The Northern Powerhouse Independent Economic Review

Workstream 1: Analysis of the pan-Northern Performance Gap – *Final* Report

1 May 2016

Contents

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1. Introduction

Context

1.1 In late October 2015, SQW Ltd and Cambridge Econometrics Ltd (CE), supported by Steer Davies Gleave Ltd (SDG), John Jarvis Consulting, and (as peer reviewers) Professors Philip McCann (Groningen), Ron Martin (Cambridge) and Roger Vickerman (Kent) were appointed by Transport for the North (TfN) on behalf of wider partners, to undertake **an Independent Economic Review (IER) of the Northern Powerhouse (NPh).**

1.2 Partners' intentions in commissioning the IER were threefold, namely to provide:

- **data, evidence, and intelligence to underpin TfN's Northern Transport Strategy in Spring 2016**, as an input to the Spring 2016 Budget, and subsequent proposals for transport investment.
- the evidence and arguments around **which the 'narrative' for the NPh** could be forged and developed.
- the **analytic bedrock on which subsequent NPh development**, – including, but not limited to, strategy and action planning – could be built and progressed for the future.

1.3 The work was undertaken between late-October 2015 and March 2016. It comprised five workstreams as follows:

- Workstream 1 – analysis of the **prosperity and productivity gaps in the North**, and the potential contribution role of different drivers, including (proxies for) transport connectivity, in closing these.
- Workstream 2 – a focused analysis of the **economies of the 11 Local Enterprise Partnership (LEP) areas, which together form the North**, including an assessment of local productivity performance and causes, sectoral specialisms, capabilities, and assets, and major investments planned/underway to address the causes of the performance gaps and realise sector opportunities.
- Workstream 3 – analysis of **distinctive competitive advantage and sectoral strengths, capabilities, and industrial potentials** of pan-Northern significance.
- Workstream 4 – **modelling future growth scenarios for the North, including growth consistent with NPh's aspirations**, and the role of agglomeration and transport in influencing the growth across the North.
- Workstream 5 – developing **suggested proposals for an Independent Panel** to act as the guardians of the IER's evidence base going forward.

What the Review was . . . and what it was not

1.4 The Review was seeking to characterise the North's economic position and the causes underpinning its performance, and to identify opportunities where 'pan-Northern' effort can

sensibly support existing 'local' activities. Whilst key elements of the work involved drilling down into transport specifics, the Review as a whole was intended to reflect on the wider 'ecosystem' in the North of England, of which transport is a part.

1.5 Importantly, the Review was not intended as a fully-dimensioned 'economic baseline' for the North, although in undertaking its work it ranging widely across a range of domains. Equally importantly, the IER was not about developing the NPh strategy or action plan, nor was it concerned with any NPh governance arrangements. Rather, it relied heavily on a review and synthesis of existing literature and evidence, with additional modelling work by Cambridge Econometrics, building on analysis of the North's 'prosperity' and 'productivity' gaps, and sectoral performance, as its key evidential foundations.

Approach and Method

1.6 The purpose of this Workstream was to look at the Northern economy as a whole and understand the nature and causes of its performance gap. It sought to set out the scale of the challenge facing the North as it aims to close its performance gap, and also looked at the role played by a variety of factors (e.g. Skills, Investment, Agglomeration, Innovation) in so doing. In particular, it focused on the interplay between transport connectivity with each of these factors, and reports on the evidence base for how transport investment is linked to regional growth in the literature.

1.7 When defining a performance gap, it is necessary to decide what benchmark to compare with. In the case of the Northern economy, the Reviewers used two alternative comparators: the rest of England minus London, and also with London included[1] for an alternative perspective.

1.8 Performance was defined through a general measure of prosperity, Gross Value Added (GVA) per capita. This is for two reasons. First, GVA per capita can be decomposed into drivers of interest such as productivity, employment and dependency rates, and performance gaps in each of these can be analysed. Second because, taken alongside population assumptions, there is a close link to the output growth aspirations discussed in Workstream 4.

1.9 The logical structure for the analysis in this Workstream is as follows. First, the scale of the performance gap is analysed. The headline GVA per capita figure is then decomposed into four constituents to show which contributes most to the GVA per capita gap:

- Productivity: as GVA per (workplace) job
- Employment rate: the proportion of the working-age population that is in work
- Jobs per worker: the ratio of workplace jobs per residence-based worker[2]

[1] Both comparators are of interest. On the one hand, London's unique characteristics as a global city and financial centre which are unlikely to be replicable elsewhere in England mean that it may not be a relevant benchmark for the Northern Economy. On the other hand, one of the aims of promoting better connectivity across the Northern economy has been to create an economy of sufficient scale to realise some of the advantages that a city of London's size enjoys, which suggests that the comparator should include London.
[2]The distinction is made between residence and workplace measures so that factors such as double-jobbing and commuting can be identified, the latter of which is particularly important when including London in the benchmark comparison. Typically, the smaller the spatial scale the more important commuting will be as an adjustment factor.

- Age structure: the share of working-age population in total population[3].

1.10 Building on this, attention is then given to the productivity gap, analysing underlying drivers of productivity highlighted in the literature and adopted by HM Treasury[4] as key indicators, such as skills, innovation, agglomeration, and connectivity, to review the extent to which they play a part in explaining the performance gap. The relationships between these indicators (including their interaction with transport) are then considered before the findings are summarised.

Report Structure

1.1 This report is the *final* output of Workstream 1**.** It has been written to report fully on the content, findings, and conclusions of the Workstream. As such, it is designed as a self-standing output, but it should also be read in the context of the companion reports which have been produced for the other Workstreams.

1.2 The remainder of this report is as follows:

- **Section 2: reports the stylised facts of the duration and scale of the performance gap,** for both GVA per capita and other main outcome indicators.
- **Section 3: presents a decomposition of the performance gap into its component parts** including labour productivity, the employment rate, jobs per worker, and population age structure.
- **Section 4: investigates the drivers behind the two most important components of the performance gap** – labour productivity and the employment rate.
- **Section 5: summarises the Workstream's findings in terms of drivers of the North's performance gap** and also focuses on the role of transport.
- **Section 6: looks ahead, and establishes links, to Workstream 4** which will develop future scenarios for the Northern economy in the New Year.

The report is supported by one Annex, setting out the bibliography which has been reviewed as part of assembling the Workstream's evidence base.

[3]This indicator is closely related to the inverse of the 'dependency rate' (the ratio of the number of children and the elderly to those of working-age). A higher dependency rate implies a lower working-age population share.
[4]ONS (2007) 'Productivity Handbook', chapter 3: Productivity Theory and Drivers.

