic assumptions are made about the most likely national economic picture, projected housing and population scenarios, and some expectations regarding planned transport investment. Using these assumptions, the likely spatial and sectoral patterns of economic growth within the study area begin to emerge.

Effort has been made to ensure the scenarios are constructed in a robust and methodological manner, but the resulting numbers should not be interpreted as a prediction or projection as to what we think will happen. They are merely constructed to serve as the starting point in a "what if" assessment.

The scale and nature of the potential economic impacts, the nature of the interlinkages between population, employment, housing and infrastructure, the potential impact of connectivity enhancements on growth and collaboration, and the role of knowledge intensive sectors in driving economic growth have all been informed by the key conclusions highlighted in Chapter 4.

Exogenous factors In each scenario, certain factors have been calibrated exogenously. These include population projections taken from the ONS, UK level forecasts of GVA and employment growth, and the relative employment and productivity growth rates of two key sectoral aggregates: High-tech Manufacturing (HTM) and Knowledge Intensive Business Services (KIBS).

These exogenous factors are used as inputs to calculate the total employment and GVA growth rates within the four major sub-regions of the study area.

Context The context behind these scenarios is the recent history of knowledge-based sectors in the corridor, with the very different employment trends being seen in the KIBS and HTM sectoral aggregations. Overall in the corridor, the main driver of employment growth has been KIBS, whereas the main driver of productivity growth has been HTM, and this pattern is expected to continue, with some caveats, going forward.

Of particular note in Table 5-1 is the consistency of both total employment growth rates at between 0.8% and 1% pa, and KIBS employment growth across the corridor at 2% pa, but the variability of employment growth in HTM, with Cambridge and Oxford roughly stable, but employment levels in Milton Keynes and Northampton shrinking. Productivity growth in HTM has been roughly double the rate of productivity growth in KIBS, reflecting the increased exposure of HTM to efficiency improvement brought about through technical change. Overall productivity growth is seen to have been historically higher in the Cambridge, Oxford and Milton Keynes sub-areas (1.5-1.9%pa) than in the Northampton area (1.1%pa).

Table 5-1: Summary of employment growth in the study areas over 1990-2014 (% pa)

	Growth Rates %pa 1990-2014	Greater Cambridge-Northern Hertfordshire	Oxford-Swindon	Milton Keynes-Bedfordshire-Aylesbury Vale	Greater Northampton	CaMKOx Corridor
Total	*GVA*	2.5	2.8	2.3	2.2	2.5
	Employment	0.9	0.8	0.8	1.0	0.9
	Productivity	1.6	1.9	1.5	1.1	1.6
KIBS	*GVA*	4.0	4.9	4.2	3.3	4.2
	Employment	2.0	2.3	2.0	2.1	2.1
	Productivity	1.9	2.5	2.1	1.2	2.1
HTM	*GVA*	4.4	5.7	-0.6	2.8	2.9
	Employment	-0.2	0.2	-3.3	-2.2	-1.4
	Productivity	4.6	5.4	2.7	5.1	4.3

5.3   Baseline Projection

Assumptions & methodology This scenario represents a prospective future in which the minimum level of intervention is executed to improve infrastructure provision within the study
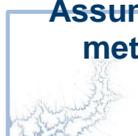
area. In this scenario, population is assumed to grow at the ONS's central principal projection.

To generate district level forecasts for this scenario, CE's Local Economy Forecasting Model (LEFM) was employed. This is an econometric model that starts with national sectoral forecasts, and on the basis of historic linkages and economic specialisations, distributes the growth in sectoral employment and GVA across the UK's 406 local authority districts. The model uses data going back to 1970 to quantify long term, medium term and short term trends and relationships, and projects forward as far as 2050.

The national level sectoral results upon which the LEFM output is based are generated by the Multi-sectoral Dynamic Model (MDM-E3) model. The parameters of the behavioural relationships in MDM-E3 are estimated econometrically over time, within limits suggested by theory, rather than imposed from theory. The economy is represented as being in a continual state of dynamic adjustment, and the speed of adjustment to changes (in, for example, world conditions or UK policies) is based on empirical evidence.

The net result of this modelling output is a highly disaggregated set of projections, with 45 individual sectoral projections, incorporating both employment and GVA, for the 26 LADs in the study area. In order to analyse these results, we have aggregated the sectoral projections up into three groups: High-tech Manufacturing, Knowledge Intensive Business Services, which we have grouped together as "Knowledge Based Sectors" (KBS) and the remainder, which we have denoted as "Non Knowledge Based Sectors", which comprises all other economic activity, and is largely comprised of a wide variety of service sectors.

The anticipated population growth from the ONS central projection is 0.7% pa, which equates to an additional 1m people living in the study area by 2050.

Assumptions relating to transport include any rail infrastructure improvements already committed to in CP5, including East-West Rail Western Section from Oxford to Milton Keynes, and plans anticipated for CP6, including East-West Rail Central Section from Milton Keynes to Cambridge. These are anticipated to be completed within the next 20 years. Local schemes such as Cambridge North Station and Oxford Parkway with connection to Oxford Central are also included. Ongoing and planned upgrades to the A14 from Cambridge to Huntingdon including the remodelling of the Girton interchange, and road-dualling working on the A428 between the Black Cat Roundabout and Caxton Gibbet are included, but more ambitious road construction schemes detailed in RIS1, including the Oxford-Cambridge Expressway are not. No other major transport infrastructure improvements have been anticipated.

Results

Overview of growth in the Corridor

Table 5-2 summarises the baseline results for employment, GVA and productivity and population in the Corridor as a whole and the city-regions. By 2050, it is projected that employment in the Corridor will have grown by 0.5% pa since 2014 to 2,168,000 people. GVA is projected to grow at 1.9% pa between 2014 and 2050, reaching more than £176bn by the end of the projection period.

Table 5-2 Summary of baseline projections

	Employment			GVA			Productivity			Population		
	2014 (000s)	2050 (000s)	2014-50 (% pa)	2014 (£2011m)	2050 (£2011m)	2014-50 (% pa)	2014 (£000)	2050 (£000)	2014-50 (% pa)	2014 (000s)	2050 (000s)	2014-50 (% pa)
CaMKOx-N Corridor	1,833	2,168	0.5	90,484	176,105	1.9	49	81	1.4	3,341	4,327	0.7
Greater Cambridge-Northern Hertfordshire	487	584	0.5	23,156	45,021	1.9	48	77	1.4	902	1,166	0.7
Oxford-Swindon	525	606	0.4	27,946	54,648	1.9	53	90	1.5	888	1,078	0.5
Milton Keynes-Bedfordshire-Aylesbury Vale	560	680	0.5	28,802	56,171	1.9	51	83	1.3	1,088	1,506	0.9
Greater Northampton	262	298	0.4	10,580	20,264	1.8	40	68	1.5	463	578	0.6

As shown in Figure 5-1, growth in employment in the sub-areas are in line with the Corridor average and therefore the spatial distribution of employment is relatively unchanged from 2014. In addition, GVA is projected to grow at a faster rate than employment (see Figure 5-2), implying stronger growth in productivity, as can be seen in Figure 5-3.

Figure 5-1 Baseline projections for employment
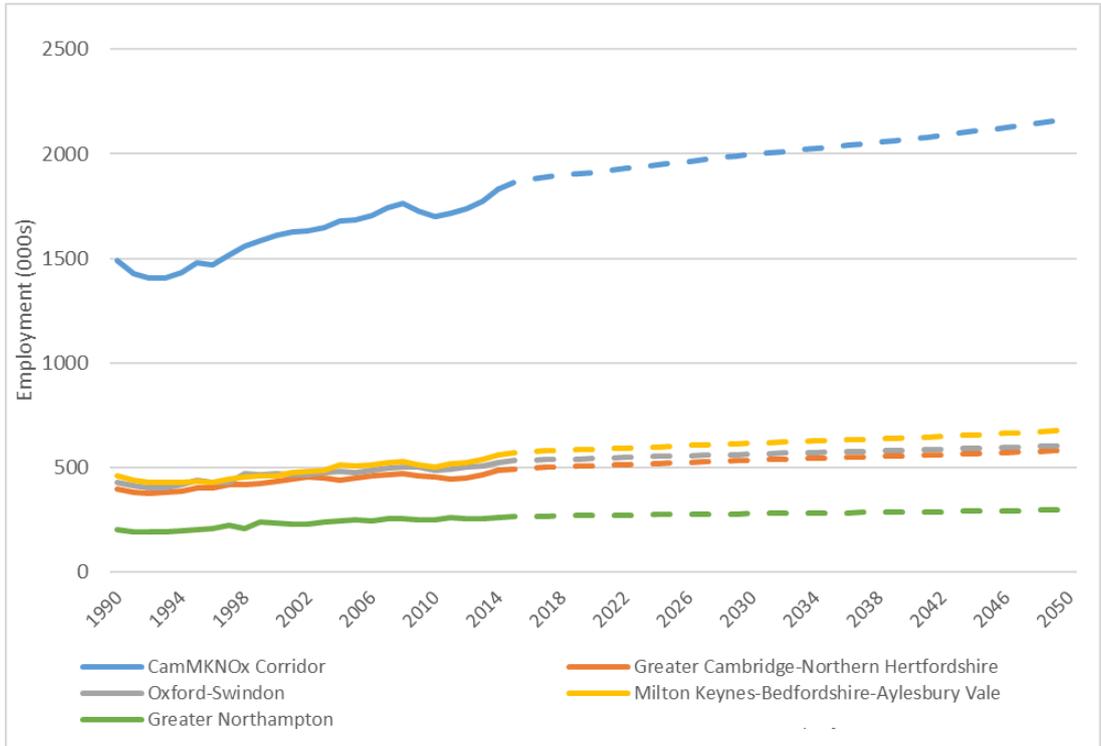
Figure 5-2 Baseline projections for GVA
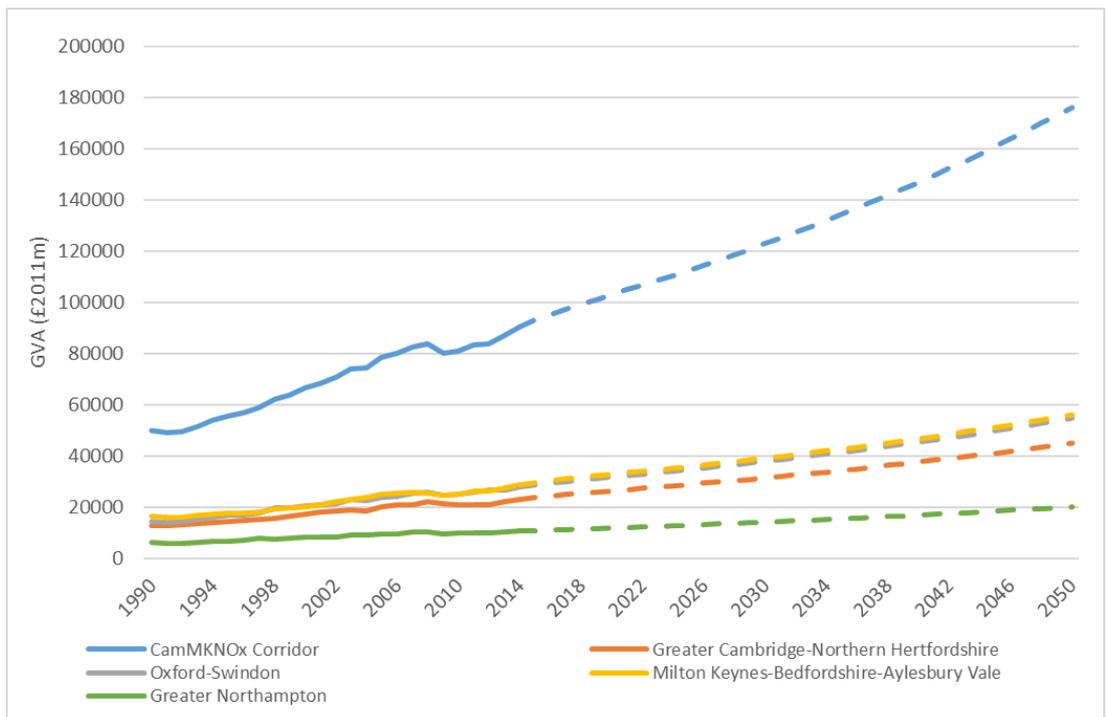
Productivity in the Corridor is expected to grow to £81,000 per person employed compared to £49,000 in 2014. There are several drivers of increased productivity in the long term: shifts in industrial structure to more productive sectors, investment in capital equipment, the dissemination of knowledge and ideas, more efficient organisational forms and economic structures, and improvements to public infrastructure.

Figure 5-3 Baseline projections for productivity
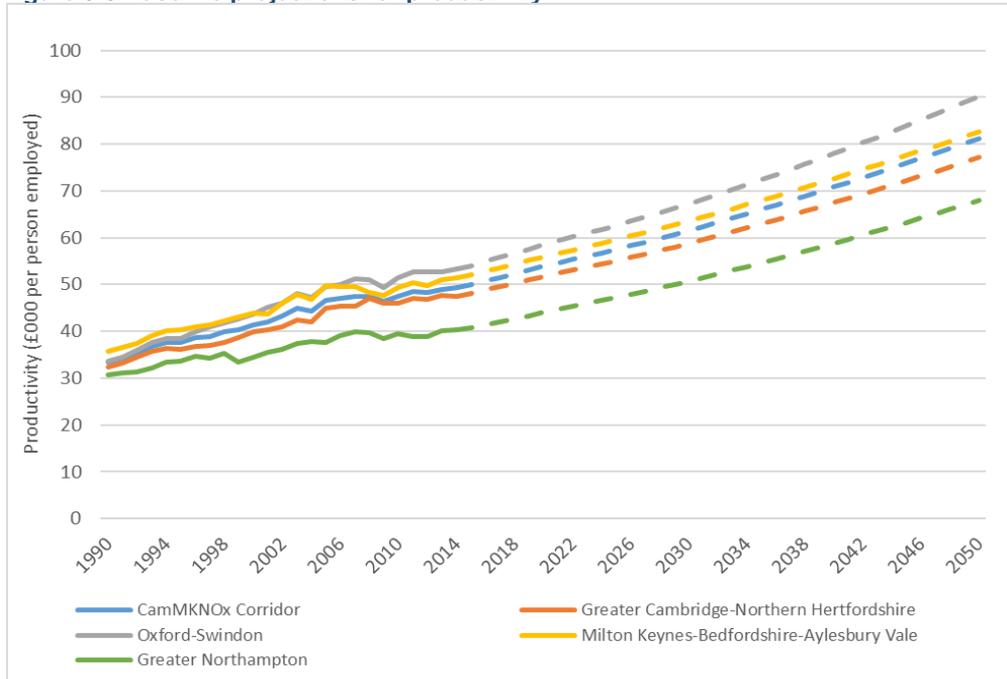
Productivity improvements in the tradeables sectors also often drive related improvements in the local non-tradeables sectors due to positive local effects on wages and local demand for services. Increased specialisation and increased access to economic mass also see positive impacts on sectoral productivity rates.

Figure 5-4 Baseline projections for population
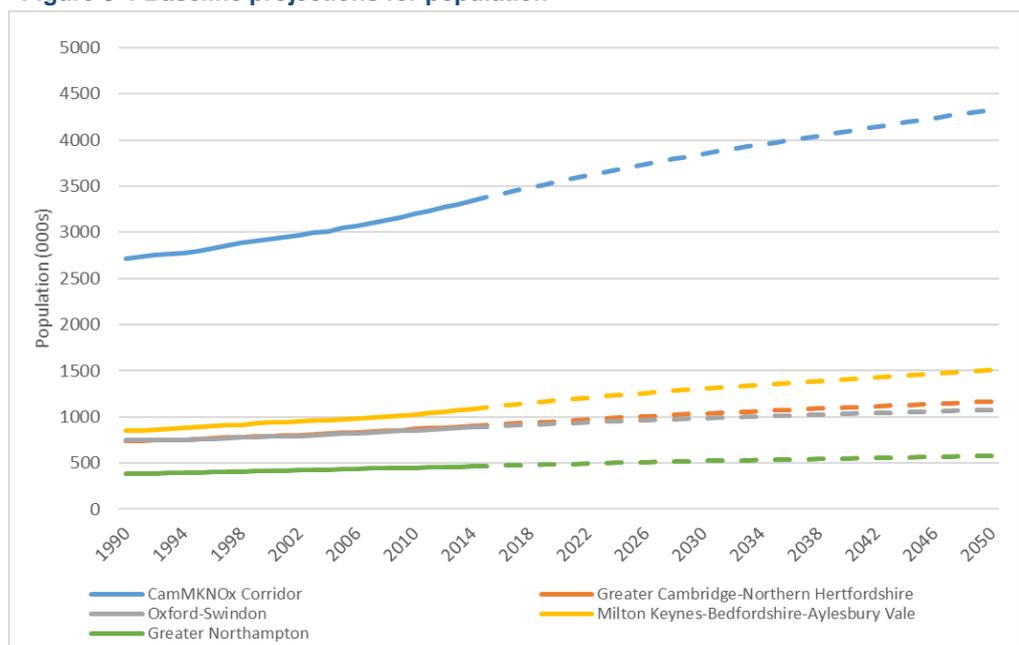
The baseline projections show that population growth in the Corridor up to 2050 will be modest at 0.7% pa, with the major population expansions occurring in the Greater Cambridgeshire-Hertfordshire area and the Milton Keynes-Bedfordshire-Aylesbury Vale area as the areas surrounding Oxford and Northampton continue to face a space shortage (see Table 5-3).

Employment and population growth at the local level

In most local authorities and aggregated areas, employment is projected to grow more slowly than historically, and more slowly in the long term than in the medium term. Projected growth does not vary widely across local authorities in each city-region, although in some cases, growth is notably stronger in certain parts than others, for example, South Northamptonshire compared to Wellingborough, Milton Keynes compared to Bedford.

Table 5-3 Baseline projections for employment by local authority

	1990-2014		2014	2025	2050	2014-25		2014-50	
	(000s)	(% pa)	(000s)	(000s)	(000s)	(000s)	(% pa)	(000s)	(% pa)
CaMKOx-N Corridor	343	0.9	1,833	1,956	2,168	122	0.6	335	0.5
Greater Cambridge-Northern Hertfordshire	92	0.9	487	523	584	36	0.7	97	0.5
Cambridge	3	0.1	104	112	126	8	0.7	22	0.5
South Cambridgeshire	34	2.1	84	91	102	7	0.7	18	0.5
East Cambridgeshire	18	2.9	37	40	46	3	0.7	9	0.6
Huntingdonshire	22	1.3	83	90	103	7	0.7	20	0.6
North Hertfordshire	1	0.1	58	63	68	5	0.7	10	0.4
East Hertfordshire	10	0.6	73	77	84	4	0.4	10	0.4
Stevenage	5	0.4	47	51	56	3	0.6	9	0.5
Oxford-Swindon	96	0.8	525	555	606	30	0.5	82	0.4
Oxford	22	0.8	128	134	148	6	0.4	21	0.4
Vale of White Horse	12	0.8	68	73	79	5	0.6	11	0.4
South Oxfordshire	19	1.2	73	77	86	4	0.5	14	0.5
West Oxfordshire	14	1.4	50	53	58	3	0.6	8	0.4
Cherwell	21	1.3	82	87	97	5	0.6	15	0.5
Swindon	9	0.3	124	131	138	7	0.5	14	0.3
Milton Keynes-Bedfordshire-Aylesbury Vale	97	0.8	560	602	680	42	0.7	120	0.5
Milton Keynes	66	2.0	175	194	223	18	0.9	48	0.7
Bedford	-0	0.0	81	85	92	4	0.4	11	0.4
Aylesbury Vale	8	0.4	89	94	101	5	0.5	12	0.3
Luton	6	0.2	100	109	131	8	0.7	31	0.7
Central Bedfordshire	17	0.7	114	121	132	7	0.5	19	0.4
Greater Northampton	58	1.0	262	276	298	14	0.5	36	0.4
Northampton	24	0.8	141	148	160	7	0.4	18	0.3
Daventry	12	1.5	42	44	48	2	0.5	7	0.4
Wellingborough	4	0.4	40	41	43	1	0.2	2	0.2
South Northamptonshire	18	2.6	39	42	47	3	0.8	9	0.6

Table 5-4 shows baseline projections for population growth in the Corridor and its sub-areas. The overall growth is expected to be slightly stronger than historically in the medium term at 1% pa over 2014-25 as the Milton Keynes region expands more rapidly (at 1.3% pa) whereas growth follows historical trends elsewhere. Growth in the long-term prospect (2014-50) is projected to slow down to 0.7% pa with most local authorities experiencing population growth of 0.5-0.9% pa.