2. Assessing the scale of the Performance Gap

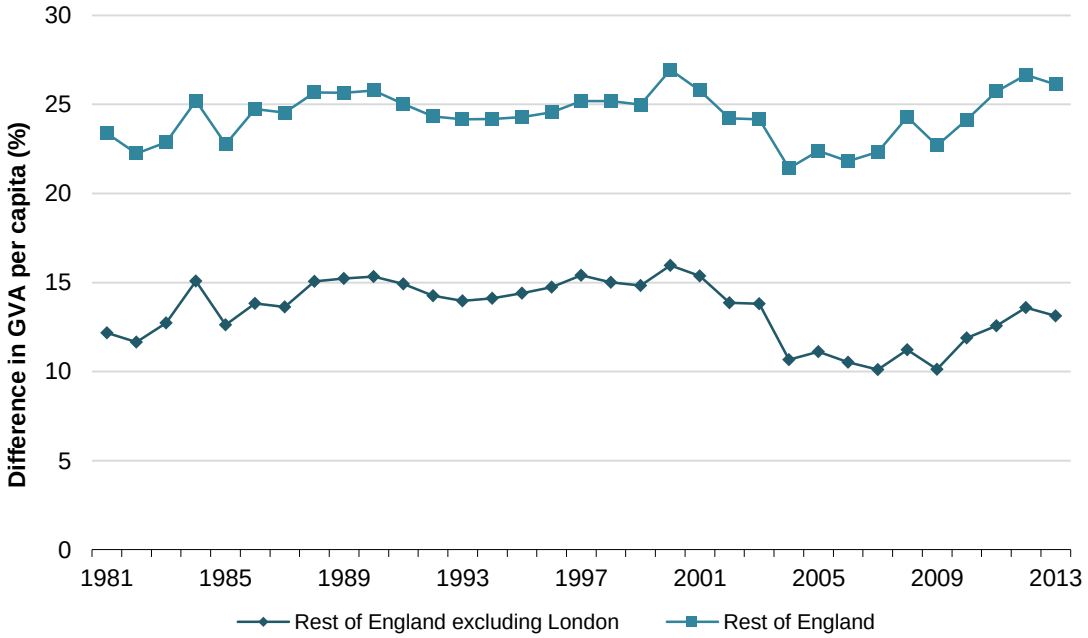
2.1 This Section looks at the headline indicator of GVA per capita to see how the Northern economy's performance gap has evolved over time, and the scale of the gap drawing on the most recent evidence. The scale of the growth challenge is also investigated by looking at long-term growth of GVA, employment, and population.

Key Messages

- The North's performance gap is persistent and entrenched, averaging about 25% against the rest of England, and almost 15% when London is removed.
- Having been on a downward trend since the early 2000s, the gap has widened since the 2008/09 recession.
- The growth of GVA, employment and population also show patterns which support the performance gap. The closing of the GVA growth gap during the mid-1990s to the 2008/09 recession was due largely to faster growth in private services.

2.2 Figure 2-1 shows there has been a persistent gap in GVA per capita between the Northern economy and the rest of England over the last 30 years. Although there was some decrease in the gap in the mid-2000s (during the period of strong UK growth prior to the recession), following the 2008/09 recession the gap has widened, returning it to the pre-boom levels.

Figure 2-1: Long-Term Trends in the North's GVA per Capita Gap



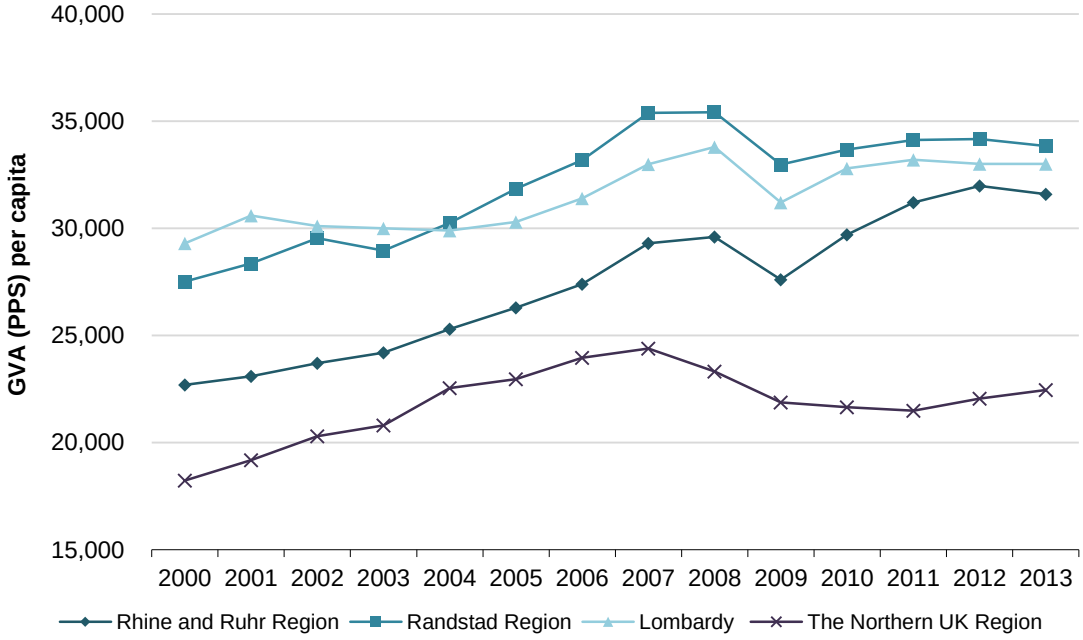
Note: The ratio of GVA per capita in the Northern economy compared to each benchmark expressed as a percentage, i.e. a ratio of 0.8 implies a gap of 20%. Source: CE data for real GVA, based on ONS data, and population data based on ONS Mid-Year Population Estimates.

2.3 Once London is excluded from the comparison, the gap compared with the rest of England, falls by almost half. But, that gap has remained between 10 and 15% over the last 30 years, and most of the gains made by the North prior to the recession have since been reversed.

2.4 Prices are also typically lower in regions with lower per capita incomes, so that equality in standard of living does not require complete convergence in nominal incomes. In the last year for which the ONS reported estimates of regional differences in consumer prices, it found that prices in the three north of England regions were about 2% below the UK average, those in the Midlands and South West about the same as the average, those in the East and South East 1-2% above the average, and those in London some 8% above the average.

2.5 Figure 2-2 takes a European perspective by comparing the GVA per capita of the Northern economy with that of the Rhine/Ruhr region (Germany), the Randstad (Netherland), and Lombardy (Italy). A persistent, yet stable, gap is observed up until the recent recession, after which a noticeable widening occurs.

Figure 2 2: European comparison – GVA per capita

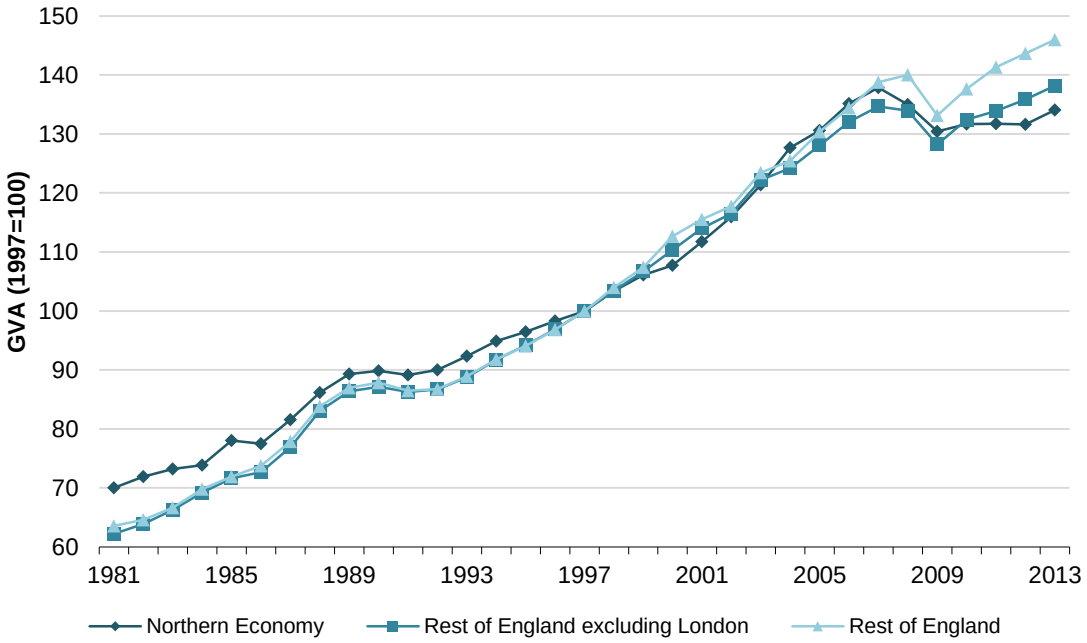


Note: GVA per capita in Purchasing Power Standard (PPS). Source: Eurostat.

2.6 Differences in GVA per capita are not the only gap of interest, however. For transport planning and provision, the overall *scale* of the economy, measured for example by GVA, jobs and population, is the critical consideration. In the case of GVA, Figure 2-3 shows that, having widened for much of the 1980s and early-1990s, the growth gap in the North was temporarily closed from the mid-1990s through to the onset of the recession. Since the recession the growth gap has opened further – the reasons behind this are explored in later Sections.

2.7 Analysis of the sectoral composition of GVA suggests that the closing of the gap in GVA growth rates in the decade from 1997 reflected a stronger performance in private services. Although this was the period when growth in public services accelerated, this was experienced across the country, and does not explain a relatively stronger outturn in the North.

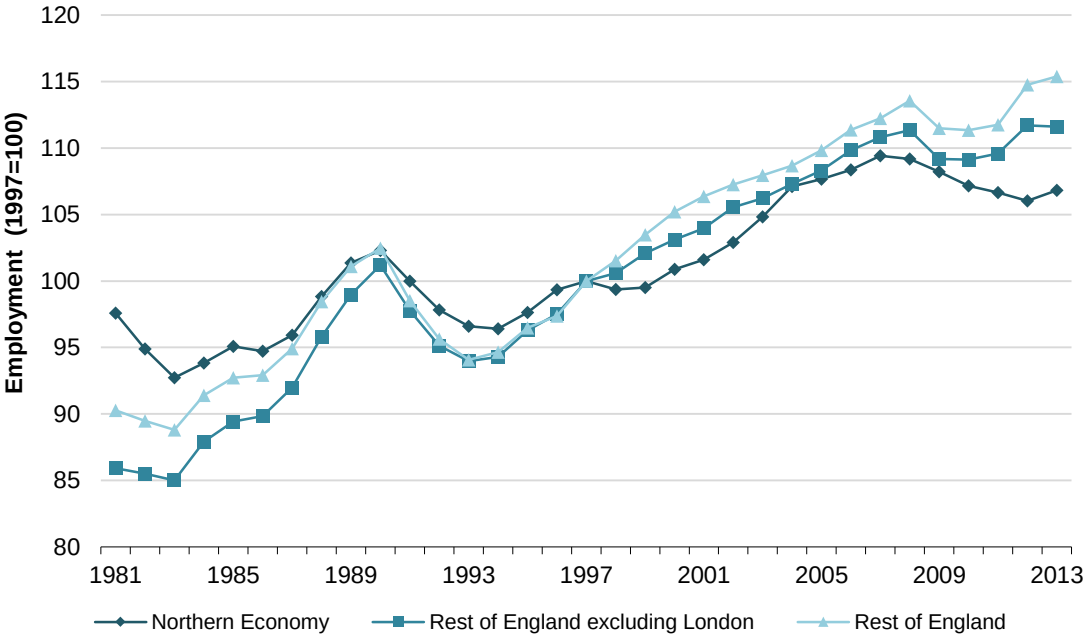
Figure 2-3: Long-Term Trends in Real GVA



Note: GVA adjusted for inflation, indexed to 1997=100. Source: CE estimates based on ONS data.

2.8 Figure 2-4 paints a similar picture for employment. The early 1980s saw slow growth because of the disproportionate impact of the recession on those traditional manufacturing industries which were still important in the North. During the period of stronger output growth from the mid-1990s, employment did not quite keep pace, growing a little more slowly than the benchmark comparators. The further slowing of employment growth also started before the 2008/09 recession, with the growth gap starting to widen from 2005 onwards.

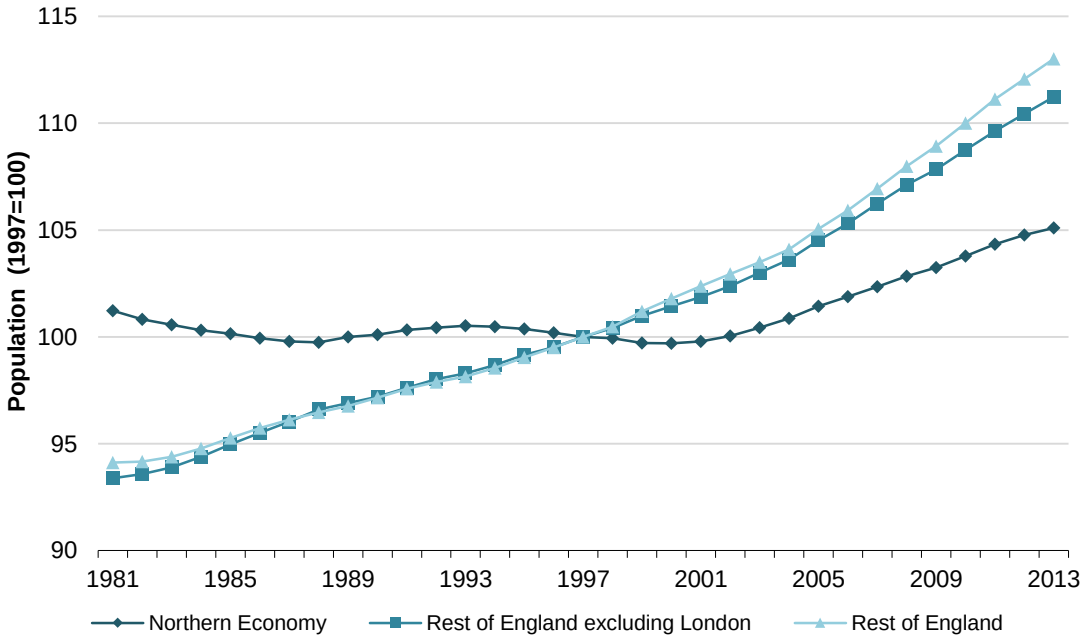
Figure 2-4: Long-Term Trends in Employment



Note: Employment is defined as the number of jobs, indexed to 1997=100. Source: CE data for employment based surveys of employers and LFS estimates of self-employment.