Table 5-4 Baseline projections for population by local authority

	1990-2014		2014	2025	2050	2014-25		2014-50	
	(000s)	(% pa)	(000s)	(000s)	(000s)	(000s)	(% pa)	(000s)	(% pa)
CaMKOx-N Corridor	630	0.9	3,341	3,711	4,327	369	1.0	986	0.7
Greater Cambridge-Northern Hertfordshire	167	0.9	902	998	1,166	96	0.9	264	0.7
Cambridge	25	0.9	129	138	157	10	0.7	29	0.6
South Cambridgeshire	33	1.0	153	173	200	19	1.1	47	0.7
East Cambridgeshire	27	1.5	87	97	112	10	1.0	25	0.7
Huntingdonshire	27	0.7	174	190	219	17	0.8	46	0.7
North Hertfordshire	19	0.7	131	146	175	15	1.0	44	0.8
East Hertfordshire	26	0.8	143	160	191	17	1.0	48	0.8
Stevenage	11	0.6	86	94	111	8	0.8	25	0.7
Oxford-Swindon	144	0.7	888	960	1,078	72	0.7	190	0.5
Oxford	30	0.9	158	170	189	12	0.6	31	0.5
Vale of White Horse	14	0.5	125	137	155	12	0.9	30	0.6
South Oxfordshire	18	0.6	137	145	158	8	0.5	21	0.4
West Oxfordshire	18	0.8	108	117	134	9	0.7	26	0.6
Cherwell	18	0.6	144	156	174	11	0.7	29	0.5
Swindon	45	1.0	216	235	267	19	0.8	52	0.6
Milton Keynes-Bedfordshire-Aylesbury Vale	238	1.0	1,088	1,247	1,506	160	1.3	418	0.9
Milton Keynes	83	1.6	259	295	352	35	1.2	93	0.9
Bedford	29	0.8	164	186	226	22	1.2	63	0.9
Aylesbury Vale	38	1.0	185	213	253	28	1.3	69	0.9
Luton	39	0.8	211	240	289	29	1.2	78	0.9
Central Bedfordshire	50	0.9	269	313	385	44	1.4	116	1.0
Greater Northampton	80	0.8	463	506	578	42	0.8	114	0.6
Northampton	37	0.8	219	244	283	24	1.0	64	0.7
Daventry	16	1.0	79	85	94	6	0.6	15	0.5
Wellingborough	9	0.5	76	81	91	5	0.6	15	0.5
South Northamptonshire	18	1.0	88	96	109	7	0.7	21	0.6

Growth in KIBS and HTM sectors

Figure 5-5 shows the breakdown of employment in KBS sectors into Knowledge-intensive business services (KIBS) and High-tech manufacturing (HTM). It is clear that knowledge intensive employment growth is expected to be driven by growth in KIBS sectors while HTM employment continues the downward historical trend.

Figure 5-5 Baseline projections for employment in KIBS and HTM sectors
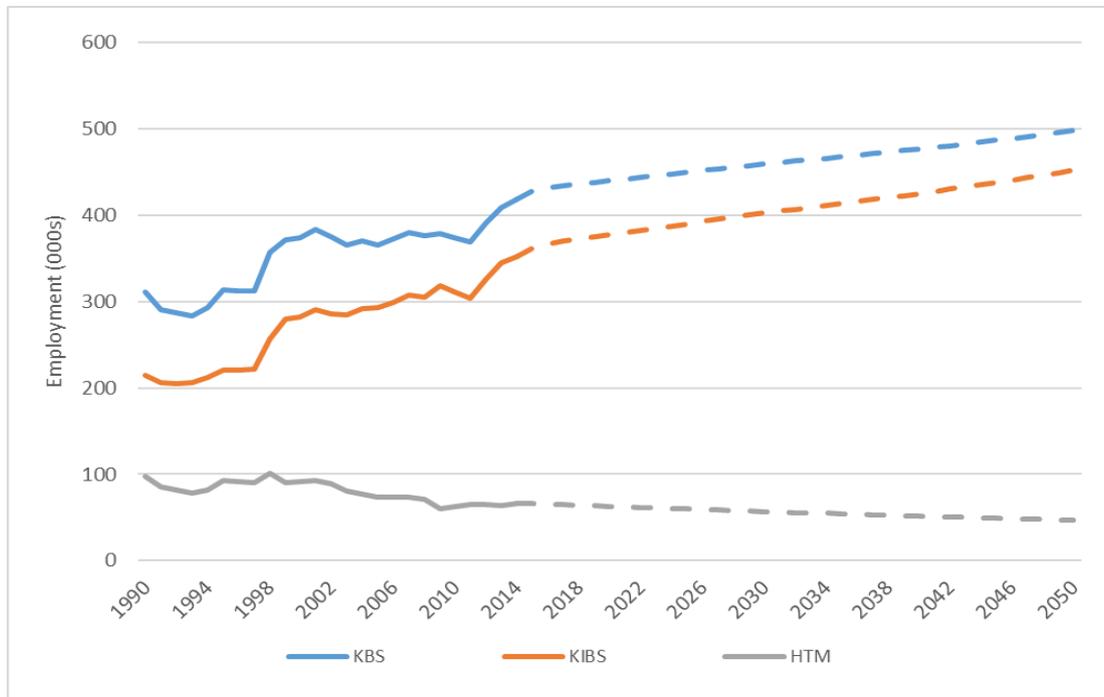
There is a similar case at the sub-area level where KBS employment growth is expected to be driven by growth in KIBS which averages 0.7% pa over 2014-50 in most city-regions (equivalent to a total of 80,000 additional jobs by 2050). Meanwhile, HTM employment is projected to decline at 1% pa within the Corridor (a loss of 20,000 jobs), where the decline is more apparent in the Milton Keynes-Bedfordshire-Aylesbury Vale area (at -2.5% pa) and the Greater Northampton area (at -2.2% pa) (see Table 5-5).

Table 5-5 Baseline projections for employment in KIBS and HTM sectors

	KBS			KIBS			HTM		
	2014 (000s)	2050 (000s)	2014-2050 (% pa)	2014 (000s)	2050 (000s)	2014-2050 (% pa)	2014 (000s)	2050 (000s)	2014-2050 (% pa)
CaMKOx-N Corridor	419	499	0.5	352	452	0.7	67	47	-1.4
Greater Cambridge-Northern Hertfordshire	118	141	0.5	98	127	0.7	20	14	-1.1
Oxford-Swindon	129	152	0.5	108	139	0.7	21	13	-1.3
Milton Keynes-Bedfordshire-Aylesbury Vale	120	145	0.5	103	138	0.8	17	7	-2.5
Greater Northampton	52	60	0.4	44	56	0.7	9	4	-2.2

On the other hand, productivity is projected to grow much faster in HTM sectors than in KIBS sectors, at 2.6% pa over 2014-50 in contrast with 1.2% pa over the same period (see Figure 5-6).

Figure 5-6 Baseline projections for productivity in KIBS and HTM sectors
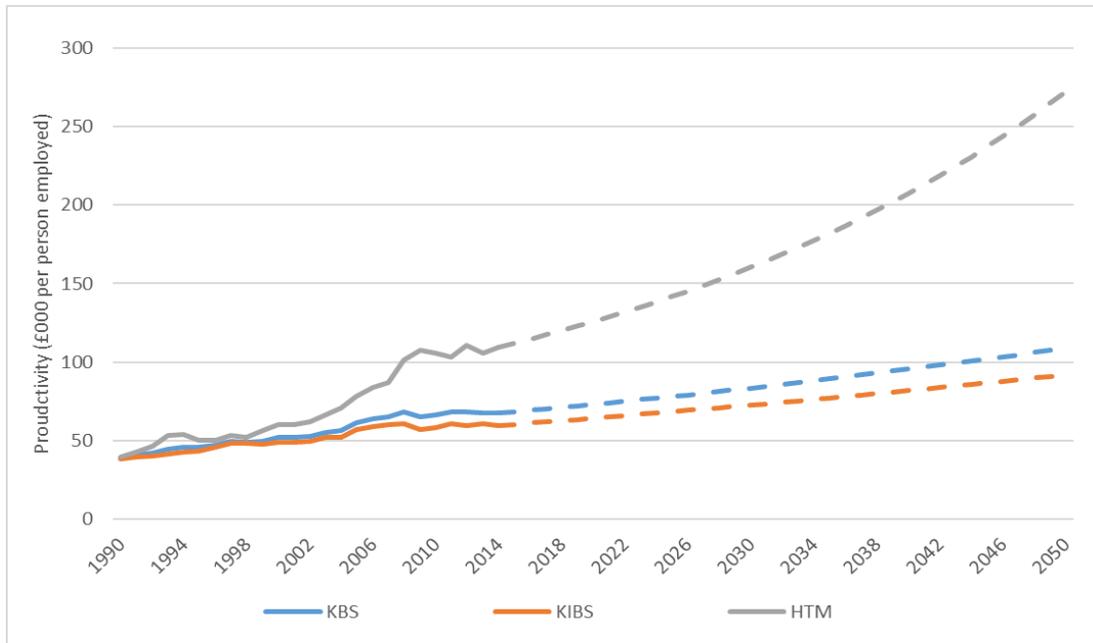
Growth rates in KIBS productivity are almost uniform across city-regions, whereas, HTM productivity is projected to grow the fastest in the Greater Northampton area (at 3.7% pa) and the Oxford-Swindon area (at 3.4% pa). The ranking of city-regions based on productivity levels is broadly consistent with historical trends, apart from the Greater Northampton area which is expected to strengthen its position in terms of productivity in HTM, overtaking both the Cambridge and Milton Keynes/Luton/Bedfordshire/Aylesbury Vale sub-areas by 2050 (see Table 5-6).

Table 5-6 Baseline projections for productivity in KIBS and HTM sectors

	KBS			KIBS			HTM		
	2014 (000s)	2050 (000s)	2014-2050 (% pa)	2014 (000s)	2050 (000s)	2014-2050 (% pa)	2014 (000s)	2050 (000s)	2014-2050 (% pa)
CaMKOx-N Corridor	68	109	1.3	60	92	1.2	110	272	2.6
Greater Cambridge-Northern Hertfordshire	69	112	1.4	60	90	1.2	113	310	2.8
Oxford-Swindon	71	119	1.4	61	91	1.1	126	414	3.4
Milton Keynes-Bedfordshire-Aylesbury Vale	69	106	1.2	65	99	1.2	95	256	2.8
Greater Northampton	52	83	1.3	45	66	1.1	89	334	3.7

5.4 Incremental Growth Scenario

Assumptions & methodology

The Incremental Enhancement Scenario is intended to represent a situation in which the study area receives enough housing and transport infrastructure to relieve or reduce several of the key employment growth constraints in the individual sub-areas, but not significant enough to represent a major shift in the labour productivity of different industries or the economic geography of the corridor. This scenario does not seek to identify infrastructural changes that would drive additional or above-trend levels of growth, instead it identifies current and projected transport and housing constraints with the ability to subdue future economic growth in the affected local economies. Evidence from chapters 3 and 4 suggests that the most significant infrastructure constraints currently exist in the Greater Cambridge and Greater Oxford areas, and therefore these are the sub-areas that will be most strongly affected by this scenario.

Transport Infrastructure

In the baseline scenario, we anticipated the construction and implementation of services on East-West Rail and other straightforward improvement and maintenance infrastructure improvements. In this scenario, we go beyond this assumption and assume some level of significantly increased transport provision at either end of the East-West Rail development, to ensure that it connects in to each destination city's transport network in an intelligent and integrated fashion, and allows efficient movement of people within the functional economic areas of each city. This could be some form of light rail system or another equivalent scheme. The labour footprints of the two cities are shown in figure 5.7.

Figure 5-7. Extent of the labour footprints of Oxford (left) and Cambridge (right), at the time of the 2011 Census.
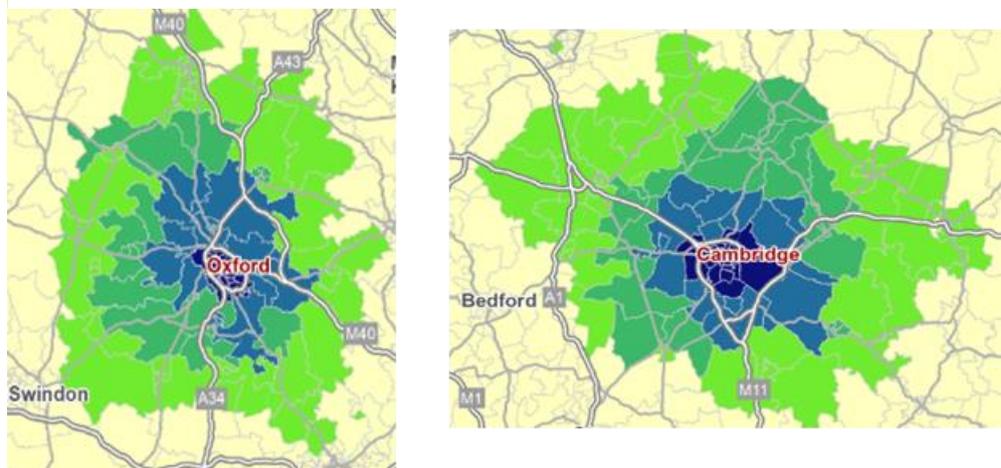
The local evidence suggests that impact of such a scheme, if successfully implemented, would represent a significant reduction in generalised transport costs for commuters between residential areas and employment sites both in and around the cities of Cambridge and Oxford, and a corresponding boost to the economic capacity of the local economy as more employees can access both the central and more widely dispersed employment hubs in an efficient, timely and cost-effective manner. We assume therefore that enhanced employment growth would occur most strongly in Cambridge and Oxford.

Housing and Population
The incremental scenario will also assume that the impact of improved housing provision and transport infrastructure on the study area will be to accommodate an increase of population. Therefore, the ONS "high migration" figures will be used for this scenario. This promises an additional 200,000 head of population on top of the baseline forecast, with the study area growing faster than the national rate.

To summarise, the key assumptions in this scenario are:

- higher population using ONS high migration estimate

- KIBS and HTM employment growth will be boosted (relative to baseline scenario) due to additional infrastructure and housing – all LADs will be boosted by 0.5% pa above baseline, with Greater Oxford and Greater Cambridge growing at 1% pa above baseline.

- Additional growth in KIBS and HTM will have a small positive impact on sectoral productivity through the ATEM relationship.

- Both 1 and 2 will lead to increased non-KBS employment via a) increased demand for services and b) supply chain effects

The non-KBS rate is calculated as the sum of:

- the baseline forecast rate
- + the additional extra employment induced through supply chain effects
- + the additional extra employment induced by the additional population (we have found empirically that an increase in population of 10% induces an increase in non-KBS employment by 1.5%).

The total employment can then be calculated as the sum of KBS and non-KBS employment.

Results

Overview of growth in the Corridor
Table 5-7 summarises the incremental scenario results for employment, GVA and productivity and population in the Corridor as a whole and the city-regions. By 2050, it is projected that employment in the Corridor will have grown by 0.9% pa since 2014 to 2,553,000 people. GVA is projected to grow at 2.4% pa between 2014 and 2050, reaching just over £214bn by the end of the projection period.

Table 5-7 Summary of incremental scenario projections

	Employment			GVA			Productivity			Population		
	2014 (000s)	2050 (000s)	2014-50 (% pa)	2014 (£2011m)	2050 (£2011m)	2014-50 (% pa)	2014 (£000)	2050 (£000)	2014-50 (% pa)	2014 (000s)	2050 (000s)	2014-50 (% pa)
CaMKOx-N Corridor	1,833	2,553	0.9	90,484	214,060	2.4	49	84	1.5	3,341	4,518	0.8
Greater Cambridge-Northern Hertfordshire	487	694	1.0	23,156	55,953	2.5	48	81	1.5	902	1,217	0.8
Oxford-Swindon	525	728	0.9	27,946	67,966	2.5	53	93	1.6	888	1,125	0.7
Milton Keynes-Bedfordshire-Aylesbury Vale	560	786	0.9	28,802	72,621	2.6	51	92	1.6	1,088	1,573	1.0
Greater Northampton	262	345	0.8	10,580	23,780	2.3	40	69	1.5	463	603	0.7

As shown in Figure 5-8 Incremental scenario projections for employment, growth in employment is similar across the sub-areas (around 0.9% pa over 2014-50), being slightly slower than historically in the Greater Northampton area but in line with historical trends elsewhere. The same case applies to growth in GVA (see Figure 5-9).

Figure 5-8 Incremental scenario projections for employment
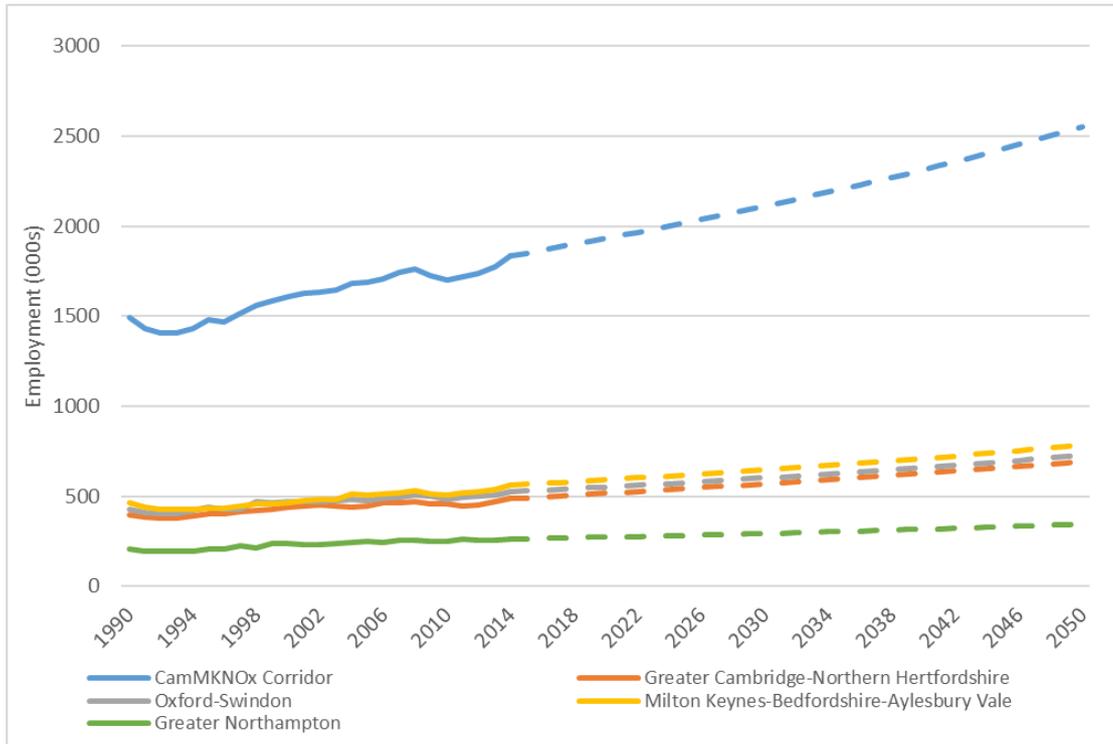
Figure 5-9 Incremental scenario projections for GVA
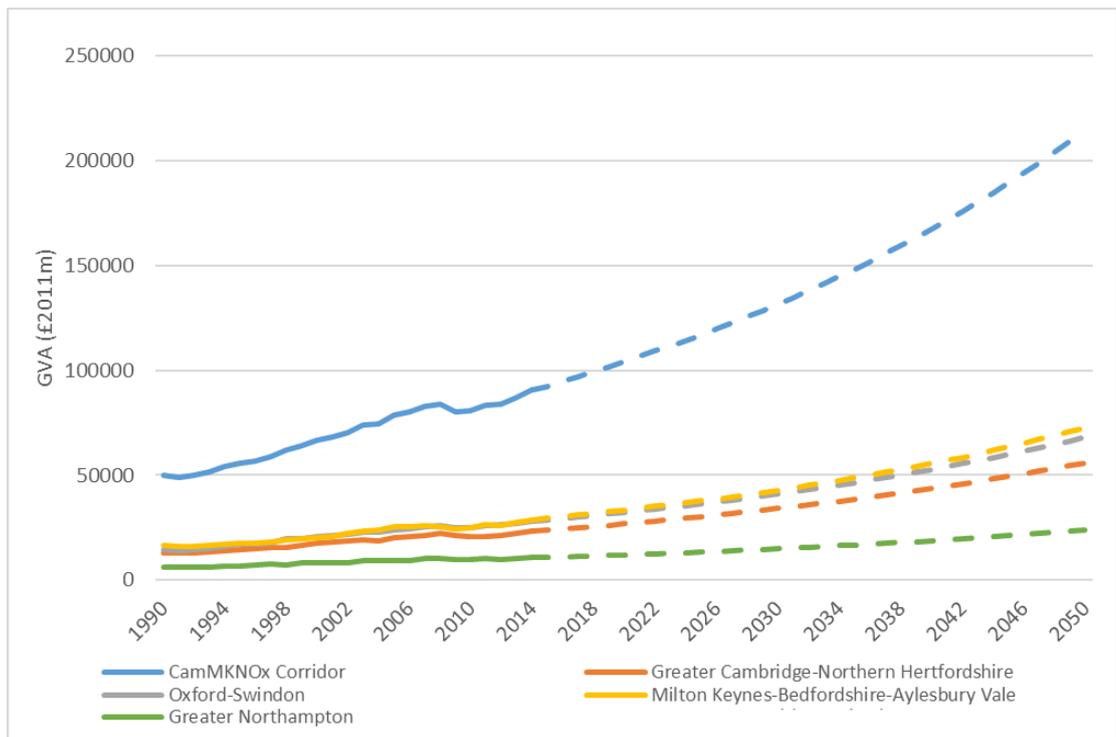
As with the baseline scenario, strong growth in productivity is expected. The productivity ranking is expected to be the same in 2050 as in 2014. Productivity levels in the Oxford and Milton Keynes/Luton/Bedfordshire/Aylesbury Vale sub-areas are expected to continue to be above the Corridor average, taking advantage of their historical strengths in KIBS productivity. Interestingly, growth is projected to be as fast in the Greater Northampton area as in other areas, indicating a potential restructure to high-value, high-productivity sectors which, as discussed in Chapter 3, had a limited presence in the local economy in the past (see Figure 5-10).

Figure 5-10 Incremental scenario projections for productivity
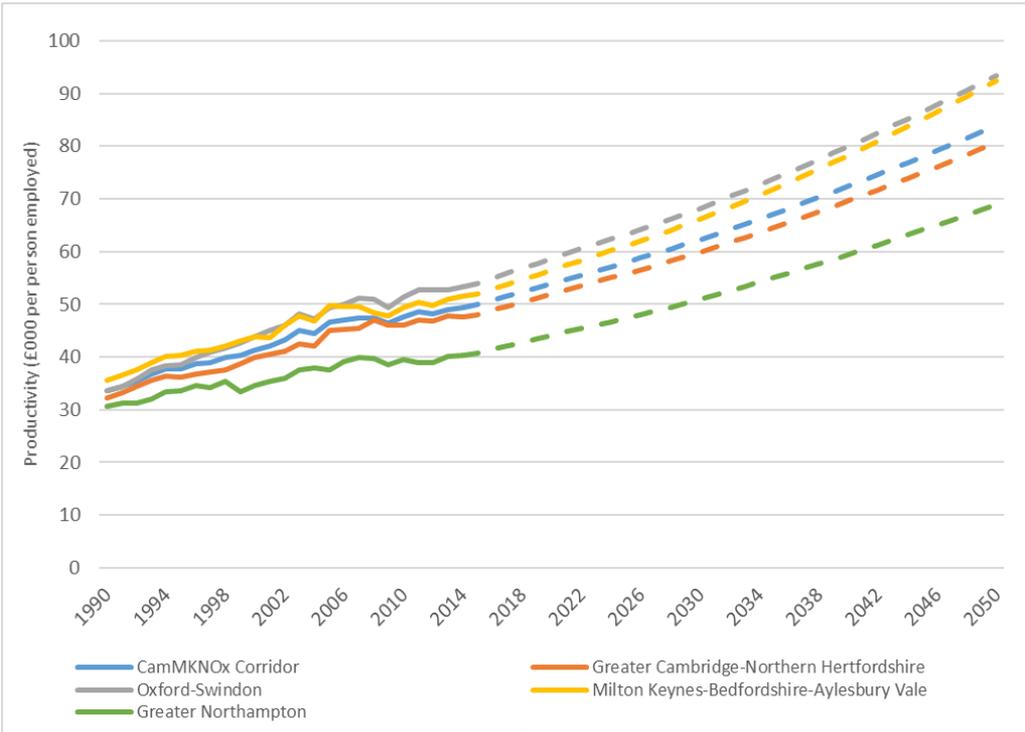
Figure 5-11 shows projections for population growth in the Corridor and its city-regions. The overall growth in the Corridor over 2014-50 is projected to be 0.8% pa, close to the city-region's growth rate apart from the Milton Keynes-Bedfordshire-Aylesbury Vale area where population growth is expected to be slightly stronger at 1% pa.

Figure 5-11 Incremental scenario projections for population
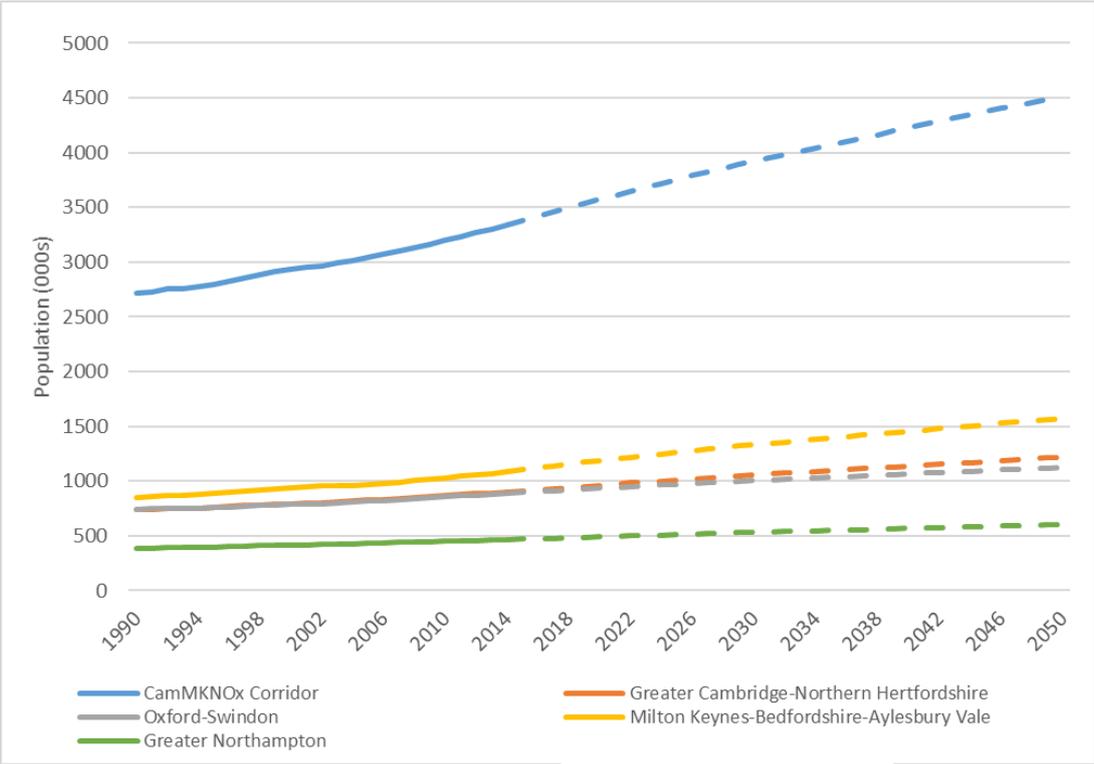
Employment and population growth at the local level

From Table 5-8, there are noticeable variations in the outlook for employment growth at the local authority level, although there is little difference between the medium-term and long-term growth rates. Some local authorities are expected to experience much stronger growth than historically such as Cambridge at 1.1% pa over 2014-50 compared to 0.1% pa over 1990-2014. In contrast, in South Northamptonshire for example, growth is projected to slow down substantially from 2.6% pa over 1990-2014 to 1% pa over 2014-50. Overall, modest growth is projected for all local authorities over the projected period.

Table 5-8 Incremental scenario projections for employment by local authority

	1990-2014		2014	2025	2050	2014-25		2014-50	
	(000s)	(% pa)	(000s)	(000s)	(000s)	(000s)	(% pa)	(000s)	(% pa)
CaMKOx-N Corridor	343	0.9	1,833	2,019	2,553	186	0.9	719	0.9
Greater Cambridge-Northern Hertfordshire	92	0.9	487	542	694	55	1.0	207	1.0
Cambridge	3	0.1	104	117	153	13	1.1	49	1.1
South Cambridgeshire	34	2.1	84	96	127	11	1.2	43	1.1
East Cambridgeshire	18	2.9	37	41	55	5	1.1	18	1.1
Huntingdonshire	22	1.3	83	92	118	9	1.0	36	1.0
North Hertfordshire	1	0.1	58	64	78	6	0.9	20	0.8
East Hertfordshire	10	0.6	73	80	97	6	0.7	23	0.8
Stevenage	5	0.4	47	52	65	5	0.9	17	0.9
Oxford-Swindon	96	0.8	525	576	728	51	0.9	204	0.9
Oxford	22	0.8	128	139	178	11	0.8	50	0.9
Vale of White Horse	12	0.8	68	76	98	8	1.0	30	1.0
South Oxfordshire	19	1.2	73	81	107	8	1.0	34	1.1
West Oxfordshire	14	1.4	50	55	70	5	1.0	20	1.0
Cherwell	21	1.3	82	91	116	9	0.9	34	1.0
Swindon	9	0.3	124	134	159	10	0.7	36	0.7
Milton Keynes-Bedfordshire-Aylesbury Vale	97	0.8	560	618	786	58	0.9	226	0.9
Milton Keynes	66	2.0	175	198	258	23	1.1	83	1.1
Bedford	0	0.0	81	88	107	7	0.7	25	0.8
Aylesbury Vale	8	0.4	89	97	117	7	0.7	28	0.8
Luton	6	0.2	100	112	151	12	1.0	51	1.1
Central Bedfordshire	17	0.7	114	124	153	10	0.8	39	0.8
Greater Northampton	58	1.0	262	283	345	21	0.7	83	0.8
Northampton	24	0.8	141	152	185	11	0.7	43	0.7
Daventry	12	1.5	42	45	56	3	0.7	14	0.8
Wellingborough	4	0.4	40	42	49	2	0.5	9	0.6
South Northamptonshire	18	2.6	39	43	55	4	1.0	16	1.0

Similar to employment, the trend in population growth in the Corridor varies, although the majority of local authorities are projected to have modest population growth of 0.8-1.1% pa over the medium term (2014-25) and 0.7-0.9% pa in the long-term outlook (see Table 5-9). Some exceptions are all local authorities in the Milton-Keynes-Bedfordshire-Aylesbury Vale area which are expected to become hotspots for growth with some of the largest increases in population over the projection period.

Table 5-9 Incremental scenario projections for population by local authority

	1990-2014		2014	2025	2050	2014-25		2014-50	
	(000s)	(% pa)	(000s)	(000s)	(000s)	(000s)	(% pa)	(000s)	(% pa)
CaMKOx-N Corridor	630	0.9	3,341	3,757	4,518	415	1.1	1,177	0.8
Greater Cambridge-Northern Hertfordshire	167	0.9	902	1,010	1,217	108	1.0	315	0.8
Cambridge	25	0.9	129	140	164	12	0.8	36	0.7
South Cambridgeshire	33	1.0	153	175	209	21	1.2	56	0.9
East Cambridgeshire	27	1.5	87	98	117	11	1.1	30	0.8
Huntingdonshire	27	0.7	174	193	229	19	1.0	55	0.8
North Hertfordshire	19	0.7	131	148	183	17	1.1	52	0.9
East Hertfordshire	26	0.8	143	162	200	19	1.1	57	0.9
Stevenage	11	0.6	86	95	116	9	0.9	30	0.8
Oxford-Swindon	144	0.7	888	972	1,125	83	0.8	237	0.7
Oxford	30	0.9	158	172	198	14	0.8	40	0.6
Vale of White Horse	14	0.5	125	139	162	14	1.0	37	0.7
South Oxfordshire	18	0.6	137	147	165	10	0.6	28	0.5
West Oxfordshire	18	0.8	108	119	140	11	0.9	31	0.7
Cherwell	18	0.6	144	158	181	13	0.8	37	0.6
Swindon	45	1.0	216	238	279	22	0.9	63	0.7
Milton Keynes-Bedfordshire-Aylesbury Vale	238	1.0	1,088	1,263	1,573	175	1.4	486	1.0
Milton Keynes	83	1.6	259	298	368	39	1.3	109	1.0
Bedford	29	0.8	164	189	236	25	1.3	72	1.0
Aylesbury Vale	38	1.0	185	216	265	31	1.4	80	1.0
Luton	39	0.8	211	243	302	32	1.3	91	1.0
Central Bedfordshire	50	0.9	269	317	402	48	1.5	133	1.1
Greater Northampton	80	0.8	463	512	603	48	0.9	140	0.7
Northampton	37	0.8	219	247	296	28	1.1	76	0.8
Daventry	16	1.0	79	85	98	6	0.7	19	0.6
Wellingborough	9	0.5	76	82	95	6	0.7	19	0.6
South Northamptonshire	18	1.0	88	97	114	9	0.8	26	0.7

Growth in KIBS and HTM sectors Figure 5-12 shows the projected growth in employment in KBS sectors, separated into KIBS and HTM sectors. The trend in KBS employment clearly tracks the trend in KIBS employment and more than cancels out the slight decline in HTM employment.

Figure 5-12 Incremental scenario projections for employment in KIBS and HTM sectors
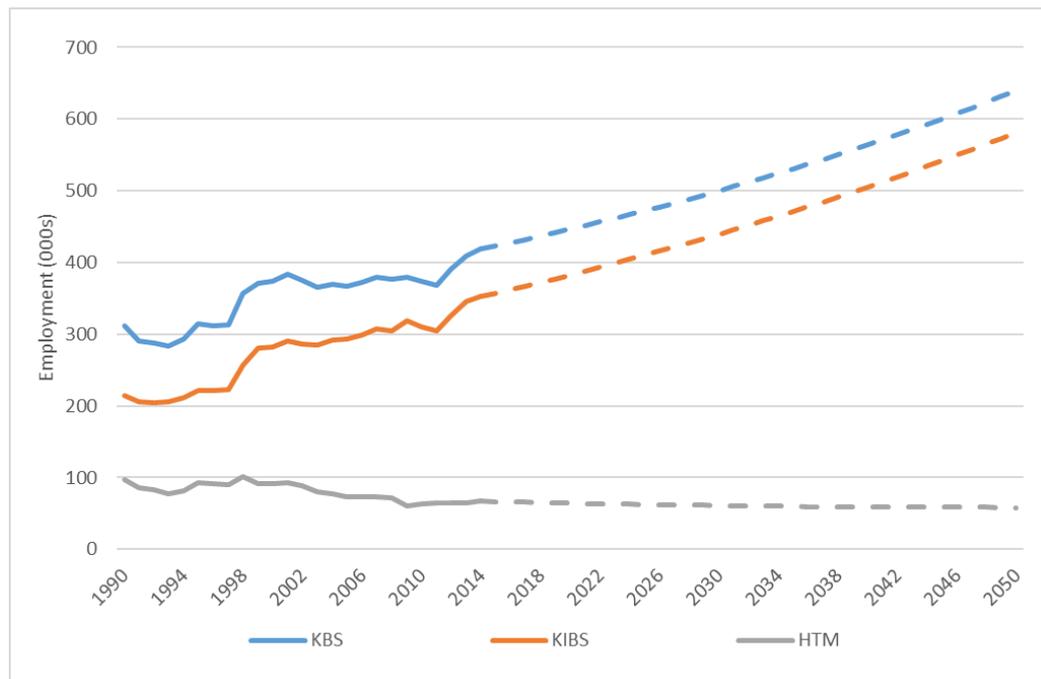
At most aggregated level, KIBS employment growth is projected to average 1.4% pa over 2014-50 (equivalent to 229,000 additional jobs by 2050) (see Table 5-10). Growth in KIBS employment is expected to be driven by relatively strong growth in both the Greater Cambridge area and the Oxford region at 1.5% pa, supported by growth in the Milton Keynes region (1.3% pa). This is likely to result from the agglomeration effects of KIBS sectors in these three regions, which are more established than those around Northampton, as Chapter 3 discussed, and considerably larger according to Table 5-10. In contrast, HTM employment in the Corridor is projected to decline at a considerably slower rate (-0.4% pa over 2014-50) than under the baseline (a loss of 9,000 jobs). The steepest decline in HTM employment is in the Milton Keynes-Bedfordshire-Aylesbury Vale areas where the sectoral mix is most diverse.

Table 5-10 Incremental scenario projections for employment in KIBS and HTM sectors

	KBS			KIBS			HTM		
	2014 (000s)	2050 (000s)	2014-2050 (% pa)	2014 (000s)	2050 (000s)	2014-2050 (% pa)	2014 (000s)	2050 (000s)	2014-2050 (% pa)
CaMKOx-N Corridor	419	640	1.2	352	581	1.4	67	58	-0.4
Greater Cambridge-Northern Hertfordshire	118	187	1.3	98	166	1.5	20	21	0.1
Oxford-Swindon	129	208	1.3	108	186	1.5	21	22	0.1
Milton Keynes-Bedfordshire-Aylesbury Vale	120	174	1.0	103	165	1.3	17	9	-1.8
Greater Northampton	52	72	0.9	44	65	1.1	9	7	-0.6

Despite the fall in employment, HTM sectors are expected to continue contributing to productivity growth in KBS sectors in the Corridor (see Figure 5-12). In fact, productivity growth in HTM sectors is expected to be at 2.7% pa over 2014-50, compared to 1.4% in KIBS sectors over the same period, which is consistent with the idea that manufacturing sectors are more receptive to technological improvements.

Figure 5-13 Incremental scenario projections for productivity in KIBS and HTM sectors
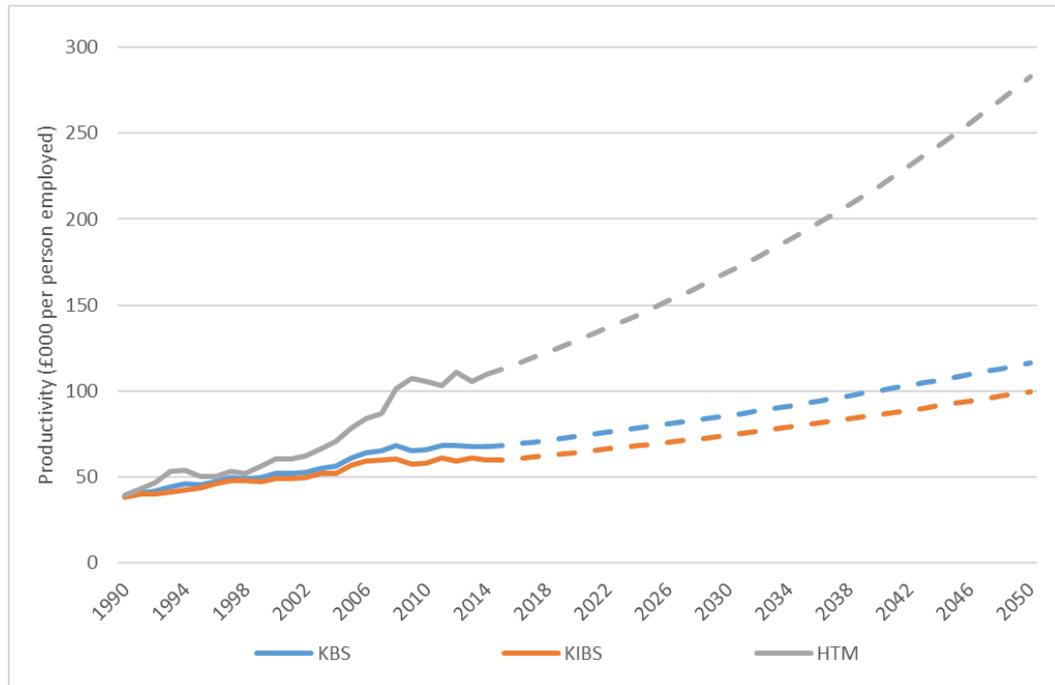
Productivity is projected to grow at a similar rate in all areas for both groups of KBS sectors, at 1.4-1.5% pa in KIBS sectors and 2.5-2.6% pa in HTM sectors over 2014-50 (Table 5-11). The Oxford region is expected to remain the city-region with the highest productivity level in HTM sectors although its lead in KIBS productivity is expected to be taken over by the Milton Keynes/Luton/Bedfordshire/Aylesbury Vale sub-area. In fact, as can be seen in Chapter 3, productivity across KIBS sectors in Milton Keynes in 2014 was already resembling that seen in Cambridge and Oxford where there is a strong reliance on IT services and Financial & insurance services, which is a positive indication of the area's potential.