2.9 Figure 2-5 shows that, at least from the early 1980s, population in the North had been gradually declining, but it rebounded from the late 1990s, albeit at a slower rate than the rest of England.

Figure 2-5: Long-Term Trends in Population



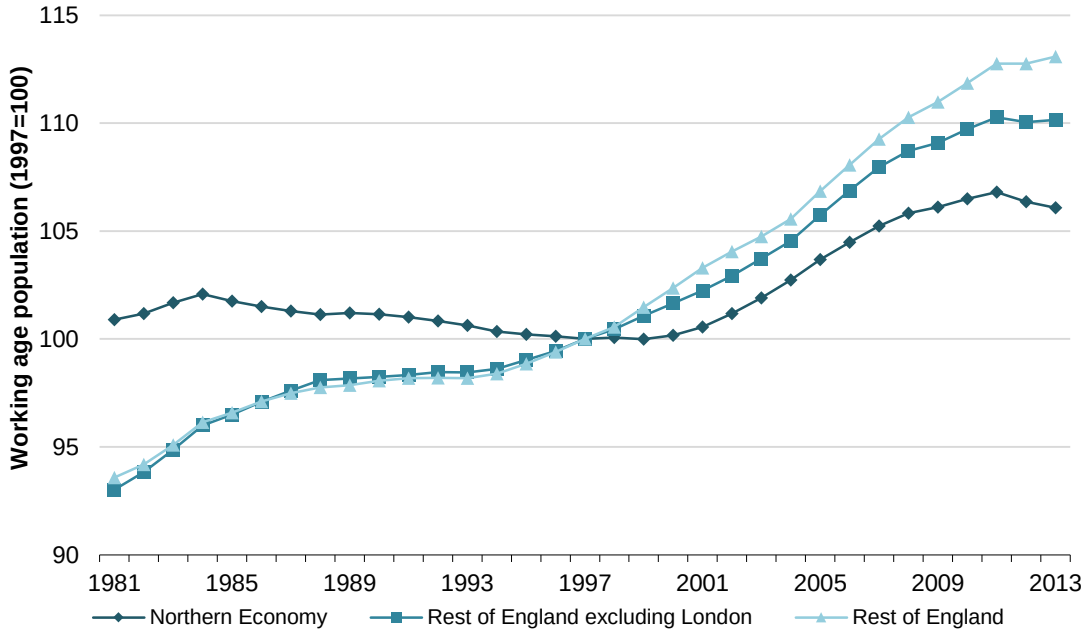
Source: CE data based on the ONS Mid-Year Population Estimates

2.10 The turnaround in population growth is noted in publications such as Champion (2005)[5] who cites a resumption of net-migration (in the early-2000s) to the North as being due (in part) to inflationary pressures in London, both allowing residents the possibility of realising the value of their homes and moving out, as well as deterring potential migrants from the North. Rowthorn (2010)[6] also comments on the role of international migration, as rapidly rising costs of living in London, traditionally a first destination for migrants, pushes people further afield, including to the Northern region.

2.11 Figure 2-6 shows a similar long-term trend and differential growth rate for the working-age population. The main difference is that from 2011 onwards working population starts to decline in the North, while in the rest of England it has either slowed (but still increased), or stabilised (when including London). The decline in working-age population is a concern, given how it might limit the future performance of the North, an issue that is taken up further in Workstream 4.

[5]Champion, T. (2005). Population movement within the UK. Focus on people and migration, pp 91-113.
[6] Rowthorn, B. (2010) 'Combined and Uneven Development: Reflections on the North–South Divide', Spatial Economic Analysis, 2010, vol. 5, issue 4, pp 363-388.

Figure 2-6: Long-Term Trends in Working-Age Population



Note: The working-age population is defined as all persons between 16 and 64 years old. Source: CE data based on the ONS Mid-Year Population Estimates.

3. Decomposing the Performance Gap

3.1 This Section provides a decomposition of GVA per capita to see which of the components are most closely linked to the overall performance gap. This is done first through charts which look to see whether the gaps in the components of GVA per capita are of similar scale and follow the same pattern over time as the overall performance gap, and second through looking at the contribution each component has made in terms of average growth rates.

Key Messages

- Productivity accounts for the largest proportion of the performance gap, and is also associated more closely with the widening of the gap in the post-recession period.
- Nonetheless, the employment rate gap has also been persistent, and largely stable over the past decade, so warrants attention.
- Age structure and jobs per worker are less relevant for explaining the persistence of the performance gap, although the latter becomes important when London is included in the comparison.

3.2 As noted in the previous section, GVA per capita can be decomposed using the following identity, each with its own economic meaning and policy implication[7]:

$$\frac{GVA_{wp}}{Population_{res}} = \frac{GVA_{wp}}{Jobs_{wp}} x \frac{Workers_{res}}{WAP_{res}} x \frac{Jobs_{wp}}{Workers_{res}} x \frac{WAP_{res}}{Population_{res}}$$

GVA per capita = Labour Productivity x Employment Rate x Jobs per Worker x Working-Age Share

3.3 Table 3-1 shows how differences over time in GVA per capita in the Northern economy are accounted for by these components. The overall average growth rate is also split across different periods of interest, in particular the post-recession growth rate which is associated with a slight widening of the performance gap.

3.4 The table shows that long-term trends in GVA per capita have been almost entirely driven by the trend in productivity, which is consistent with findings from the literature (e.g. Gardiner et al, 2004[8]), with only a limited role for employment. The growth rates and contributions are relatively stable for most of the sub-periods, with the exception of the post-recession period. During 2009/13, productivity growth slowed while jobs per worker decreased. This has led to some large contributions to growth over what is admittedly a short interval to do such calculations.

Table 3-1: Contributions to growth in GVA per capita

	Average growth rate (%pa)			
	1992/2013	1992/1997	1997/2009	2009/2013
GVA per capita	1.7	2.2	2.0	0.3
Productivity	1.5	1.7	1.6	1.0
Jobs per Worker	0.0	0.4	0.0	-0.7
Employment rate	0.2	0.3	0.1	0.4
WAP share	0.0	-0.1	0.2	-0.5

[7]Where 'WAP' stands for working-age population, 'wp' represents workplace figures and 'res' refers to residential figures.

[8] Gardiner, B., Martin, R. and P. Tyler (2004), Competitiveness, Productivity and Economic Growth across the European Regions, Regional Studies, 38:9, pp 1045-1067.

	Contribution to Overall Change in GVA per capita (%)			
	1992/2013	1992/1997	1997/2009	2009/2013
GVA per capita	100%	100%	100%	100%
Productivity	88%	76%	80%	400%
Jobs per Worker	-2%	16%	2%	-286%
Employment rate	13%	11%	7%	162%
WAP share	1%	-4%	12%	-176%

Source: CE calculations based on the above-referenced data sources.

3.5 Table 3-2 shows how differences across regions in GVA per capita are accounted for by the various components. When London is excluded, the gap is fairly evenly split between productivity and the employment rate. The relatively low employment rates and higher productivity in the capital make the latter component more important when London is included in the comparison. London's high level of in-commuting also makes the jobs per worker measure a stronger (and positive) contribution to the GVA per capita gap.