Table 5-11 Incremental scenario projections for productivity in KIBS and HTM sectors

	KBS			KIBS			HTM		
	2014 (000s)	2050 (000s)	2014-2050 (% pa)	2014 (000s)	2050 (000s)	2014-2050 (% pa)	2014 (000s)	2050 (000s)	2014-2050 (% pa)
CaMKOx-N Corridor	68	116	1.5	60	100	1.4	110	283	2.7
Greater Cambridge-Northern Hertfordshire	69	120	1.6	60	100	1.4	113	280	2.5
Oxford-Swindon	71	126	1.6	61	103	1.5	126	320	2.6
Milton Keynes-Bedfordshire-Aylesbury Vale	69	113	1.4	65	107	1.4	95	242	2.6
Greater Northampton	52	88	1.5	45	73	1.4	89	228	2.6

5.5   Transformational Growth Scenario

**Assumptions &
methodology**

This scenario addresses the concept of "*the Cambridge – Milton Keynes – Oxford corridor as a globally competitive knowledge cluster",* and what such a corridor might look like in reality, aiming to reduce the gravitational pull of London so there is more cross-movement and strength in the middle of the area.

*A functional
economic
corridor*

Economic corridors have several key characteristics, including:

- excellent connectivity, which facilitates:
- reduced generalised transport costs, leading to a productivity enhancement, and:
- high levels of movement and interaction along the corridor, which might mean:
- moderate-high levels of commuting along the corridor
- moderate-high levels of trade along the corridor
- moderate-high levels of firm collaboration along the corridor, which might reveal itself as:
- similar or complementary sectoral specialities that extend along the corridor, in this case:
- knowledge intensive business services and high-tech manufacturing

The evidence suggests that the four sub-areas currently have quite distinct and separate economies, with only limited commuting, leisure travel and business collaboration from end to middle or middle to end, and with dissimilar sectoral distributions. To function as a knowledge based functional economic corridor, these four sub-regions would require a greater coordination in industrial structure. Chapter 3 of this report identifies the differing structures and trajectories of the economies of the four sub-areas, whilst Chapter 4 identified both the potential for enhanced growth and collaboration between these areas, and examples from further afield where such collaboration has been realised.

In investigating current and potential sources of cross-corridor collaboration in the data and case study material, we have postulated a potential for enhanced "triangular trade" between the different sectors and aggregations within the corridor. Here we could envisage that greater interaction between the knowledge and innovation generating sectors of R&D around Cambridge and Oxford, the (currently spatially distributed) clusters of high-tech manufacturing that are able to convert these innovations and knowledge to marketable products, and the KIBS sectors based within the major study area cities that are able to provide key business services, could potentially create a dynamic, synergistic system that provides world-class innovative products and services.

This could, in theory, revolutionise the knowledge based employment potential of this corridor and create the kind of globally competitive cluster that was envisaged in the Chancellor's statement.

*Transport
Infrastructure*

In order to facilitate this level of growth and collaboration, we assume radical levels of transport infrastructure investment in this scenario, including a completed East-West Rail link providing fast and extensive rail connectivity

across the corridor, a fully realised Oxford-Milton Keynes-Cambridge Expressway linking the three cities, combining with upgraded radial links (both road and rail) down to London and upwards into the midlands offering extremely quick, frequent and efficient travel between the 4 major hubs in the study area.

In combination with this, we envisage a full level of transport integration between regional and local level transport systems, with a swift and efficient transfer between Rail Links and local transport networks, be they light rail or some form of road based autonomous transport.

The empirical evidence presented in the literature review suggests that the net impact of this step change in connectivity is likely to vastly reduce the generalised transport costs in moving within and along the corridor, thereby simultaneously increasing the economic capacity of each employment hub individually, but also significantly increasing the levels of interaction and integration along the corridor.

We therefore assume that the significantly increased ease of business promotes a corresponding increase in the level of employment and GVA growth in the existing tradable sectors in the study area. Rather than decreasing growth rates as seen in the baseline condition, in this scenario it becomes feasible that the growing KIBS and HTM clusters across the maintain their historic rates of employment growth. Using this assumption, we project forward total employment rates across both knowledge-based sectors specifically and to the wider economy.

Housing As well as housing plans included in the incremental scenario, additional housing developments beyond current plans would be developed at key strategic sites along the new rail and road networks, allowing commuting in both directions along the rail line or along the express way.

The transformational scenario also assumes that the impact of this improved housing provision and transport infrastructure on the study area will be the accommodation of a corresponding increase of population. Therefore, a population estimate above the ONS "high migration" figure will be used for this scenario to generate the additional demand for employment in non-KBS sectors. This high migration figure has been calculated by Savills and is based upon their research into potential housing and transport infrastructure developments in the corridor.

The non-KBS rate has been calculated in the same way as before; as the sum of: the baseline forecast rate, plus the additional extra employment induced through supply chain effects, plus the additional extra employment induced by the additional population. The total employment can then be calculated as the sum of KBS and non-KBS employment.

We use an ATEM calculation to detail the rates of productivity growth within the study area, based around sectoral specific economic density variations between LADs. The empirical literature suggests that an increase in economic density can have a positive productivity increase, although this effect varies by

sector. Using coefficients from the TIEP report,[93] we are able to calculate a net impact by sectoral productivity.

A possible extension of this method could be to analyse the additional productivity enhancing mechanisms that may act at a length greater than the size of the LADs, particularly the knowledge spillover effects that may occur due to long range interactions (either through long distance commuting or business collaboration) that are made more frequent by the dramatically enhanced connectivity.

Results

Overview of growth in the Corridor

Table 5-12 summarises the transformational scenario results for employment, GVA, productivity and population in the Corridor and the city-regions. By 2050, it is projected that employment in the Corridor will have grown by 1.3% pa since 2014 to 2,937,000 people. GVA is projected to grow at 2.9% pa between 2014 and 2050, reaching almost £254bn by the end of the projection period.

---

[93] Specifically in Table 3.1 of Venables, Laird and Overman (2014) which reports elasticities from the literature supporting links between accessibility and productivity. There is a range of results, but we use elasticities of 4% for high-tech manufacturing and 8% for KIBS.

Table 5-12 Summary of transformational scenario projections

	Employment			GVA			Productivity			Population		
	2014 (000s)	2050 (000s)	2014-50 (% pa)	2014 (£2011m)	2050 (£2011m)	2014-50 (% pa)	2014 (£000)	2050 (£000)	2014-50 (% pa)	2014 (000s)	2050 (000s)	2014-50 (% pa)
CaMKOx-N Corridor	1,833	2,937	1.3	90,484	253,635	2.9	49	86	1.6	3,341	4,892	1.1
Greater Cambridge-Northern Hertfordshire	487	783	1.3	23,156	63,618	2.8	48	81	1.5	902	1,309	1.0
Oxford-Swindon	525	825	1.3	27,946	77,963	2.9	53	95	1.6	888	1,258	1.0
Milton Keynes-Bedfordshire-Aylesbury Vale	560	934	1.4	28,802	84,191	3.0	51	90	1.6	1,088	1,676	1.2
Greater Northampton	262	396	1.2	10,580	27,813	2.7	40	70	1.6	463	650	0.9

As shown in Figure 5-14, growth in employment at the city-region level is projected to be faster than historically in all city-regions, but the growth rate in the Greater Northampton area is expected to be marginally lower than the overall average in the Corridor (at 1.2% pa compared to 1.3% pa).

Figure 5-14 Transformational scenario projections for employment
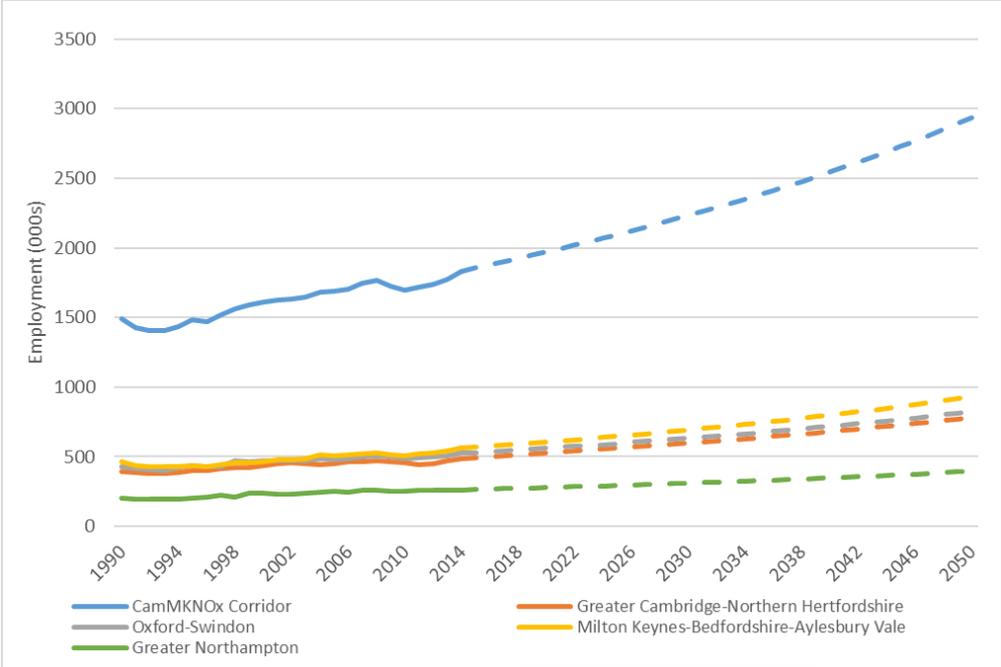
The Greater Northampton region also lags behind slightly in the outlook for GVA growth (at 2.7% pa over 2014-50 compared to growth of more than 2.8% pa in other areas) (see Figure 5-14).

Figure 5-15 Transformational scenario projections for GVA
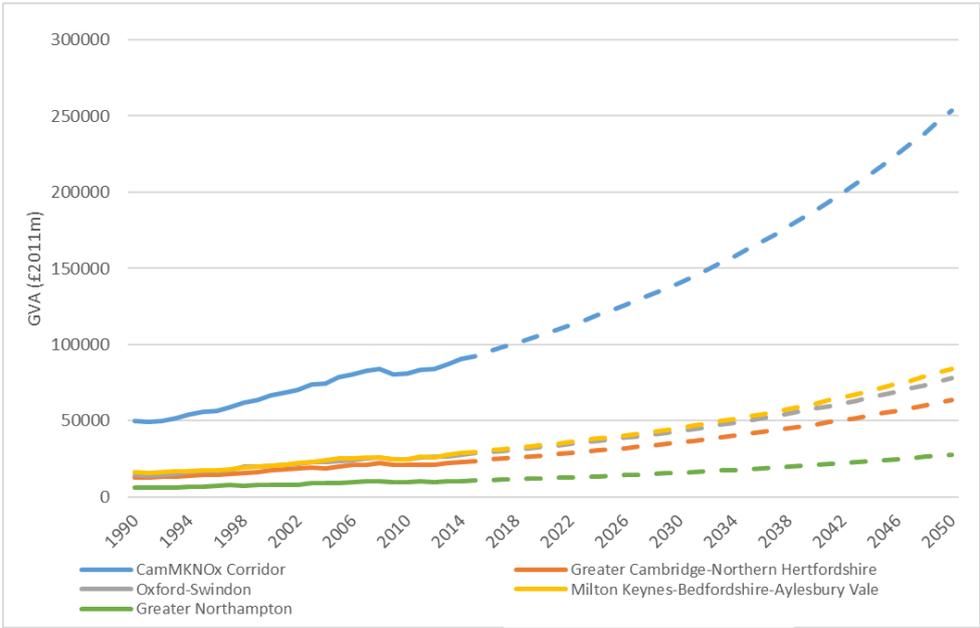
The implication of these trends is that productivity growth is very similar across the sub-areas (see Figure 5.15).

Figure 5-16 Transformational scenario projections for productivity
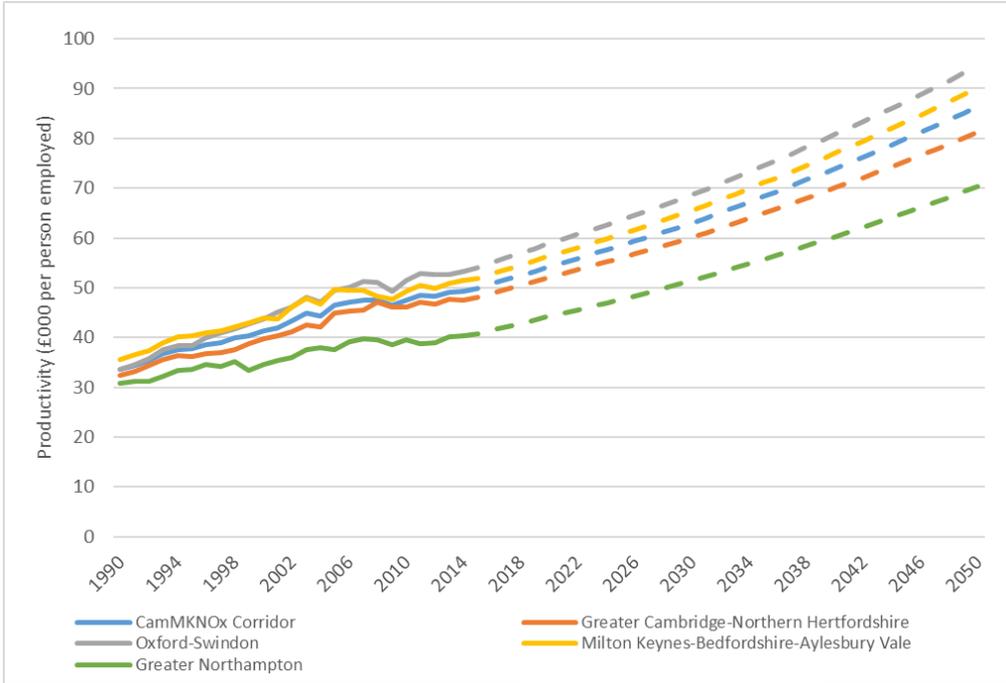
Population growth in the Corridor is expected to be at 1.1% pa over 2014-50 at the Corridor level, with particularly strong growth in the Milton Keynes-Bedfordshire-Aylesbury Vale area (see Figure 5.16).

Figure 5-18 Transformational scenario projections for population
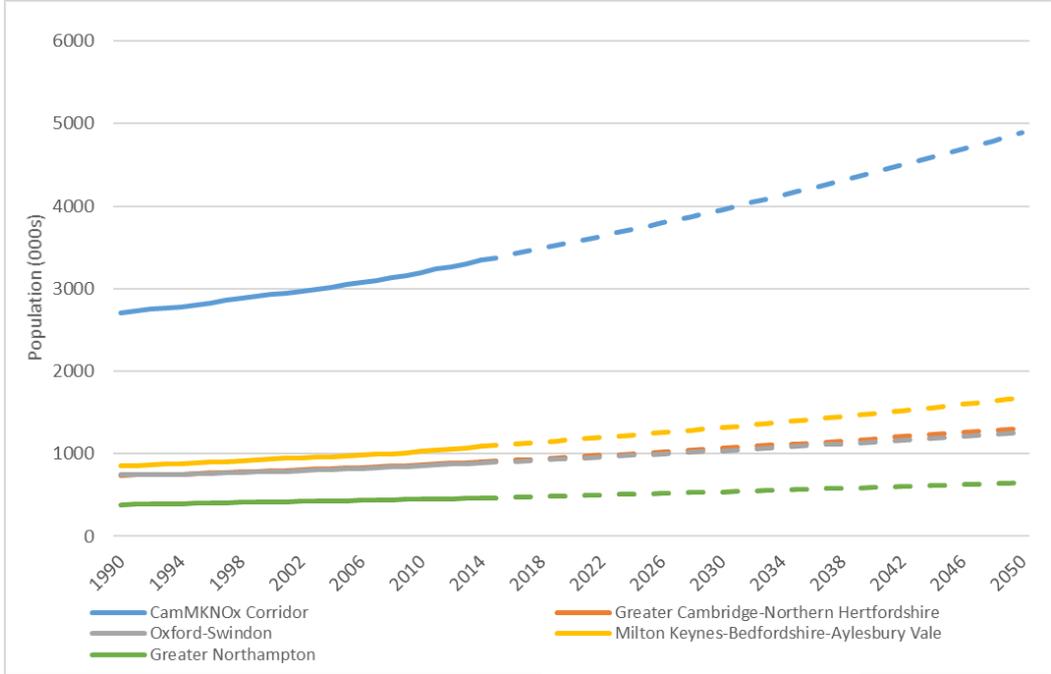
Employment and population growth at the local level

According to Table 5-13, employment growth in the Corridor is expected to be slightly faster than the historical growth rate, at 1.3% pa over 2014-50. The long-term growth rates are only marginally higher than in the medium-term prospect at the local authority level. As with the incremental scenario, local authority growth rates are markedly different from historical trend but there is more than modest growth in employment in all local authorities, Wellingborough being the only one with a growth rate of below 1% pa over 2014-50. Some of the highest growth rates are in South Cambridgeshire, and Milton Keynes which have historically been centres of activities in their respective sub-area, as identified in Chapter 3.

Table 5-13 Transformational scenario projections for employment by local authority

	1990-2014		2014	2025	2050	2014-25		2014-50	
	(000s)	(% pa)	(000s)	(000s)	(000s)	(000s)	(% pa)	(000s)	(% pa)
CaMKOx-N Corridor	343	0.9	1,830	2,100	2,940	262	1.2	1,103	1.3
Greater Cambridge-Northern Hertfordshire	92	0.9	487	560	783	73	1.3	296	1.3
Cambridge	3	0.1	104	121	171	16	1.3	67	1.4
South Cambridgeshire	34	2.1	84	99	142	14	1.4	58	1.5
East Cambridgeshire	18	2.9	37	43	62	6	1.3	25	1.4
Huntingdonshire	22	1.3	83	96	136	13	1.3	53	1.4
North Hertfordshire	1	0.1	58	66	88	8	1.2	30	1.2
East Hertfordshire	10	0.6	73	82	109	9	1.0	36	1.1
Stevenage	5	0.4	47	54	74	7	1.2	27	1.3
Oxford-Swindon	96	0.8	525	595	825	71	1.2	300	1.3
Oxford	22	0.8	128	143	200	15	1.0	72	1.3
Vale of White Horse	12	0.8	68	78	109	10	1.2	41	1.3
South Oxfordshire	19	1.2	73	84	120	11	1.3	47	1.4
West Oxfordshire	14	1.4	50	57	78	7	1.2	28	1.3
Cherwell	21	1.3	82	94	132	12	1.2	50	1.3
Swindon	9	0.3	124	140	186	16	1.1	62	1.1
Milton Keynes-Bedfordshire-Aylesbury Vale	97	0.8	560	647	934	87	1.3	374	1.4
Milton Keynes	66	2.0	175	208	312	33	1.6	136	1.6
Bedford	-0	0.0	81	92	125	10	1.1	44	1.2
Aylesbury Vale	8	0.4	89	101	141	12	1.2	51	1.3
Luton	6	0.2	100	116	173	16	1.3	73	1.5
Central Bedfordshire	17	0.7	114	130	183	16	1.2	70	1.3
Greater Northampton	58	1.0	262	293	396	31	1.0	134	1.2
Northampton	24	0.8	141	158	212	16	1.0	70	1.1
Daventry	12	1.5	42	47	64	5	1.0	22	1.2
Wellingborough	4	0.4	40	44	56	4	0.8	16	0.9
South Northamptonshire	18	2.6	39	45	63	6	1.3	25	1.4

In terms of population, the highest growth rates are expected in local authorities in the Milton Keynes/Luton/Bedfordshire/Aylesbury Vale sub-area, averaging 1.2% pa in both the medium-term and the long-term prospects (Table 5-14). Population growth rates are broadly similar among local authorities belonging to the same city-region.