Table 3-2: Contributions to GVA per capita gap

	Contribution to Gap in GVA per capita (%) **with Rest of England (minus London)**			
	1992/2013	1992/1997	1997/2009	2009/2013
GVA per capita gap	13%	14%	13%	12%
of which				
Productivity	8%	9%	8%	8%
Jobs per worker	-1%	-2%	-2%	-1%
Employment rate	7%	8%	7%	6%
WAP share	-1%	0%	0%	-2%

	Contribution to Gap in GVA per capita (%) **with Rest of England**			
	1992/2013	1992/1997	1997/2009	2009/2013
GVA per capita gap	24%	24%	24%	25%
of which				
Productivity	15%	15%	15%	17%
Jobs per worker	3%	3%	3%	4%
Employment rate	5%	6%	5%	5%
WAP share	1%	1%	1%	0%

Source: CE calculations based on the above-referenced data sources.

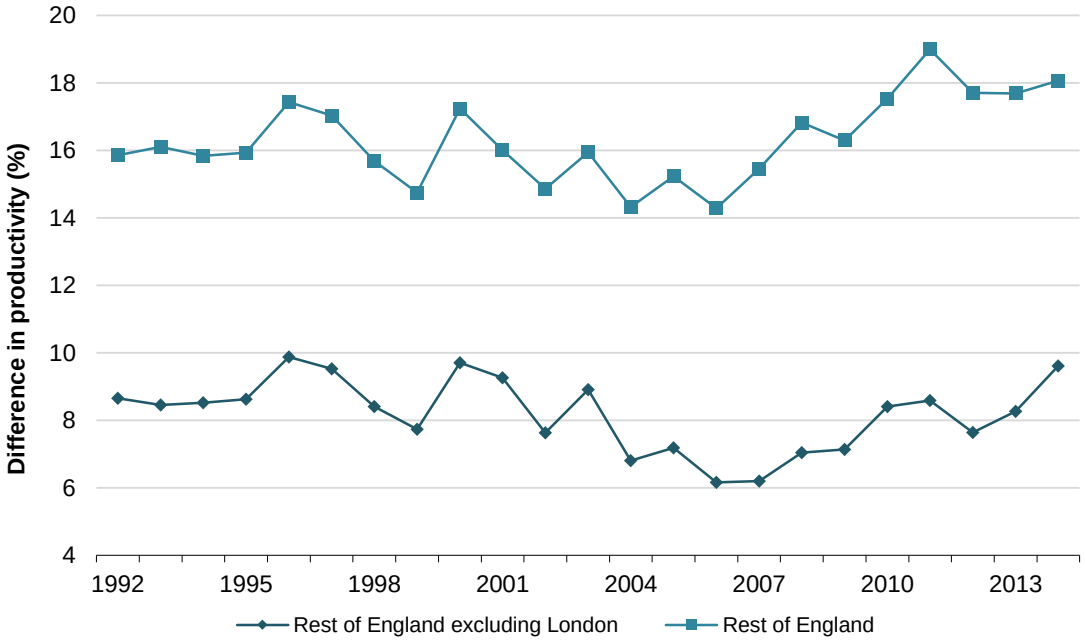
3.6 Figure 3-1 reinforces the findings from Table 3-1. It shows that the North's productivity gap has remained broadly constant, with a modest fall in the decade from 1997 and a gradual widening from the onset of the recession (particularly, but not only, when London is included in the comparison). The profile of the productivity gap is consistent with that of the broader performance (GVA per capita) gap.

3.7 There has been little evidence of the predictions from textbook (neoclassical) economic theory in which capital flows to low productivity areas and close the gap (Martin, Gardiner and Tyler, 2014)[9]. Rather, the gap is persistent and entrenched. These differences in labour

[9] Martin R., Gardiner, B., 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.

productivity translate broadly into differences in earnings: in 2015, mean earnings of full-time workers in the North were about 5% below those in the Rest of England excluding London and 16% below those in the Rest of England including London[10].

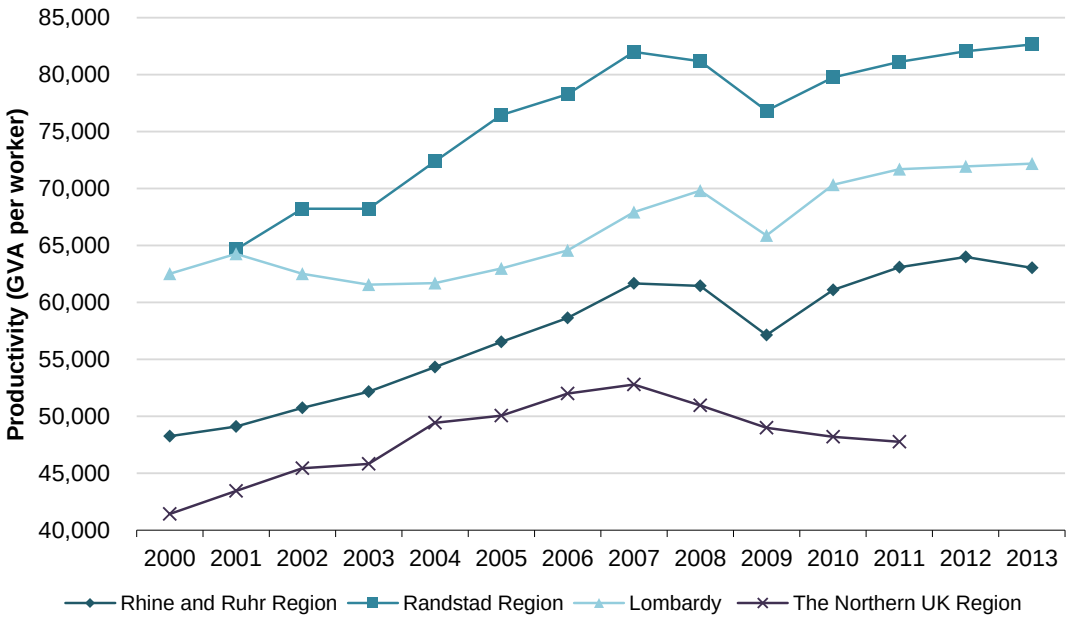
Figure 3-1: Long-Term Trends in the North's Productivity Gap



Note: The ratio of GVA per worker in the Northern economy compared to each benchmark. Source: CE data for GVA based on ONS data and employment (jobs) based on ONS Annual Population Survey.

3.8 Figure 3-2 extends the European analysis shown in the previous section to investigate productivity differences. It can be seen that the pattern for productivity is very similar to that of GVA per capita, particularly with the gap widening post-2009.

Figure 3-2: European Comparison – Labour Productivity

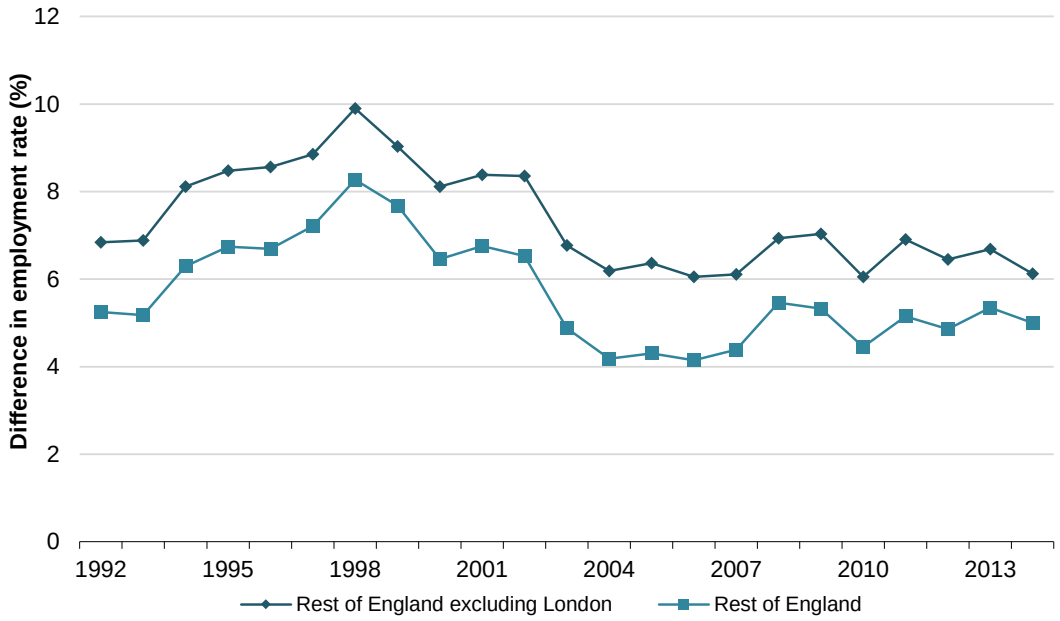


Note: GVA per (workplace) worker in PPS, UK data missing after 2011. Source: Eurostat.

[10] Annual Survey of Hours and Earnings, 2015.

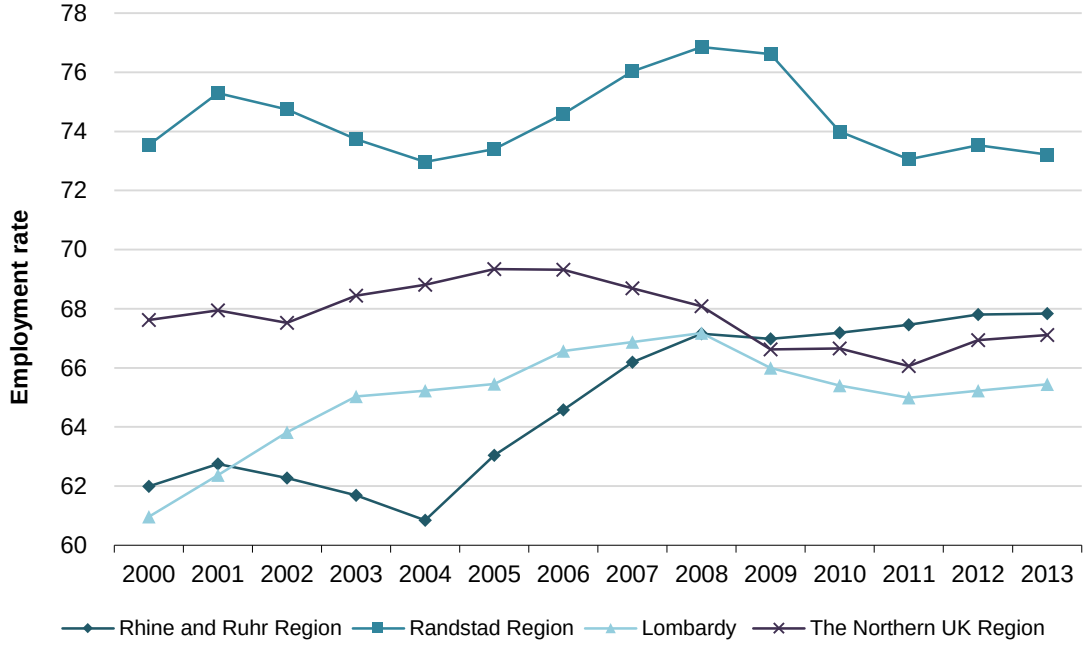
3.9 Figure 3-3 shows the English region comparator gap for the employment rate, while Figure 3-4 provides the European equivalent. Since 1998, the English regional gap has been on a downward trend, although it has stabilised mostly during the last decade. While the gap is persistent, it is smaller than the productivity gap and does not show any notable increase in the post-recession period. Across the European regions, the pre-recession performance of the North was quite favourable, with a higher employment rate than both Lombardy and Rhine/Ruhr. The gap narrowed considerably during and after the recession, however, with little now to separate these three regions, while the Randstad remains a strong performer throughout.

Figure 3-3: Long-Term Trends in the North's Employment Rate Gap



Note: The ratio of the employment rate in the Northern economy compared to each benchmark. Source: CE data for employment (number of workers) based on the ONS Annual Household Survey data and working-age population based on ONS' and Mid-Year Population Estimates.

Figure 3-4: European Comparison – Employment Rate

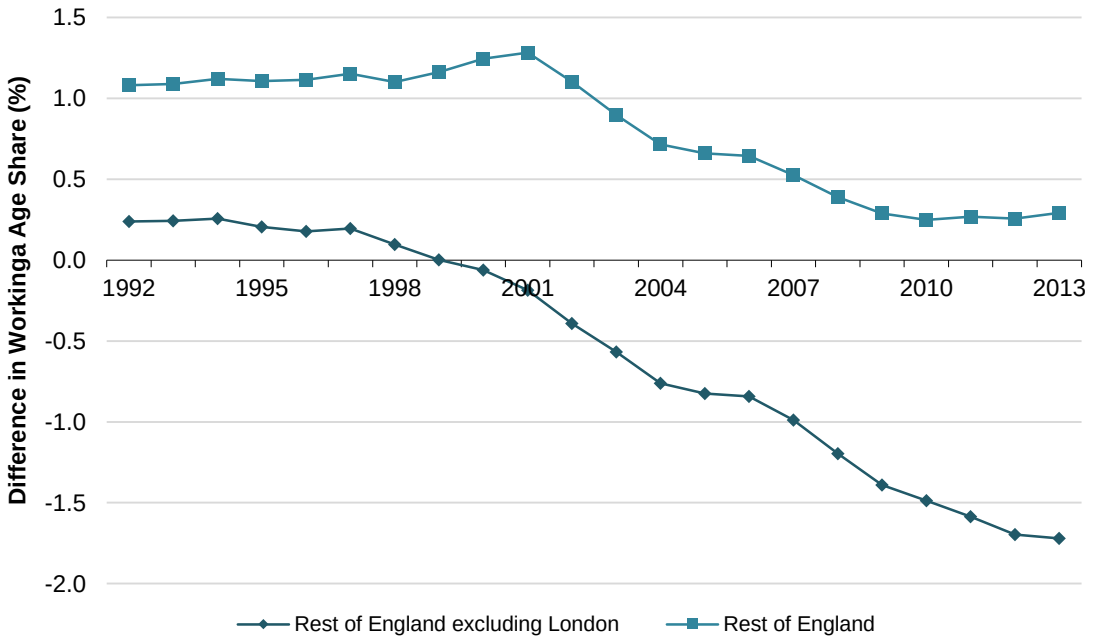


Note: Workers (residential basis) as a % of working-age population. Source: Eurostat.