Table 5-14 Transformational scenario projections for population by local authority

	1990-2014		2014	2025	2050	2014-25		2014-50	
	(000s)	(% pa)	(000s)	(000s)	(000s)	(000s)	(% pa)	(000s)	(% pa)
CaMKOx-N Corridor	630	0.9	3,341	3,753	4,892	412	1.1	1,551	1.1
Greater Cambridge-Northern Hertfordshire	167	0.9	902	1,011	1,309	108	1.0	406	1.0
Cambridge	25	0.9	129	141	176	13	0.9	48	0.9
South Cambridgeshire	33	1.0	153	172	224	19	1.1	70	1.1
East Cambridgeshire	27	1.5	87	97	126	10	1.0	39	1.0
Huntingdonshire	27	0.7	174	193	247	20	1.0	74	1.0
North Hertfordshire	19	0.7	131	148	197	17	1.1	66	1.1
East Hertfordshire	26	0.8	143	162	214	19	1.1	71	1.1
Stevenage	11	0.6	86	96	125	10	1.0	39	1.0
Oxford-Swindon	144	0.7	888	988	1,258	100	1.0	370	1.0
Oxford	30	0.9	158	175	220	17	0.9	62	0.9
Vale of White Horse	14	0.5	125	140	180	15	1.0	55	1.0
South Oxfordshire	18	0.6	137	152	190	15	0.9	53	0.9
West Oxfordshire	18	0.8	108	120	152	12	0.9	43	0.9
Cherwell	18	0.6	144	160	204	16	1.0	59	1.0
Swindon	45	1.0	216	242	313	26	1.0	97	1.0
Milton Keynes-Bedfordshire-Aylesbury Vale	238	1.0	1,088	1,241	1,676	153	1.2	588	1.2
Milton Keynes	83	1.6	259	294	393	35	1.2	133	1.2
Bedford	29	0.8	164	187	254	23	1.2	90	1.2
Aylesbury Vale	38	1.0	185	211	284	26	1.2	100	1.2
Luton	39	0.8	211	238	314	27	1.1	103	1.1
Central Bedfordshire	50	0.9	269	311	431	42	1.3	161	1.3
Greater Northampton	80	0.8	463	514	650	50	0.9	187	0.9
Northampton	37	0.8	219	246	317	26	1.0	98	1.0
Daventry	16	1.0	79	87	107	8	0.8	28	0.8
Wellingborough	9	0.5	76	84	103	7	0.8	26	0.8
South Northamptonshire	18	1.0	88	98	124	10	0.9	35	0.9

Growth in KIBS and HTM sectors KIBS employment growth is projected to continue driving overall growth in KBS sectors while HTM employment is expected to stay almost unchanged over the whole projected period (see Figure 5-19).

Figure 5-19: Transformational scenario projections for employment in KIBS and HTM sectors
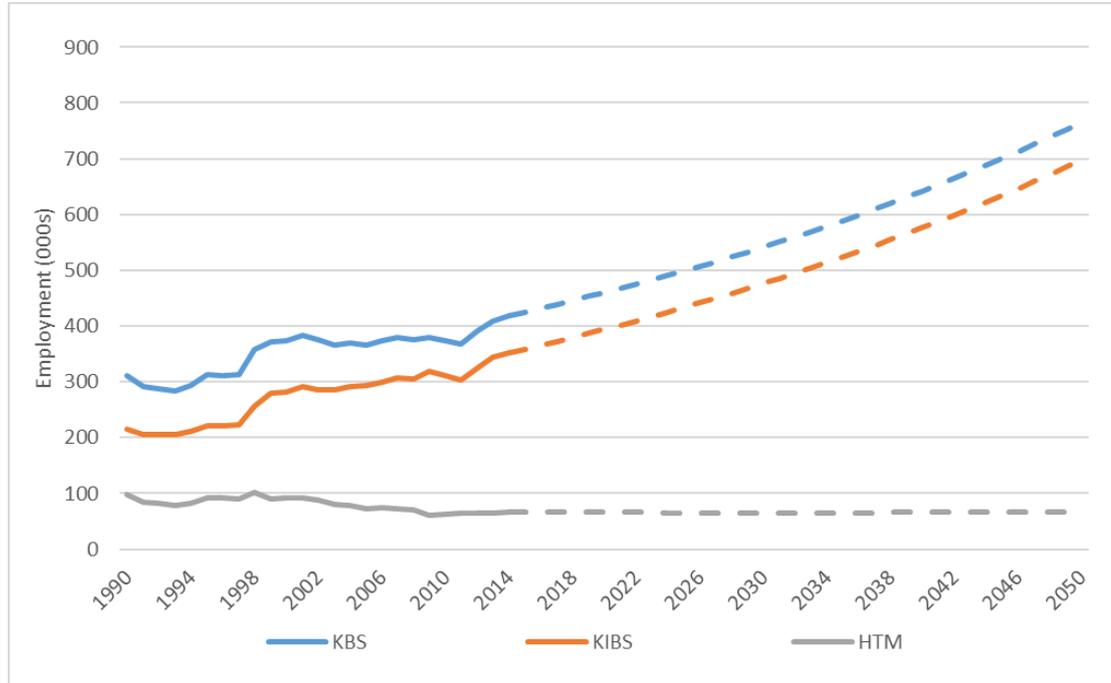
By 2050, there is expected to be 346,000 additional KBS sector jobs, all of which are created in KIBS sectors (see Figure 5-17). Growth in employment in KIBS sectors is projected to be strong in all parts of the Corridor at 1.6% pa or above over 2014-50, particularly in the Milton Keynes-Bedfordshire-Aylesbury Vale area at 2.2% pa. The historical decline in HTM employment is projected to cease at the most aggregated level. Although the downward trend is expected to continue to a notably lesser extent in the Milton Keynes and Northampton areas, this is offset by a slight expansion of HTM sectors in the Cambridge and Oxford areas.

Table 5-15 Transformational scenario projections for employment in KIBS and HTM sectors

	KBS			KIBS			HTM		
	2014 (000s)	2050 (000s)	2014-2050 (% pa)	2014 (000s)	2050 (000s)	2014-2050 (% pa)	2014 (000s)	2050 (000s)	2014-2050 (% pa)
CaMKOx-N Corridor	419	765	1.7	352	698	1.9	67	67	0.0
Greater Cambridge-Northern Hertfordshire	118	207	1.6	98	184	1.8	20	23	0.4
Oxford-Swindon	129	232	1.7	108	208	1.8	21	24	0.5
Milton Keynes-Bedfordshire-Aylesbury Vale	120	240	1.9	103	228	2.2	17	12	-1.1
Greater Northampton	52	86	1.4	44	77	1.6	9	8	-0.1

Compared to the incremental scenario, productivity growth in KBS sectors, as well as the component KIBS sectors is only slightly faster and HTM productivity is also expected to grow much faster than KIBS productivity (see Figure 5-20).

Figure 5-20 Transformational scenario projections for productivity in KIBS and HTM sectors
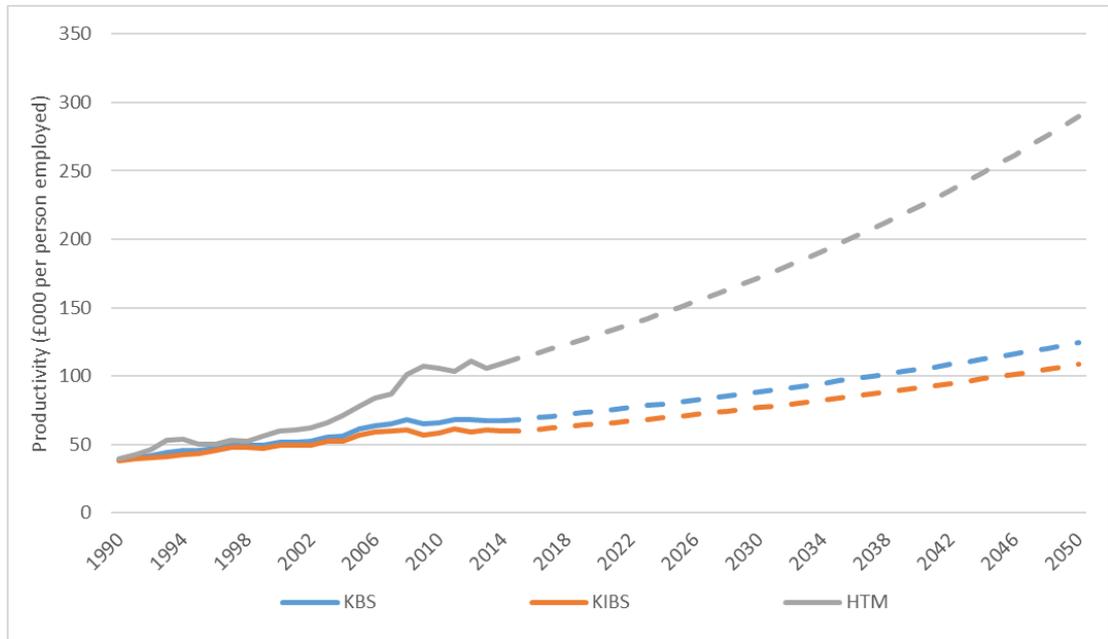
Under the transformational scenario, HTM productivity is expected to grow at an almost uniform pace in all city-regions, at 2.6-2.7% pa over 2014-50. As a result, the regions' HTM productivity ranking in 2050 is unchanged from 2014. There are marginal differences in KIBS productivity growth across regions, the strongest in the Milton Keynes-Bedfordshire-Aylesbury Vale area at 1.8% pa and the weakest in the Greater Cambridge-Northern Hertfordshire area at 1.5% pa.

Table 5-16 Transformational scenario projections for productivity in KIBS and HTM sectors

	KBS			KIBS			HTM		
	2014 (000s)	2050 (000s)	2014-2050 (% pa)	2014 (000s)	2050 (000s)	2014-2050 (% pa)	2014 (000s)	2050 (000s)	2014-2050 (% pa)
CaMKOx-N Corridor	68	124	1.7	60	108	1.7	110	290	2.7
Greater Cambridge-Northern Hertfordshire	69	123	1.6	60	103	1.5	113	283	2.6
Oxford-Swindon	71	131	1.7	61	107	1.6	126	335	2.7
Milton Keynes-Bedfordshire-Aylesbury Vale	69	130	1.8	65	125	1.8	95	247	2.7
Greater Northampton	52	93	1.6	45	78	1.6	89	234	2.7

5.6   Comparison and Conclusions

This section compares the following variables for each scenario, comparing them to recent historic trends and identifying the implications of these scenarios.

Population   In each scenario, population has been used as an exogenous variable. The three projections used for each scenario are as follows:

- The ONS principal population projection was used for the "business as usual" scenario.

- The ONS "high migration" population projection was used for the incremental scenario. The implicit assumption here is that the improved availability of housing and infrastructure within the study area both facilitates and attracts a larger number of migrants to the region. Whether these migrants originate from other regions of the UK or from external sources in unspecified.

- A population projection above that of the ONS high migration scenario was used for the transformational scenario. This projection was provided to CE by the Savills group undertaking the Housing Provision Workstream of this Study. The projection is intended to replicate the total population that would be accommodated by the Transformational Housing scenario used in Savills' own study.

The three projections are shown in Figure 5-21, along with the historical trend from 1990 to 2014 for context. As of 2014, the population of the study area stands at approximately 3.3m. By 2050, this figure is anticipated to have increased to 4.3m in the baseline scenario. The incremental and transformational scenarios show a projected total in 2050 of 4.5m and 4.8m respectively. This represents a significant increase over the baseline – the transformational scenario is anticipated to bring an additional half a million people to the area.

Figure 5-21 Population scenario comparison
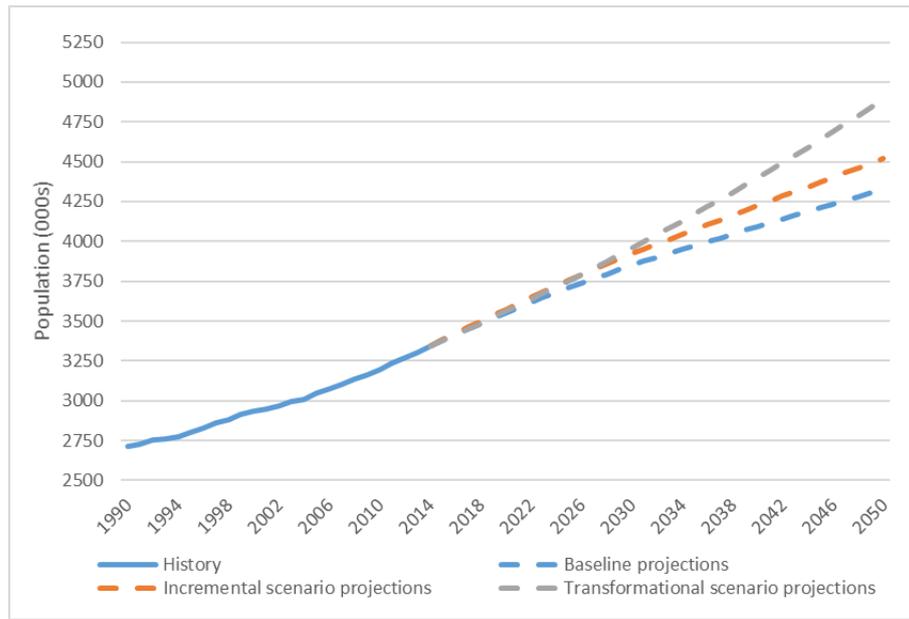
Employment Total employment is an endogenous variable within the model. The two assumptions that directly impact onto this are the effects of transport infrastructure in firstly facilitating (incremental scenario) and secondly driving (transformational scenario) KIBS and HTM employment growth in each of the 26 local authority districts in the study area, and the increased demand for services from the increases in population outlined in the previous section.

Employment projections for each scenario are shown in Figure 5-22. The impact of the incremental changes is shown to allow the corridor to maintain its employment growth at close to its current growth rate, whereas the transformational changes drive the employment growth above the historic growth rate.

Figure 5-22 Employment scenario comparison
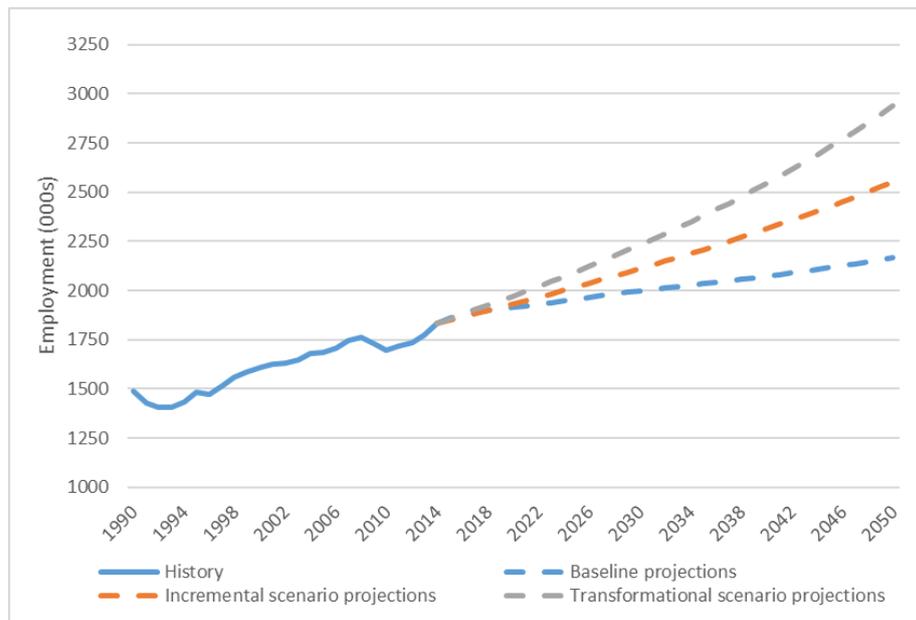
As of 2014, there are approximately 1.8m people employed within the study area. In the baseline scenario, this is anticipated to increase steadily to 2.2m by 2050. The incremental scenario sees a further 300,000 jobs created by 2050, with a total figure of 2.5m, and the transformational scenario sees an additional 700,000 jobs, taking the total employed to 2.9m by 2050.

Knowledge-Based Sectors Looking at the employment growth in more detail, Figure 5-23 shows the change in employment in KIBS (left) and HTM (right) in each scenario. In the baseline scenario, the KIBS sectors see moderate growth from 350,000 employees to around 460,000, but this is partially offset by a drop in HTM employment (following historic trends) from around 65,000 to around 45,000.

The incremental scenario sees a significant boost to KIBS, which more than doubles the number of new jobs created in the study area, and a softening of the reduction in HTM jobs to only around 5,000.

The transformational scenario sees a further increase in the number of KIBS jobs, with the current trend being extended onwards, and 700,000 jobs being realised by 2050. This scenario also sees no further reduction in the number of jobs in HTM, despite the ongoing increases in technology-driven productivity enhancements that are expected to continue.

Figure 5-23 Employment scenario comparison for KIBS and HTM
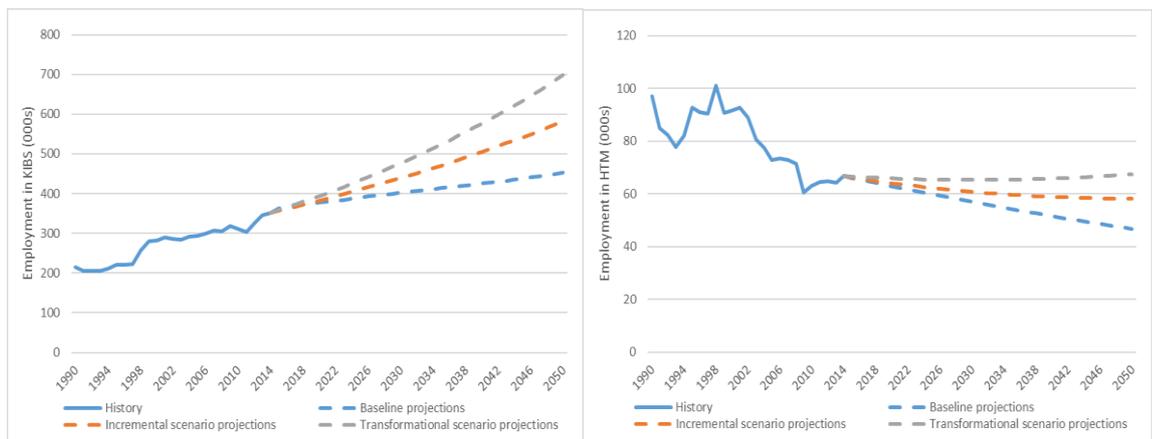
The net effect of this on knowledge intensive employment as a % of total employment is shown in Figure 5-24. Here we see that in the baseline scenario, the number of knowledge intensive jobs grow at the same rate as the wider economy, and remains at 23% of total employment; whereas for the incremental and transformational scenario, knowledge intensive sectors grow at a faster rate, and comprise 25% and 26% of the total employment in the study area by 2050.

Figure 5-24 Share of employment in Knowledge Based Sectors
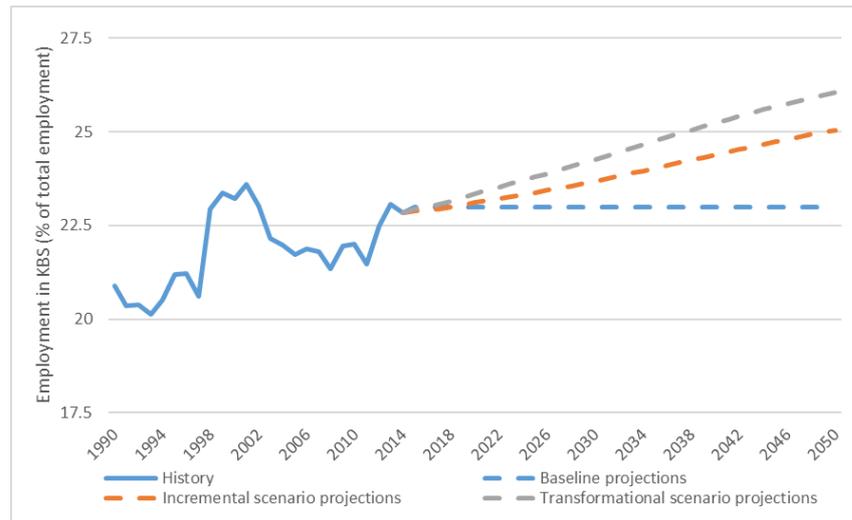
Productivity One of the net results of this relative boost to knowledge-based sectors, which tend to be more productive on average than the wider economy, is a relative increase in total productivity across the study area.

The effect of the incremental scenario is to raise the average productivity level in 2050 by an additional £4,000 per worker over business as usual case, and the transformational scenario is found to generate an additional £6,000 above the business as usual case

Figure 5-25 Productivity scenario comparison
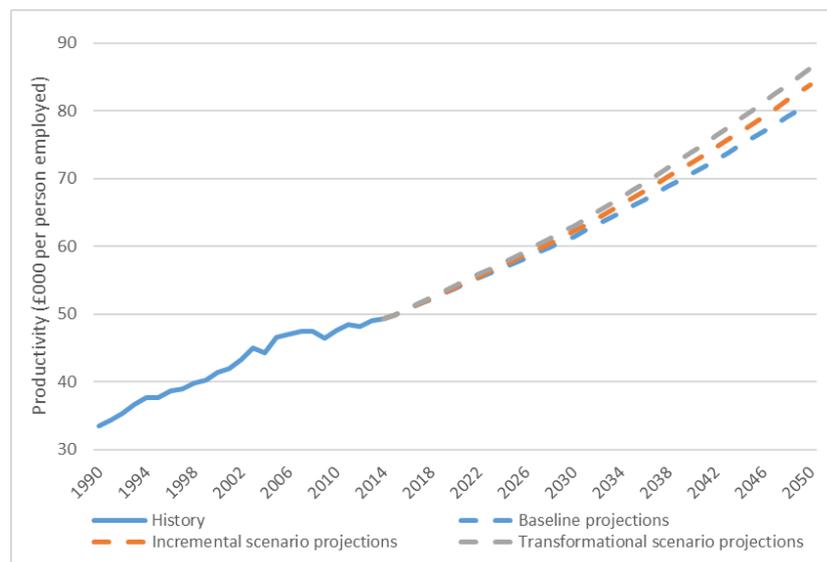
Table 5-17 Table showing comparison of different scenarios

	Population Growth (%pa)				Employment Growth (%pa)				Productivity Growth (%pa)s			
	Historic (1990 to 2014)	Baseline (2014 to 2050)	Incremental (2014 to 2050)	Transformational (2014 to 2050)	Historic (1990 to 2014)	Baseline (2014 to 2050)	Incremental (2014 to 2050)	Transformational (2014 to 2050)	Historic (1990 to 2014)	Baseline (2014 to 2050)	Incremental (2014 to 2050)	Transformational (2014 to 2050)
CaMKOx-N Corridor	**0.9**	**0.7**	**0.8**	**1.1**	**0.9**	**0.5**	**0.9**	**1.3**	**1.6**	**1.4**	**1.5**	**1.6**
Greater Cambridge-Northern Hertfordshire	0.9	0.7	0.8	1.0	0.8	0.5	1.0	1.3	1.9	1.4	1.5	1.5
Oxford-Swindon	0.7	0.5	0.7	1.0	0.8	0.4	0.9	1.3	1.5	1.5	1.6	1.6
Milton Keynes-Bedfordshire-Aylesbury	1.0	0.9	1.0	1.2	1.0	0.5	0.9	1.4	1.1	1.3	1.6	1.6
Greater Northampton	0.8	0.6	0.7	0.9	0.9	0.4	0.8	1.2	1.6	1.5	1.5	1.6

Table 5-18 Table showing KIBS and HTM Growth Rates for each scenario

	Knowledge Intensive Business Services Employment Growth (%pa)				High-Tech Manufacturing Employment Growth (%pa)			
	Historic (1990 to 2014)	Baseline (2014 to 2050)	Incremental (2014 to 2050)	Transformational (2014 to 2050)	Historic (1990 to 2014)	Baseline (2014 to 2050)	Incremental (2014 to 2050)	Transformational (2014 to 2050)
CaMKOx-N Corridor	**2.1**	**0.7**	**1.4**	**1.9**	**-1.4**	**-1.4**	**-0.4**	**0.0**
Greater Cambridge-Northern Hertfordshire	2.0	0.7	1.5	1.8	-0.2	-1.1	0.1	0.4
Oxford-Swindon	2.3	0.7	1.5	1.8	0.2	-1.3	0.1	0.5
Milton Keynes-Bedfordshire-Aylesbury Vale	2.0	0.8	1.3	2.2	-3.3	-2.5	-1.8	-1.1
Greater Northampton	2.1	0.7	1.1	1.6	-2.4	-2.2	-0.6	-0.1

6   Conclusions

This chapter looks back over the previous four chapters to identify important points of analysis and general conclusions.

Chapter 2 developed a theoretical logic framework, premised on processes of agglomeration but within a spatial context that was defined largely at the scale of city-regions. Chapter 3 then considered the overall pattern and process of growth across the four spatial economies defined within the wider study area. Building on this narrative, Chapter 4 used a series of case studies to probe the growth processes in more detail, considering the perspectives provided by historical accounts of the area's potential; current analyses of its key clusters and assets; and the experience of comparator areas from outside of the UK. A series of scenarios was then developed in Chapter 5, in collaboration with the work-streams investigating housing & commercial space and transport infrastructure. The projected economic outcomes associated with three different sets of housing and transport scenarios were computed and analysed.

Looking across the evidence, data and arguments presented in all four chapters, a number of important conclusions might be identified. These are crucial in relation to the overall growth potential of the CaMKOx-N area. They are discussed in the paragraphs that follow.

Using the logic framework   The logic framework distilled a substantial body of theoretical literature – some from economics and some from economic geography – into one model. Inevitably (and necessarily) this simplified the process of growth, but it allowed for some consideration of the similarities and differences between the four spatial economies within the wider CaMKOx-N area.

In very high level terms – and drawing on evidence from Chapters 3 and 4 – the graphic below characterises each of the sub-areas according to the "fundamentals" within the logic framework. It then colour-codes them on a simple (and certainly over-simplistic) Red-Amber-Green assessment. It shows that all four local economies have some major assets but all four are facing challenges, albeit of different forms.

Table 6.1: Summarising the four local economies in terms of the logic framework

Spatial economy / Logic framework "Fundamental"	Greater Cambridge – northern Hertfordshire	Greater Northampton	Milton Keynes / Luton / Bedford / Aylesbury	Oxfordshire and Swindon
HE and R&D institutions	Outstanding assets – amongst the best in the world	Historically relatively weak	Developing – Cranfield University is significant and the wider asset base is developing quickly	Outstanding assets – amongst the best in the world
Educational base	Very strong in Cambridge; somewhat less strong across the wider area	Generally relatively poor workforce skills	Poor schools performance is identified as an issue and workforce skills are mixed	Generally very strong
Quality of Life factors	Although both are under pressure, schools and healthcare are perceived to be good	Generally well regarded across the county although Northampton itself has regeneration challenges	In parts, the quality of life is very well regarded, albeit in different ways from elsewhere and generally by a different demographic	Generally, the quality of life is very good, but all the contributory elements are under some pressure
Affordable and high quality housing	Under very significant pressure, particularly in Cambridge itself	Delivery has been reasonably strong and the area is relatively affordable	Housing delivery has been consistently strong and housing is relatively affordable	Much of the area is under significant pressure
Commercial and industrial space	Some supply – particularly outside Cambridge. Specialist provision is good	Good availability of relatively low cost employment sites and premises	Good availability of relatively low cost employment sites and premises	Supply is very constrained in Oxford but better elsewhere. Th
Transport infrastructure	Extreme congestion issues both within the larger urban areas and in terms of access to them	Well located and relative to elsewhere, the transport infrastructure is less stretched	Very well located with less acute challenges than elsewhere although still locally important ones	Extreme congestion issues both within the larger urban areas and in terms of access to them
Governance	Governance arrangements have been made to work well for a long time in a challenging	Governance arrangements generally work well	Governance arrangements have been highly effective in part because of the legacy of the	Governance arrangements across Oxfordshire are under considerable pressure

	context – albeit they are under constant pressure		Development Corporation in MK	
Access to finance and business support	Very well developed networks and possibilities in the knowledge-based sector	Developing networks – but they are relatively limited currently compared to elsewhere	Developing networks which are relatively limited compared to elsewhere but bolstered by a lively professional and financial services sector	Networks are developing quickly and they have strengthened over the last couple of years

Key:

	Major existing strength		Developing assets/strength		Major challenge/ weakness

Spatial Narratives

The value of this assessment really needs to be seen in the context of the evidence and data presented in Chapter 3. Whilst causality cannot be "proved", it is important to consider how the assets and constraints summarised above map onto both the overall pattern of growth and the particular pattern of growth in relation to the knowledge-based sectors.

Oxford and Cambridge areas

The areas around both Cambridge and Oxford have developed a considerable knowledge-intensive economy, with a combination of world-class knowledge generating institutions (including but not limited to the respective universities) a highly skilled and well-educated workforce, opportunities for rewarding and well-paid jobs, and a relative specialisation in high-tech and knowledge intensive sectors, forming a self-reinforcing cycle of knowledge generation, innovation, and economic growth.

This is evidenced in the strong employment growth rates not just in the KIBS sector, but also in the strong productivity growth in the HTM sector. Although neither area has seen employment levels in high-tech manufacturing grow, this needs to be seen in the context of a national trend of employment reduction across all manufacturing sectors. In that context, the areas around Cambridge and Oxford have managed to buck the national trend by improving their productivity rates without experiencing a substantial decline in sectoral employment.

Despite these similarities, the development trajectory of the two areas has been subtly different, with the Cambridge area experiencing a higher relative degree of specialisation in the science and high-tech sectors, including Electronics, IT, and a variety of scientific research endeavours, whereas the Oxford area's knowledge economy is more diverse, with relatively greater levels of employment in more directly business focused sectors.

Looking towards the future, and as detailed in table 6.1, both Oxford and Cambridge face a wide range of challenges in the coming decades. Housing and employment space provision has been constrained within the cities themselves for some time now, and the result of this has been that both

employment sites and housing developments have been located outside the city boundaries.

However, this development has brought with it problems of its own. As the effective economic footprint of each city has rapidly grown outwards, the infrastructure provision has failed to keep up. The number of workers commuting either into the cities from surrounding areas, from within the city to peripheral employment zones, or even across the city from periphery to periphery sites has increased dramatically over the past decades, taking them outside the functional scope of existing public transport provision and putting additional pressure on the local road system.

From Table 6.1, it is apparent that both Greater Cambridge-Northern Hertfordshire and Oxfordshire-Swindon benefit from outstanding assets linked to higher education and research and development institutions. The strength of these assets should not be underplayed. They are amongst the best in the world – and in both scale and quality, they outstrip any of those described in the comparator case studies presented in Chapter 4. In both cases, the high rates of both employment and productivity growth need to be seen in terms of the constraints flagged in Table 6.1 which have been, and are, considerable.

 In terms of the growth narrative, Greater Cambridge-Northern Hertfordshire has navigated them more effectively than Oxfordshire-Swindon, but in both places the process of growth has not been easy: in the context of tightly defined green belts around the two main cities, there are major constraints relating to both transport and housing. Although we do not have the counterfactual, the inference must be that the rate of growth in knowledge-based sectors has been slower than might have occurred in a less constrained context.

Milton Keynes area

As described in detail in Chapter 3, the sub-area which has seen the fastest growth in housing, population and jobs is that defined around Milton Keynes/Luton/Bedford/Aylesbury. This area is relatively unconstrained in planning terms. Moreover, as Table 6.1 demonstrates, in terms of the "fundamentals", it benefits from good transport connectivity and is has been enabled – particularly in Milton Keynes itself – by strong and effective governance. As explained in Chapter 3 (and in more detail in Chapter 4), the role of the Development Corporation was significant in the early years of the New Town. Some 50 years after its original designation as a New Town, Milton Keynes continues to be highly ambitious and aspirational as a growth city.

However, whilst this growth has been impressive, the figures suggest it has not been driven by growth in knowledge intensive sectors, which only constitute 10% of overall growth, compared to figures of 25% and 30% in Oxford and Cambridge respectively, despite its close geographical proximity to them.

Better physical and economic linkages to these two centres may help drive forward knowledge intensive sector growth in the Milton Keynes region, both in the city itself, but also along the east-west route through Aylesbury Vale linking it to Oxford and through Central Bedfordshire en route to Cambridge.

Northampton area

As examined in chapter 3, Northampton has experienced moderate to high levels of population and employment growth. Its location near the M1 and juxtaposed between the manufacturing regions in the West Midlands and the increasingly large and diverse services hub in Milton Keynes only 20 miles to the south has provided it with the opportunity for growth in its logistics and business support sectors, a function that doubles up with its status as a county town and local retail, public and residential services hub.

As it is the furthest city in the study area from London, it benefits from a comparative increase in the supply of affordable housing and commercial premises, a factor that has been a major factor in its growth in recent years, and there appears to be an appetite for further growth in the immediate future.

The combination of affordability and excellent connectivity, combined with the town's close links to the industrial sectors in the west midlands and the services oriented hubs to the south, make Northampton an attractive place for new firms to locate, and it has the highest start-up rate in the UK with 10 start-ups per 1000 population in 2015.

However, the positive business birth figures are juxtaposed with its low patent rate, at only 0.4 patents per 10,000 population. Other than an area of high-tech manufacturing in the area around Silverstone on the border with Bedfordshire, the Greater Northampton area features the lowest economic density of knowledge based sectors in our study area. This is reflected in the skills base, with only 25% of workers with qualifications at level 4 or above, the lowest sub-area in the study region.

This major challenge going forward for the Greater Northampton area is not so much the absolute extent to which it is able to grow its raw employment figures, but the extent to which it is able to drive up its skill levels and best integrate its economy with the growing regional hub of Milton Keynes to the south and to improve the quality and productivity of those additional jobs.

Looking back to look forward

Much can be learnt from looking backwards. Particularly over a medium-long term timescale, a key observation from Chapter 4 was that growth narratives are not simply linear and the nature of growth does change over time. The commentators of the 1960s underestimated the significance of knowledge-based growth. We can only speculate on what the policy makers of 2070 might make of our attempts to anticipate the future across a core part of central southern England from the vantage point of 2016.

Because of this, we should however recognise that it would be folly simply to extrapolate the future from the past and assume (a) that this outcome is inevitable and (b) investments should only be made to make it more likely. Particularly with reference to Table 6.1, a range of different possibilities and permutations need to be considered.

Possible economic futures from the logic framework and the case studies

Looking ahead, the "amber boxes" in Table 6.1 are particularly important. These, arguably, are the opportunities that are currently unfulfilled. Whilst the "green" boxes are already driving growth, the "red" ones are – in some respects – verging on "too difficult" (or at least "too expensive" in the current environment); whilst incremental improvements are important,

transformational ones are unlikely to be possible. The critical question therefore surrounds what might be done with the "amber" opportunities.

From Table 6.1, one "amber box" stands out in relation to the future growth narrative for the CaMKOx-N area:

The Milton Keynes/Luton/Bedford/Aylesbury area has the greatest capacity – and appetite – for growth.

Its knowledge-based assets are not on a par with those to the east or west, but they are still substantial compared to most other parts of the UK, and they are developing quickly.

Is there an economic rationale for focusing on these, and using them as something of a "stepping stone" in relation to the ambition for a "single knowledge-based cluster corridor-wide"?

And if this could be achieved, what might be the consequential implications for growth in both Greater Cambridge/northern Hertfordshire and Oxfordshire/Swindon?

The point is that this emerging asset could be transformational both within the area, and in enabling the wider area to function as a "single knowledge-based cluster" – which was the original challenge posed by the former-chancellor.

Headline Observations

The assets and capabilities of the Milton Keynes/ Luton/Bedford/ Aylesbury area are significant.

Cranfield University – and its Technology Park – are crucial, but we might point also to the strengthening university presence within Milton Keynes, the role of various Catapults with a presence in the city, the possibilities linked, for example, to Silverstone Park and Millbrook, and the propensy of some significant knowledge-based businesses to locate in the area. Particularly in an era of convergent technologies, open innovation and digital experimentation, this cocktail of assets is potentially powerful

Evidence of knowledge based collaborations

Second, there is some - albeit limited - evidence of businesses in this geography forging effective knowledge-based collaborations with businesses/organisations from both Greater Cambridge-northern Hertfordshire and Oxfordshire-Swindon. This has happened despite patterns of connectivity, not because of it, and it hints at the potential that might exist

Increased interest from Oxford and Cambridge

Whilst there have been previous attempts to "marry together" Oxford and Cambridge through an Arc across the wider area, these have faltered, in part, through a lack of willingness at the two ends. But over the last decade, the centre has matured, growing both economically and in size, and the pressures on the two ends have grown noticeably. This is another reason why future policy direction should perhaps be different from the past.

Potential for Commuting and Collaboration

Fourth, without significant infrastructure investment in fast rail, Oxford and Cambridge are simply too far apart for anything approaching regular commuting. However, the distance between the two is not much greater than the distance between each and London, where there is significant daily commuting. There is also evidence of functionally significant collaboration and

this ought to be encouraged, recognising that these are two of the most significant concentrations of science and know-how anywhere in the world.

Conclusions from Chapter 5

When considering the economic impacts of the two enhanced scenarios, we need to consider their relative effects compared to the baseline or business as usual case at the chosen point in time of 2050.

We find that the assumptions used in the incremental scenario, informed by the evidence of chapters 3 and 4 – namely the sufficient additional housing provision to support the ONS high migration projection across the study area, and the additional infrastructure around Oxford and Cambridge in particular, to both maximise the impact of the anticipated East-West Rail link and coincidently release currently constrained employment growth potential in these two areas, provide the study area with an additional **300,000 jobs**, of which 50,000 will be in the Cambridge FEA and 70,000 in the Oxford FEA specifically. We also find an additional productivity boost of **£4,000 per worker** over the entire study area.

The assumptions in the transformational scenario – which assumes a house building rate of 23,000 new houses per year, and significant improvements to transport infrastructure both within existing functional economic areas, but also in creating better linkages between them (for example the proposed Oxford-Cambridge Expressway), and thus driving enhanced interaction and collaboration across the corridor, provide the study area with an additional **700,000** jobs, of which 250,000 are in the central Milton Keynes sub-area at the heart of the cross-corridor infrastructure improvements. We find an associated productivity boost of **£6,000 per worker**.

What is clear, is that without the housing and infrastructure interventions outlined in Chapter 5 of this report, employment, and productivity growth in the four key sub-areas is unlikely to be maintained at current rates, and genuinely transformational changes will be required to realise the full potential of the study area and effect the Chancellor's envisaged "knowledge intensive growth corridor".

Bibliography

Besley, T., Coelho, M., & Van Reenen, J. (2013). Investing for prosperity: skills, infrastructure and innovation. *National Institute Economic Review*, *224*(1), R1-R13.

Brunner, H.P. (2013) What is Economic Corridor Development and What Can it Achieve in Asian Regions? EC, RCI Discussion Paper.

Centre for Cities (2016) Cities Outlook 2016.

CH2M, Steer Davies Gleave and WSP |Parsons Brinckerhoff (2016). *Oxford to Cambridge Expressway Strategic Study Deliverable 1 – Examination of the Strategic Case for New Expressway East-West Road Links*. Retrieved on 28. September 2016 from https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/545354/oxford-to-cambridge-expressway-strategic-study-interim-report.pdf

Combes, P. P., Duranton, G., Gobillon, L., Puga, D., & Roux, S. (2012). The productivity advantages of large cities: Distinguishing agglomeration from firm selection. *Econometrica*, *80*(6), 2543-2594.

Department for Communities and Local Government (2011). Updating the evidence base on English cities.

Department for Transport (2014). *Statistical Release: Journey Time Statistics: Access to Services 2014*. Retrieved on 12. October 2016 from https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/485222/jts-access-2014.pdf

Gardiner, B., Martin R., and P. Tyler (2014). The Evolving Economic Performance of UK cities: City Growth Patterns 1981-2011. Government Office for Science, Future of Cities Working Paper.

Gardiner, B., Martin, R., Sunley, P., & Tyler, P. (2013). Spatially unbalanced growth in the British economy. *Journal of Economic Geography*, *13*(6), 889-928.

Grant Thorton LLP (2014). *Where growth happens The high growth index of places*. Retrieved on 28. September 2016 from http://www.grantthornton.co.uk/globalassets/1.-member-firms/united-kingdom/pdf/publication/2014/where-growth-happens-the-high-growth-index-of-places.pdf

Glaeser E. (2005). Reinventing Boston: 1640-2003. Journal of Economic Geography. 5, pp. 119-153.

Glaeser E. L., Kallal H. D., Scheinkman J. A. and A. Schleifer (1992). Growth in Cities. Journal of Political Economy. 100(6), pp. 1126-1152.

Glaeser, E. L. (2008). Cities, agglomeration, and spatial equilibrium. *OUP Catalogue*.

Hope, A. and Cox, J. (2015) Development Corridors, Coffey International Development, December 2015.

IPPR (2015): The Missing Pieces: Solving Britain's productivity puzzle.

IPPR North (2015): The State of the North – Four Tests for the Northern Powerhouse.

Jacobs J. (1969). The Economy of Cities. New York: Vintage.

Limao, N., & Venables, A. J. (2001). Infrastructure, geographical disadvantage, transport costs, and trade. *The World Bank Economic Review*, *15*(3), 451-479.

Liz Lake Associates and Qube (2005). *East Cambridgeshire Green Belt Review*. Retrieved on 14. October 2016 from http://www.eastcambs.gov.uk/sites/default/files/East%20Cambs%20Green%20Belt%20Assessment%202005%20Main%20Report.pdf

London Stansted Cambridge Corridor Growth Commission (2016). *Findings and Recommendations of the London Stansted Cambridge Corridor Growth Commission The Next Global Knowledge Region: Setting the Ambitions and Delivering the Vision*. Retrieved on 28. September 2016 from http://www.lsccgrowthcommission.org.uk/wp-content/uploads/2016/07/LSCC-Growth-Commission-Final-Report-full.pdf

LSE (2013): Investing for Prosperity: Skills, Infrastructure and Innovation – Report of the LSE Growth Commission.

Manchester Independent Economic Review (2015), The Case for Agglomeration Economies.

Marshall A. (1890). Principles of Economics. London: Macmillan.

Martin, R. and Sunley, P. (2003), Deconstructing clusters: chaotic concept or policy panacea?', *Journal of Economic Geography*, pp5-35.

Martin R. and Simmie J., 2008. The theory bases of urban competitiveness: does proximity matter? Revue d'Économie Régionale & Urbaine. 3, pp. 333-351.

Martin, R. (2008). National growth versus spatial equality? A cautionary note on the new 'trade-off' thinking in regional policy discourse. *Regional Science Policy & Practice*, *1*(1), 3-13.

Martin, R. L., Tyler, P., & Gardiner, B. (2014). *The Evolving Economic Performance of UK Cities* (No. 5). Working Paper.

Melo, P. C., Graham, D. J., & Noland, R. B. (2009). A meta-analysis of estimates of urban agglomeration economies. *Regional science and urban Economics*, *39*(3), 332-342.

MIER (2009): Reviewer's Report.

Miles, N. J.O (2008). *The Oxford to Cambridge Arc Struggles in Partnership!* [PDF document]. Presentation from the 2008 OECD workshop on partnership for development and diffusion on innovation, Trento: Italy. Retrieved on 28. September 2016 from http://www.oecd.org/sti/inno/40049628.pdf

Milton Keynes Council (2016). Local Economic Assessment 2016.

Milton Keynes Futures 2050 Commission (2016). *Milton Keynes: Making a Great City Greater*. Retrieved on 28. September from http://www.mkfutures2050.com/images/pdfs/reports/MK-Futures-2050-Full-Report-printable.pdf

NIHR Cambridge Biomedical Research Centre (2015). The Cambridge Bioscience Impact Assessment Study.

Nationwide (2016). *Nationwide House Price Index Report June Q2 2016*. Retrieved on 12. October 2016 from http://www.nationwide.co.uk/~/media/MainSite/documents/about/house-price-index/2016/Jun_Q2_2016.pdf

Northamptonshire County Council (2015). Northamptonshire Local Economic Assessment 2015.

ONS (2016). *Statistical bulletin: House Price Index: July 2016*. Retrieved on 12. October 2016 from https://www.ons.gov.uk/economy/inflationandpriceindices/bulletins/housepriceindex/july2016#house-price-index-by-english-region

Overman, H. (2015). *The Economic Performance of UK Cities: Can Urban and Regional Policy Make a Difference to the North-South Divide* (No. 025). Centre for Economic Performance, LSE.

Overman, H., (2014). Agglomeration Economies. LSE Spatial Economic Research Centre.

Oxfordshire Local Enterprise Partnership (2014). *Strategic Economic Plan Driving Economic Growth Through Innovation*. Retrieved on 28. September from https://www.oxfordshirelep.org.uk/sites/default/files/Oxford%20SEP_FINAL_March14_1.pdf

Peterborough City Council and Cambridgeshire County Council (2003). *Cambridgeshire and Peterborough Structure Plan 2003.* https://www.cambridge.gov.uk/sites/default/files/documents/rd-ad-010.pdf

Porter, M. E. (1990) The Competitive Advantage of Nations. London: Macmillan.

Rietveld, P. (1994). Spatial economic impacts of transport infrastructure supply. Transportation Research Part *A: Policy and Practice*, *28*(4), 329-341.

Roper S., Love J. and K. Bonner (2015). Benchmarking Local Innovation: The Innovation Geography of the UK. Enterprise Research Centre.

SQW (2011). *Cambridge Cluster at 50. The Cambridge Economy: retrospect and prospect.* Retrieved on 14. October from http://www.lsccgrowthcommission.org.uk/wp-content/uploads/2016/01/Cambridge_cluster_report_FINAL_REPORT_060411_0.pdf

SQW (2011), Rebalancing the economy sectorally and spatially.

Steer Davies Gleave (2014), *Transport Constraints and Opportunities in the North of England*

Venables, A., Laird, J. J. & Overman, H. G. (2014). Transport investment and economic performance: Implications for project appraisal.

Wheaton, W. C., & Lewis, M. J. (2002). Urban wages and labor market agglomeration. *Journal of Urban Economics, 51*(3), 542-562.

Appendix A: Quantifying the Evidence for Growth

Data on various indicators (shown below) have been taken from official and proprietary data sources. The data shown below are for the most recent year available, which for many series is 2015 or later, and are aggregated from local authority data[94]. Where the estimates required weighting of component geographies, population or another series was used to derive the relative weights as appropriate.

Higher education and R&D institutions

In terms of higher education and R&D institutions, it's not surprising that Oxford and Cambridge surpass the others, since both serve as host cities to world leading universities. Table shows two indicators: The percentage of persons with level 4 qualification or higher as of 2011 and the average number of patent applications to the European Patent Office (EPO) per 10,000 persons over the years 2008-2012.

Table A-1. Higher Education and R&D Institutions

	Greater Oxford	Greater Milton Keynes	Greater Northampton	Greater Cambridge
Percentage of persons with level 4 qualifications or higher in 2011	33%	27%	25%	34%
Patent Applications per 10,000 persons to the EPO (yearly average 2008-2012)	2.9*	1.1*	0.4*	2.4*

Note(s): * Data not completely compatible with region definition since it is based on Eurostat's NUTS 3 classification rather English local authority boundaries.

Source(s): CE's calculations and ONS – Nomis for level 4 qualification data, Eurostat for Patent data.

Greater Oxford and Greater Cambridge has a considerably higher percentage of highly educated persons as well as more than double the amount of patent applications as compared to the other areas. Unsurprisingly, the proportion of highly educated persons is also higher in Greater Oxford and Greater Cambridge than the national average within England, which was around 27% in 2011. The Greater Northampton area trails somewhat behind the national average while Greater Milton Keynes is line with the average for England as a whole.

A similar ranking of areas is seen with the number of patent applications; again Greater Oxford and Greater Cambridge far exceed the other areas as well as the England average of 1.02 patents per 10,000 persons during the period. Greater Milton Keynes had slightly more applications than the England average while Greater Northampton had half as many. While Greater Oxford and Greater Cambridge might do well on the former indicator simply as a result of the many academics and students associated with the universities,

---

[94] It was not practical to construct data for areas that do not follow administrative boundaries within the scope of this project.

the fact that they also do well in terms of patent applications strengthens the notion that both have strong fundamentals in terms of research and development.

Affordable and high quality housing

Looking at the data on affordable and high quality housing the tables have turned somewhat, with Greater Milton Keynes and Greater Northampton having more favourable conditions either Greater Oxford or Greater Cambridge. Table shows six indicators: Yearly average net additional dwellings from 2002-2015, average house values as of June 2016, the increase in the housing price index from 2005 to 2016, median monthly rents as of Q2 2016, the percentage of detached houses within the total housing stock in 2011 and the percentage of residences with more than 3 bedrooms in 2011.

Table A-0-1. Affordable and high quality housing

	Greater Oxford	Greater Milton Keynes	Greater Northampton	Greater Cambridge
Yearly Average Net Additional Dwellings 2002-2015	602	952	505	539
Average house value as of June 2016	£317,674	£251,470	£210,558	£322,768
Increase in housing price index from December 2005 to June 2016	435.55%	454.69%	398.09%	455.25%
Median Monthly Rents (Q2 2016)	£1,003	£869	£737	£941

Source(s): CE's calculations, Saville Consulting for data on net additional dwellings, average house value and house price indexes, Rightmove for data on median rents

The number of yearly additional dwellings has been the highest in Greater Milton Keynes during the last decade while, despite high demand, Greater Oxford and Greater Cambridge have only built around half that of Greater Milton Keynes. This surplus demand for housing within Greater Oxford and Greater Cambridge is reflected in the average house values in these areas, which are far higher than in the other two. However, while lower than in Greater Oxford and Greater Cambridge, the average house values in Greater Milton Keynes and Greater Northampton are still much higher than the national average within the United Kingdom, where the average house value was £204,968 in June 2016 (Nationwide, 2016).

The last decade has also seen a spectacular increase in housing prices in all areas, having more than quadrupled from 2005 to 2015. In this respect all areas far surpass the national average, housing prices in England having increased by around half since 2005 and prices in London having just about doubled (ONS, 2016). This explosive growth has meant that monthly rents in all areas have become quite high, although Greater Northampton does skew somewhat closer to the national average than the other three. The fact that

rents are much higher in Greater Oxford and Greater Cambridge than the other two areas shows once again the current inability of these cities to completely satisfy present and future demand.

Transport infrastructure   The transport infrastructure in all areas seems to be well connected, although Northampton does suffer somewhat from its rurality and greater distance from London. Table shows six indicators: Miles of road per 1000 hectares in 2015, the percentage of roads with dual carriageways, the percentages of working age population within 15 minutes of employment centres by cycle and car and two airport connectivity indexes, one for public transport and another one for travel by car.

Table A-0-2. Transport Infrastructure

	Greater Oxford	Greater Milton Keynes	Greater Northampton	Greater Cambridge
Miles of road per 1000 hectares in 2015	12.29*	14.83*	12.01*	12.88*
Dual Carriageways as percentage of total miles of road in 2015	3.81%*	3.78%*	4.82%*	5.11%*
Percentage of working age population 15 minutes by cycle of employment centres with at least 5000 jobs available in 2014	30.99%	29.6%	6.91%	25.38%
Percentage of working age population 15 minutes by car of employment centres with at least 5000 jobs available in 2014	52.35%	55.47%	18.18%	42.92%
Airport Connectivity in 2015 by Public Transport Index (minutes)	143*	121*	146*	114*
Airport Connectivity in 2015 by Car Index (minutes)	93*	80*	114*	82*

Note(s): * Data not completely compatible with region definition since it includes the whole of Buckingham- and Northamptonshire.

Source(s): CE's calculations, Department for Transport for data on miles of road by road type and hypothetical travel times, Civil Aviation Authority for data on number of flights by airport and ONS – SAM for data on the area of individual LADs.

In terms of miles of road per 1000 hectares Greater Milton Keynes has the most road out of the four areas while Greater Northampton has the least. Looking at the national average for England, which has 14.42 miles per 1000 hectares, only Greater Milton Keynes comes out above the average while the others are considerably below it. Before drawing any conclusions though it´s important to also look at the percentage of roads that have dual carriageways. Here Greater Cambridge has the highest percentage of dual carriageways, exceeding the 3.2% national average for England. All four parts of the study

area also have a larger percentage of their road network being dual carriageways than the national average. However, when drawing any conclusions from this indicator it´s important to pair it with the first one. The fact that Greater Cambridge and Greater Northampton have a larger percentage of dual carriageways than Milton Keynes does not necessarily mean that the road network there is more connected. Since Greater Milton Keynes has more road per 1000 hectares it could just as well be that the high percentage in Greater Cambridge and Greater Northampton is a symptom of these areas having less minor roads. Thus these areas could suffer from overreliance on major roads which could lead to more congestion.

Relative commuting times provides another perspective on the effectiveness of the road network (but are also influenced by the scale and physical characteristics of the different sub-areas) In terms of commuting times by cycle Greater Oxford and Greater Milton Keynes do the best, with around 30% of the working age population having been within a 15-minute hypothetical bike ride from work. The number for Greater Cambridge was a bit lower at 25.38% and that of Greater Northampton was much lower at 6.91%. The average for England as a whole is 28% (Department for Transport, 2014). As mentioned above this is most likely a result of the Greater Northampton area being more rural than the others. The proportion of commuting journeys undertaken by car is higher in Greater Milton Keynes than Greater Oxford (55% and 52% respectively). This might in part be because of many areas within Greater Milton Keynes being less dense than those within Greater Oxford, but could also be a result of Greater Milton Keynes´ larger road network in terms of area. Greater Cambridge is ranked third on this measure well behind the national average for England of 52% (Department for Transport, 2014). This might indicate that Greater Cambridge suffers from considerable congestion, as speculated above, especially compared to Greater Milton Keynes. The number for Greater Northampton is very low at 18.18%, again likely a result of the area being the least population dense.

Two airport connectivity indexes seek to capture the transport infrastructure´s international connections; one in terms of travel times by public transport and another by car. The index was computed by averaging the time it takes to travel from each area to one of the five major London airports (Heathrow, Gatwick, Stansted, Luton and London City). The averaging was based on weights computed using the total number of yearly flights from each airport. Thus, Heathrow and Gatwick had the largest weights followed by Stansted, then Luton and finally London City. Travel time for all areas averaged at a little less than or around two hours. Not surprisingly, given that it is the farthest distance away from London, travel times from Greater Northampton are the greatest. However, despite its close proximity to Heathrow, average travel times from Greater Oxford were only just lower than those of Greater Northampton. As would be expected, the average travel times for journeys by car were lower than for public transport. The main difference between areas is that differential between travel from Greater Oxford and Greater Northampton is much greater for car travel than under public transport. Despite this, average travel times from Greater Oxford are still markedly higher than those of Greater Cambridge and Greater Milton Keynes This probably reflects the relatively poor connectivity of Greater Oxford to airports other than Heathrow.

Also, while the average traveling time is the lowest for Greater Cambridge in terms of public transport, Greater Milton Keynes beats it by a couple of minutes when looking at journeys by car. The larger road network around Milton Keynes, as well as its centralized position, as compared to the other areas, in regards to the major London airports might go a long way to explain this.

Educational base In regards to the number of schools, teachers and pupils the educational base within the four areas seems to be about the same as the national average for England. However, in terms of quality, the results are a bit more mixed. Table A-0-3 shows six indicators: The number of nurseries, primary and secondary schools per 1000 persons in 2015, the number of pupils per 100 persons in 2015, the number of full-time teachers per 1000 persons in 2015, The pupil to teacher ratio in 2015, the percentage of the population with GCSE qualifications in 2011 and the percentage of pupils that archived level 4+ in all subjects on the 2013 Key Stage 2 exams.

Table A-0-3. Educational Base

	Greater Oxford	Greater Milton Keynes	Greater Northampton	Greater Cambridge
Nurseries, Primary and Secondary Schools per 1000 persons in 2015	0.49*	0.4*	0.48*	0.96*
Number of pupils in Nurseries, Primary and Secondary Schools per 1000 persons in 2016	160*	114*	167*	342*
Full-time teacher equivalents per 1000 persons in 2015	7.75	8.84	8.71	8.09
Pupil - Teacher Ratio in 2015	17.56	17.4	17.72	17.16
GCSE A-C Attainment in 2011	77.75%	71.42%	70.1%	79.13%
Percentage of Pupils Achieving Level 4+ in Reading, Writing and Mathematics in the 2013 Key Stage 2 Assessments	79.26%	77%	76.41%	79.59%

Note(s): * Data not completely compatible with region definition since it includes the whole of Buckingham- and Northamptonshire.

Source(s): CE's calculations, ONS – Nomis for GCSE attainment and Department of Education for data on schools, pupils, number of teachers and Key Stage 2 assessment results.

Overall, in all of the areas except Greater Cambridge, the number of schools, pupils and teachers per 1000 persons were similar to the national averages for England, which were 0.46 schools, 156 pupils and 8.32 full-time teachers per 1000 persons. In Greater Cambridge however, the number of schools and pupils were both about twice the national average. Despite this, the number of teachers per 1000 persons in Greater Cambridge was similar to the other areas as well as the national average. It´s notable though that both Greater Cambridge and Greater Oxford had slightly fewer teachers per 1000 persons than the national average. This is probably a direct result of the high population of university students within these areas and not necessarily reflecting any lack of teachers. This notion is further supported by the fact that the pupil to teacher ratio in all areas was close to the 17.4 national average for England. Greater Cambridge does fall slightly below this average though, the only area to do so. Most likely this is a result of the higher number of students and schools within Greater Cambridge as compared to the other areas.

Looking only at the absolute numbers of institutions and persons within the education system can be deceptive however and as such the last two indicators are thought of as measures of the quality of education provided by the education base. The first one, the number of adults holding GCSE

qualifications, can be thought of as a historical measure of the quality of education. However, it must be noted that when viewed this way the indicator is quite biased, since the underlying assumption is that people will generally not move away from the area they were educated in. Thus, Greater Oxford and Greater Cambridge both score considerably higher than the other two areas. Nonetheless, the difference is not so great that it can't be explained away by the presence of the universities. It would therefore seem that historically all areas have provided compulsory education of similar quality. Further supporting this conclusion is the fact that when looking at the percentage of students that scored 4+ in all subject on the 2013 Key Stage 2 exams, none of the areas were too far from the national average for England, which was at 78%. While the pupils in Greater Oxford and Greater Cambridge did score slightly better on average than those in the other two areas, this could just as well be a consequence of there being a greater number of higher educated parents in these areas, rather than something caused by the education system itself.

Governance Governance within all areas looks too good in comparison to other parts of England, although Greater Northampton lags a bit behind the others in this respect. Table A-0-4 show three indicators: Voter turnout in the most recent local council elections, the number of civil servants per 1000 persons in 2015 and the number of violent crimes per 100,000 persons during 2012-2013.

Table A-0-4. Governance

	Greater Oxford	Greater Milton Keynes	Greater Northampton	Greater Cambridge
Voter Turnout in most recent Local Council Elections which did not coincide with parliamentary elections (Ballot box turnout, includes votes rejected at count)	34.63	35.41*	31.19	34.44
Number of Civil Servants per 1000 persons in 2015	4.32	4.66	3.56	3.16
Violent Crime from 2012 – 2013 (crimes per 100,000 persons)	8.1	9.39	11.96	6.61

Note(s): * Does not include Central Bedfordshire

Sources: CE's calculations, The Electoral Commission for data on the 2016, 2013 and 2011 English local council elections, ONS – Nomis for data on civil servants and ONS – Neighbourhood statistics for data on notifiable offences recorded by the Police.

Voter turnout is intended as a measure of social engagement and the populations perception towards local government. It must be noted that since the aggregated turnouts for the areas are not all from the same years, these numbers should be thought more of as indicators than actual turnout numbers. Despite this, all the computed averages are similar to the national average turnouts during the past two local council elections, excluding those who coincided with parliamentary elections. The 2016 English local council elections had an average turnout of 33.87% and the 2013 elections an average turnout of 30.94%. However, the average for the Greater Northampton are is a little bit lower than that of the others, which might provide an indication that the population there has on average less believe in its local government.

This is further supported when looking at the number of civil servants per 1000 persons and the crime rates in the areas. While Greater Cambridge has the lowest number of civil servants per 1000 persons, Greater Northampton trails closely behind. It must be noted though, that none of the areas come close to the national average for England, which was 6.46. This number, while informative, is of course inflated by the huge number of government officials in and around London. In terms of violent crime rates though, Greater Northampton ranks considerably worse than the other areas. While the others have much lower rates of violent crime than the national average for England of 10.28 crimes per 100,000 persons, Greater Northampton's is almost 20% higher than that. Furthermore, even despite the apparent lack of civil servants, the crime rate in Greater Northampton is nearly twice as high as the crime rate in Greater Cambridge. Thus, while the quality of governance within the other areas seems to be around or even above that of the average for England, Greater Northampton looks to be below it.

Quality of life Overall, when measuring quality of life, the areas all appear above average as compared to the rest of England. Table A-0-5 shows seven indicators: the

healthiness of the population, the life expectancy at birth for both males and females, per capita CO2 emissions, the number of square meters of greenspace and domestic gardens per capita and the average life satisfaction score within each area.

Table A-0-5. Quality of Life

	Greater Oxford	Greater Milton Keynes	Greater Northampton	Greater Cambridge
Healthiness of Population, those who believe they are in very good health in 2011	51.4%	48.93%	47.11%	50.88%
Life Expectancy at Birth (Males) from 2007 to 2009	79.25	78.61	78.61	79.73
Life Expectancy at Birth (Females) from 2007 to 2009	83.7	82.08	82.6	83.39
Per Capita CO2 Emissions in 2013	7.62	6.05	7.82	7.5
Thousands of sq. Meters of Greenspace per capita in 2005	2.88	1.99	3.01	3.42
Thousands of sq. Meters of Domestic Gardens per capita in 2005	3.38	3.5	2.36	2.69
Average Life Satisfaction, scale of 0-10 (April 2014 to March 2015)	7.75	7.59	7.63	7.74

Sources: CE's calculations, ONS – Nomis for general healthiness of population, ONS – Neighbourhood statistics for data on life expectancy and land use, ONS for data from life satisfaction surveys and Department of Energy & Climate Change for data on CO2 emissions.

The population within each area seems to be rather healthy, with every around other persons believing themselves to be very healthy in 2011. In this regard three of the areas were above the 47.17% national average for England and Greater Northampton was only slightly below that at 47.11%. This is further reflected in the life expectancy at birth within the areas. Males in all areas can expect to live slightly longer than the national average of 78.3 years. So can females in three of the areas, their life expectancy in Greater Oxford, Greater Cambridge and Greater Northampton being slightly higher than the national average of 82.3 years. Additionally, although the life expectancy of females in Greater Milton Keynes is lower than the national average, it is only very slightly so.

Looking at pollution and the environment, per capita C02 emission were actually quite high in all of the areas except for Greater Milton Keynes, which was the only area below the national average of 6.7 per capita. However, Greater Milton Keynes did not have as many greenspaces as the other ones, being slightly below the national average for England at 2.11 thousand square

meters per capita. The other areas were all well above that, especially Cambridge which had around 50% more greenspace per capita than the national average. As for domestic gardens, all areas were way above the national average of 0.11 thousand square meters per capita. While the national average is most likely lowered considerably by the inclusion of heavily urbanized areas, this indicator does at least show that all areas offer some additional benefits to their inhabitants which they would not necessarily be able to enjoy elsewhere. It must be noted however, that the latest numbers of greenspaces and domestic gardens are from as far back as 2005 and as such a lot may have changed within the areas in the meantime.

Finally, data from life satisfaction surveys shows that overall the population within the areas seems to be rather happy with life. Here Greater Cambridge and Greater Oxford score a bit higher than the other two, but this might just be a result of the higher level of personal wealth within these areas. The national average satisfaction for England was 7.6 and that for the United Kingdom was only a tad higher at 7.61. So the population within Greater Milton Keynes and Greater Northampton was very close to the national average in terms of happiness while that of Greater Oxford and Greater Milton Keynes was a little bit above that. However, self-reported levels of happiness have usually been found to be relative to how people perceive their standing in the society around them. Thus, someone might for example perceive himself as poor and unhappy in Greater Oxford while in Greater Northampton he would consider himself richer compared to his neighbours and possibly happier as a result. Therefore, data from life satisfaction surveys should be taken with a grain of salt.

Access to finance and support

Looking at indicators for access to finance and support, new businesses seem to have an easier time in Greater Milton Keynes and Greater Northampton than they do in either Greater Oxford or Greater Cambridge. Table shows six indicators: The percentage of young business, the birth of businesses, the death of businesses, a business birth-death ratio, the number of start-ups in 2015 and the number of start-ups in 2015 per capita.

Table A-0-6. Access to Finance and Support

	Greater Oxford	Greater Milton Keynes	Greater Northampton	Greater Cambridge
Young Business Percentage in 2012	16.10%	18.54%	17.90%	15.71%
Business Births in 2012 as a Percentage of Total Businesses	10.47%	11.85%	11.56%	10.25%
Business Death in 2012 as a Percentage of Total Businesses	9.61%	10.58%	10.03%	9.76%
Business Birth-Death Ratio in 2012	1.09	1.12	1.15	1.05
Number of Startups in 2015	6142	10683	4586	7252
Number of Startups per 1000 Persons in 2015	6.98	9.97	10	8.13

Sources: CE's calculations and ONS – Neighbourhood statistics for data on local business demography and StartUp Britain for data on start-ups.

The percentage of young businesses was the highest in Greater Milton Keynes, followed closely by Greater Northampton. Both areas were above the national average for England, which was at 17.38%. The numbers for Greater Oxford and Greater Cambridge on the other hand were noticeably below the other areas as well as the national average. This was also true for business births, Greater Oxford and Greater Cambridge being around 1% below the national average for England, which was 11.6%, while Greater Milton Keynes was slightly above it and Greater Northampton just a touch below it. In terms of business deaths though, all the areas performed better than the 10.8% national average for England, with Greater Oxford and Greater Cambridge having a somewhat lower percentage than the others. However, this indicator needs to be considered simultaneously with the percentage of business births. Since newer business are more likely to go under than older established ones, more business births lead directly to more business deaths. As such, the last indicator combines the two into one by computing the business birth-death ratio. Here, Greater Milton Keynes and Greater Northampton once again perform markedly better than Greater Oxford and Greater Cambridge. Greater Milton Keynes and Greater Northampton are also above the 1.07 national average for England. Greater Oxford also performs better than the national average while in the case of Greater Cambridge the ratio is a bit lower.

The number on start-ups also convey a similar story. In absolute numbers Greater Milton Keynes had the most start-ups in 2015, with Greater Cambridge trailing somewhat behind but still beating Greater Oxford by about a 1000 start-ups. Greater Northampton had the lowest number of start-ups in

terms of absolute numbers, not even half that of Greater Milton Keynes, but this was mainly due to the population difference between the areas, as can be seen when looking at the per capita numbers. There Greater Milton Keynes and Greater Northampton are on pair with each other, Greater Cambridge and Greater Oxford have around 20% and 30% fewer start-ups per capita than the others. Looking at national averages, Greater Milton Keynes and Greater Northampton are at around the same as the 9.96 per capita national average for England, although they do beat the 9.13 per capita national average for the United Kingdom. Both Greater Oxford and Greater Cambridge however are noticeably below both national averages. It must be noted though that the numbers for both Greater Oxford and Greater Cambridge could be somewhat lowered due to the large number of university students within these areas.

Thus, the conclusion seems to be that Greater Milton Keynes and Greater Northampton offer a more vibrant and supportive environment for new business than the national average. Greater Oxford appears to do so as well, although to a lesser extent than the other two, especially considering the low number of start-ups per capita. Greater Cambridge on the other hand looks a bit less hospitable for new businesses. However, it's hard to say whether this is caused by a lack of support for new businesses or because there is more severe competition in Greater Cambridge than in the other areas.

Competitive tradeable base Greater Northampton performs best in terms of international competitiveness while Greater Milton Keynes does the worst. Table shows two indicators of international competitiveness: the GVA and employment based location quotients for export intensive sectors.

Table A-0-7. Competitive Tradable Base

	Greater Oxford	Greater Milton Keynes	Greater Northampton	Greater Cambridge
Location Quotient in 2014 - Export Intensive Sectors – GVA based	0.97	0.85	1.05	1.04
Location Quotient in 2014 - Export Intensive Sectors – Employment based	1.03	1.04	0.90	1.11

Sources: CE's calculations and own database of local sectoral employment and GVA.

The GVA based location quotients show that only in Greater Northampton and Greater Cambridge are export intensive sectors producing proportionately more value than the national average within the United Kingdom. The proportional export value produced by Greater Oxford is only slightly less than the national average, but that of Greater Milton Keynes is considerably so. Nonetheless, looking at the employment based location quotients shows that in terms of employment export intensive sectors are important for all areas. Noticeably, the share of employment in export intensive sectors within Greater Cambridge is 11% higher than the national average for the United Kingdom.

International competitiveness is clearly highest in Greater Northampton, since the export intensive sectors there produce proportionately higher value than average using less labour than average. The results are a bit more mixed for Greater Oxford and Greater Cambridge. Greater Oxford does produce a tad less proportional value than the average within the United Kingdom and, while it does use proportionally more labour to do so, the use of labour is only slightly above average. The export intensive sectors in Greater Cambridge on the other hand do produce proportionally more value than on average, but they use a considerably higher proportion of labour to do so. In the case of Greater Milton Keynes however the results are quite clear. Its export intensive sectors produce much less proportional value than the national average while also using more proportional labour. Thus, in terms of international exports Greater Northampton appears to be the most competitive while Greater Milton Keynes is the least competitive area.

Diversity and specialisation
None of the areas seems to have a more specialised or diverse economy than the others, although there are some indications that Greater Milton Keynes might be slightly more diverse in terms of economic value. Table shows six indicators: GVA and employment based concentration ratios calculated both in terms of the four and eight biggest sectors and GVA and employment based normalised Herfindahl indexes.

Table A-0-8. Economic Diversity and Specialisation

	Greater Oxford	Greater Milton Keynes	Greater Northampton	Greater Cambridge
Concentration Ratio in 2014 - GVA based (CR 4)	0.365	0.36	0.34	0.359
Concentration Ratio in 2014 - Employment Based (CR 8)	0.569	0.56	0.554	0.563
Concentration Ratio in 2014 - GVA Based (CR 4)	0.338	0.3	0.316	0.308
Concentration Ratio in 2014 - GVA Based (CR 8)	0.519	0.492	0.525	0.496
Normalized Herfindahl Index in 2014 - Employment Based	0.0382	0.0332	0.0304	0.0336
Normalized Herfindahl Index in 2014 - GVA Based	0.0277	0.0198	0.0233	0.0224

Sources: CE's calculations and own database of local sectoral employment and GVA.

The employment based concentration ratios were similar for all areas. All of them were also slightly above the national averages for England, which were 0.33 for the 4 largest sector ratio and 0.54 for the 8 largest sector ratio. Since it is usually the case that smaller areas are more specialised than larger ones this is not surprising. The GVA based concentration ratios tell a similar story, the areas are all above the national averages, which were 0.26 for the 4
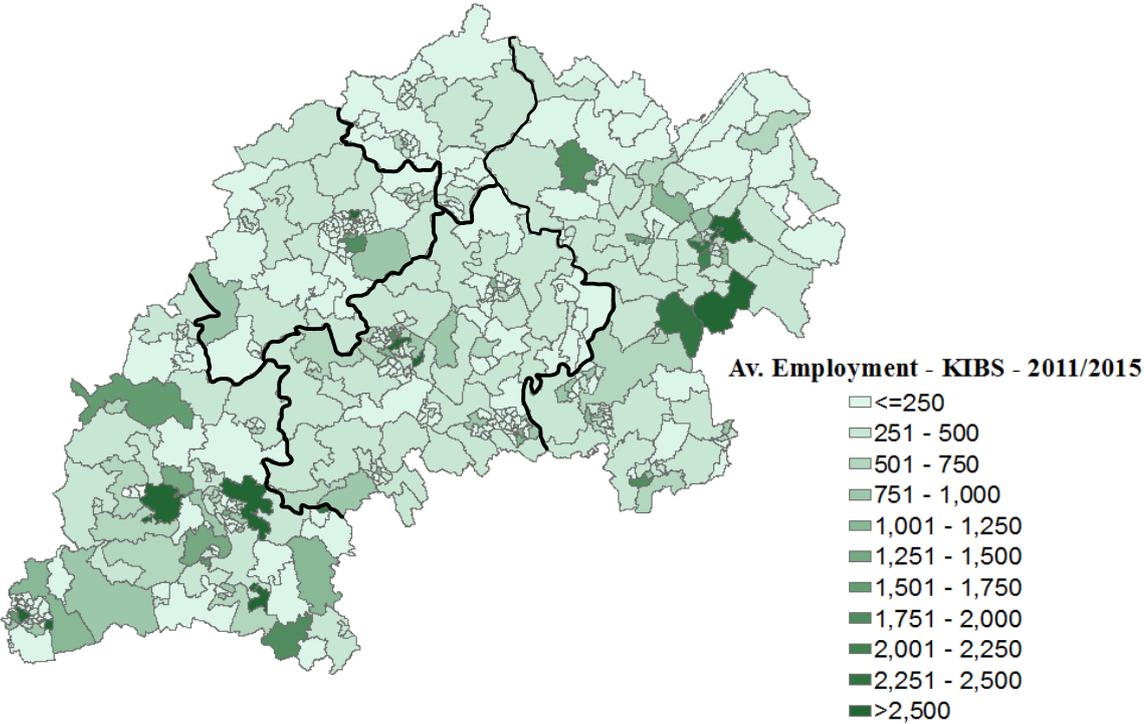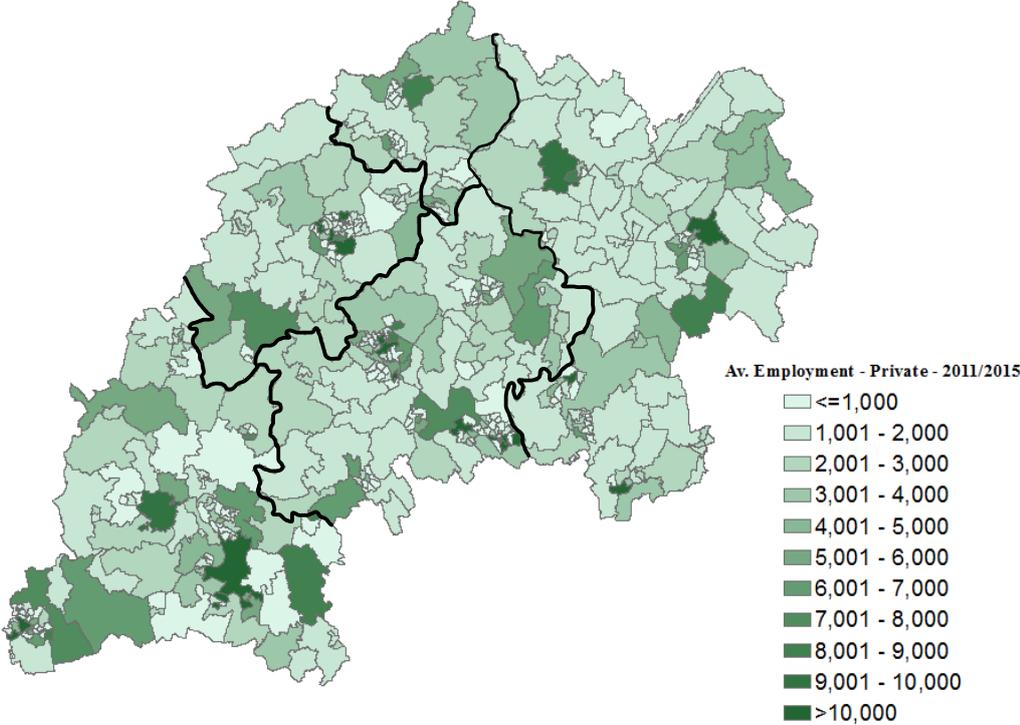
largest sectors and 0.47 for the 8 largest sectors. However, the indicators for Greater Milton Keynes are slightly lower than the other areas in both cases, indicating that the area might be just a little bit more diverse in terms of value. It's also interesting to note that the differences between the employment and GVA based ratios does point to there being a slight mismatch between the number of employees in the largest industries in terms of employment and the value created by the largest industries in terms of GVA. However, this mismatch is also evident in the national numbers, although the difference is slightly lower within the areas in question. Looking at the Herfindahl indexes reveals similar results, with all areas being above the national averages for England, which were 0.0266 for the employment based index and 0.0151 for the GVA based one. Again, there is very little variation in the employment based indexes but the GVA based ones indicate that the Greater Milton economy Keynes might be slightly more diverse than the others.

Summary A wide range of indicators have been examined and discussed. It is important to note that the relevance and strength of these indicators is likely to vary considerably across the different measures and different spatial areas, and it is not simply a matter of aggregating the numbers provided in a naïve fashion to produce some form of composite indicator. Instead, each identified variable should provide context and insight into the various factors that have shaped the economies of the four identified sub-areas over the past 25 years, and offer an indication of current strengths and opportunities for the future.

Appendix B: Maps

Historic Medium Level Super Output Area Level Maps

Av. Employment - Private - 2011/2015
- <=1,000
- 1,001 - 2,000
- 2,001 - 3,000
- 3,001 - 4,000
- 4,001 - 5,000
- 5,001 - 6,000
- 6,001 - 7,000
- 7,001 - 8,000
- 8,001 - 9,000
- 9,001 - 10,000
- >10,000

Av. Employment - KIBS - 2011/2015
- <=250
- 251 - 500
- 501 - 750
- 751 - 1,000
- 1,001 - 1,250
- 1,251 - 1,500
- 1,501 - 1,750
- 1,751 - 2,000
- 2,001 - 2,250
- 2,251 - 2,500
- >2,500

Av. Employment - High-Tech - 2011/2015

- <=100
- 101 - 200
- 201 - 300
- 301 - 400
- 401 - 500
- 501 - 600
- 601 - 700
- 701 - 800
- 801 - 900
- 901 - 1,000
- >1,000

Av. Employment - Scientific R&D – 2011/2015

- 501 - 1000
- 1001 - 1500
- 1501 - 2000
- 2001 -

Scenario Maps: current spatial distributions in 2014, plus same distributions in 2050 under 3 different scenarios.

Current Total Productivity (2014)

Baseline Total Productivity 2050

Incremental Total Productivity 2050

Transformational Total Productivity 2050

Current KIBS Employment (2014)

Baseline KIBS Employment 2050

Incremental KIBS Employment 2050

Transformational KIBS Employment 2050

Current HTM Employment (2014)

Baseline HTM Employment 2050

Incremental HTM Employment 2050

Transformational HTM Employment 2050

Current KIBS Productivity (2014)

Baseline KIBS Productivity 2050

Incremental KIBS Productivity 2050

Transformational KIBS Productivity 2050