3.10 One possible reason for the Northern economy's lower employment rates[11] is the sectoral makeup. Although, historically, manufacturing has led to relatively high employment rates in the North, the Government Office for Science and Foresight (2014)[12] states that between 1981 to 2011 '*all of the sectors that declined in employment were in manufacturing*'. This decline could have particularly large consequences for the Northern economy's employment rate as even though *'manufacturing and production more generally now account for a much smaller proportion of employment across all of the regions of the UK, much of the North remains considerably more dependent on these sectors than does the South*' (Gardiner, Martin and Tyler 2012)[13].

3.11 Figure 3-5 shows that the part of the North's performance gap explained by the share of working-age population is relatively small, and was mostly constant until the early 2000s, when it started declining. More recently, the gap with the rest of England has reduced to almost zero, while the difference when London is removed has become negative, meaning that the share of working-age population became larger in the North than in the benchmark[14].

Figure 3-5: Long-Term Trends in the North's Working-Age Population Share Gap



Note: The ratio of the working-age population share in the Northern economy compared to each benchmark. Source: CE data for working-age population based on ONS Mid-Year Population Estimates and population data based on ONS' Mid-Year Population Estimates.

3.12 To provide a sub-regional dimension to the analysis, Table 3-3 shows the performance of the various LEP areas relative to the Northern economy in terms of GVA per capita, productivity and the employment rate for 2004 and 2013. The results show a number of things:

[11] Data form the Annual Population Survey indicate that during the recession (from 2008 onwards) the share of full time employment fell. However, this decrease was similar in size to the benchmark regions. This indicates that the gap in employment rates cannot be attributed solely to a changes in full-time to part-time employment.
[12] Government Office for Science and Foresight, (2014): The evolving economic performance of UK cities 1981-2011.
[13] Gardiner, B., Martin, R. and P. Tyler (2012), Government Office for Science and growth in the British economy. Journal of Economic Geography, 13:6, pp 889-928
[14] Some additional investigation was undertaken to see whether different age structure of the population might explain different employment rates, and even skill levels. The findings are that such effects are at best a marginal explanation of the performance gap.

- A high degree of persistence in terms of the GVA per capita ranking at the high and low ends, with some movement in the middle (Cumbria seeing an improvement in its relative position, Lancashire and Humber seeing relative deterioration).
- The importance of labour productivity behind the overall GVA per capita ranking, although the employment rate has become more a more important determinant in the most recent year, particularly for Cheshire and Warrington.

Table 3-3: Sub-Regional Performance Analysis

	Performance Relative to the Northern Economy (2004)			
	GVA per capita	Labour Productivity	Employment Rate	Working-Age Share
Cheshire and Warrington	119	109	107	101
Greater Manchester	107	102	99	102
Leeds City Region	107	101	103	103
Liverpool City Region	100	113	93	98
York, North Yorkshire and East Riding	97	101	106	99
Cumbria	95	88	103	100
Humber	94	95	100	101
Lancashire	93	92	100	100
Tees Valley	91	93	95	101
North Eastern	90	99	95	99
Sheffield City Region	87	98	98	104

	Performance Relative to the Northern Economy (2013)			
	GVA per capita	Labour Productivity	Employment Rate	Working-Age Share
Cheshire and Warrington	118	101	111	100
Greater Manchester	107	105	99	106
Leeds City Region	105	101	102	104
Cumbria	104	92	109	95
Liverpool City Region	102	113	94	102
York, North Yorkshire and East Riding	97	100	109	100
Lancashire	91	91	100	99
Humber	91	97	104	99
Tees Valley	91	95	96	103
North Eastern	91	98	99	103
Sheffield City Region	88	93	101	99

Note: North=100. Source: CE calculations, based on the above-referenced data sources.

3.13 IPPR (2011)[15] found during 2008 the cities with the lowest employment rate were mostly in the North (Manchester, Liverpool, Newham (East London) and Kingston upon Hull). Furthermore, although the proportion of people in work in the North improved compared with the Rest of England after 2000, this was because partly the Rest of England saw faster growth in the number of people of working-age: the number of people in work grew at broadly similar rates in the North and in the Rest of England.

[15] IPPR (2011): Learning from the Past: NEFC Briefing Paper No 1, Northern Economic Futures Commission.

4. Identifying the drivers of the Performance Gap

4.1 The previous Section identified two main factors responsible for the persistent performance gap between the Northern economy and the rest of England – productivity, and the employment rate. The drivers behind both components are considered in this Section, with productivity receives a more detailed treatment because it relates more closely to longer-term performance and prosperity.

4.2 It should also be noted that the two factors are not independent of one another. Higher productivity growth can be associated with lower employment when rationalisation takes place. Alternatively, a policy that successfully brought people with low skills back into work could raise the employment rate at the expense of overall productivity.

Key Messages

- The skills gap mirrors the pattern of the performance gap most closely, and seems to be the most important factor as it influences both productivity and the employment rate.
- Measures of investment, agglomeration, and research-innovation also show persistent gaps between the North and its comparators. Those factors which show a rising post-recession gap include skills and investment, particularly the former where the evidence points to out-migration of skilled workers to the southern regions where employment prospects are better.
- The role of transport is hard to gauge directly, due to the difficulty in measuring connectivity and the importance of considering the stock, and not just the flow, of investment. However, there is evidence from the literature that suggests improved connectivity can assist employment and skills (through better matching of workers with jobs) and by increasing the density of employment and so realising agglomeration gains.

Employment Rates

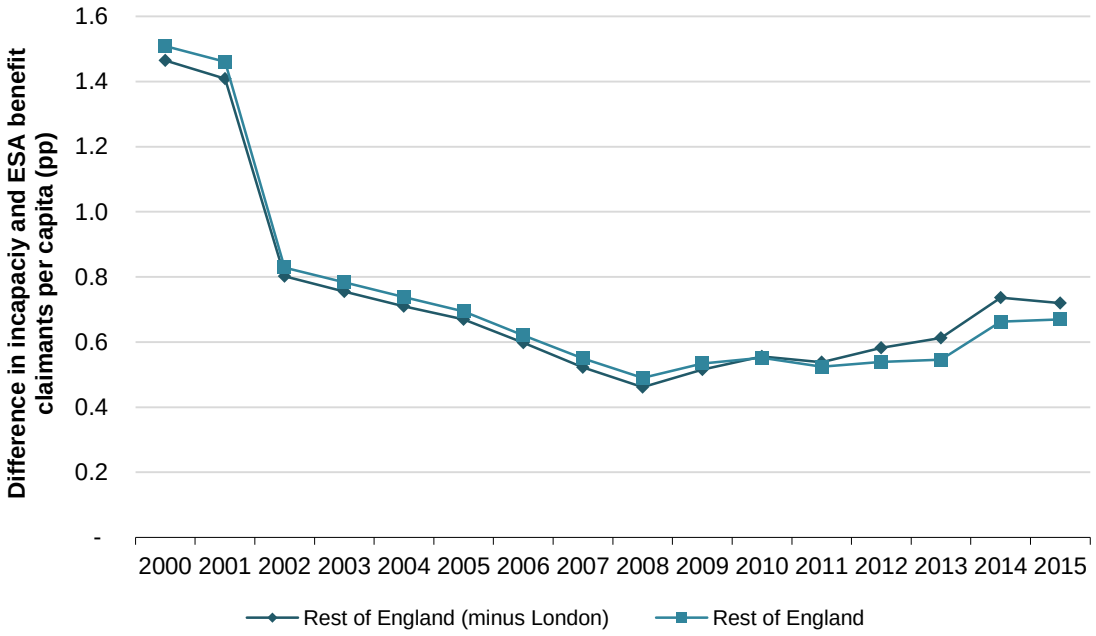
4.3 There are a range of reasons (both individual and structural) why people of working-age may not be in employment:

- They are caring for a dependant
- They have a health problem or disability which hinders their chances of getting a job
- Their cultural tradition discourages them from seeking work (notably for women in certain ethnic minorities)
- They face discrimination in the labour market
- They have become disengaged from the labour force for one of a variety of reasons, including lack of success in securing work in the past
- There could be more of a poverty trap in the North due to wages being lower generally than in the rest of England while welfare and social payments are nationally set

- They have lower skills or cannot find work that matches their skills and pay expectations within their geographical area of search, notably because of structural change in the local economy.

4.4 Gathering data on individual reasons for not being in employment is difficult, and the evidence that the Northern economy is different from the rest of England in these aspects is limited. On the issue of disengagement, IPPR North (2015)[16] notes that large numbers of people in the North have become detached from the labour market by claiming incapacity benefit or employment support.

Figure 4-1: Trends in the North's Long-Term Unemployment



Note: The difference in the share incapacity and employment support allowance (ESA) benefit claimants per capita in the Northern economy compared to each benchmark. Source: benefit claimants data from the Work and Pensions Longitudinal Study and population data from the ONS Annual Population Survey

4.5 Figure 4-1 demonstrates there is a larger proportion individuals disconnected from the labour market (represented by those claiming incapacity and employment support allowance (ESA)) in the Northern regions than in the comparator regions. Although the gap has fallen, this decrease has been slowing and since 2008 has shown signs of rising. These data are in line with IPPR North's (2015, ibid) comments, whereby a larger proportion of individuals in the North are disconnected from the labour market, compared to the benchmark regions.

4.6 Such statements are not unrelated to the broader issue of structural demand, however. The last government-commissioned review of skills, the Leitch Review[17], emphasised the importance of skill and qualification levels as a key determinant of whether people are in work.

4.7 This finding is also associated with long-term unemployment which can lead to deterioration of skills, and thus the ability to find a job and generally engage with the labour market. LSE (2013, p14)[18] notes that, '*There is a risk that if high levels of unemployment persist for many*

[16] IPPR North (2015): The State of the North - Four Tests for The Northern Powerhouse.
[17] HM Treasury (2006) Prosperity for all in the global economy - world class skills, Final Report of the Leitch Review of Skills, TSO, London.
[18] LSE (2013): Investing for Prosperity: Skills, Infrastructure and Innovation - Report of the LSE Growth Commission.

years, the long-term unemployed will lose their skills, motivation and networks, thus reducing potential supply. If there are fewer innovative new entrants, this will drag down potential growth for many years.'

4.8 Transport can play a role here by bringing people closer to the jobs they are more suited for, as highlighted by the Institute for Transport Studies (2009)[19], which observed that '*a lack of residential mobility and skill mis-matches have resulted in persistent high unemployment rates in post-industrial cities in the North of England.*'

Productivity

4.9 The literature on labour productivity suggests a number of drivers, including skills, innovation, investment, enterprise, connectivity, sectoral mix, and governance, mostly following guidelines already set out by HM Treasury (2006, op.cit.). Each driver is assessed below, drawing together the available data to construct indicators to characterise the North's relative position.

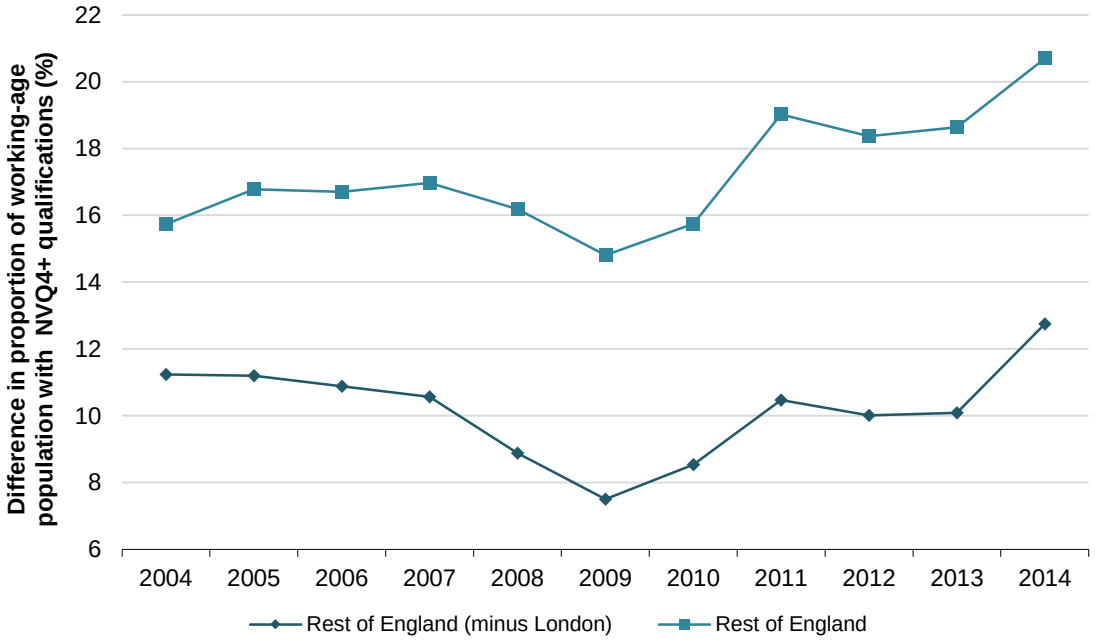
Skills

4.10 Figure 4-2 and Figure 4-3 look at the Northern skills gap. For high-skilled people, it shows that, at least from the mid-2000s, there has been a persistent gap in skill levels between the North and the rest of England, and that this gap increased in the post-recession period.

4.11 The main source of data on differences in earnings, the Annual Survey of Hours and Earnings, does not identify the qualifications of workers, but it does identify differences due to the level of occupation. Using occupation as a crude proxy for skill levels and average earnings as a crude proxy for productivity, if full-time workers in the North had the same distribution of occupations as in the Rest of England excluding London, but the same pay level for each occupation as at present, the average level of earnings (and hence, by assumption, productivity) would be raised by about 4%. For people with low or no skills, the negative gap means that the North has a higher proportion than its benchmarks. Having narrowed up until 2008, the gap has widened since the recession.

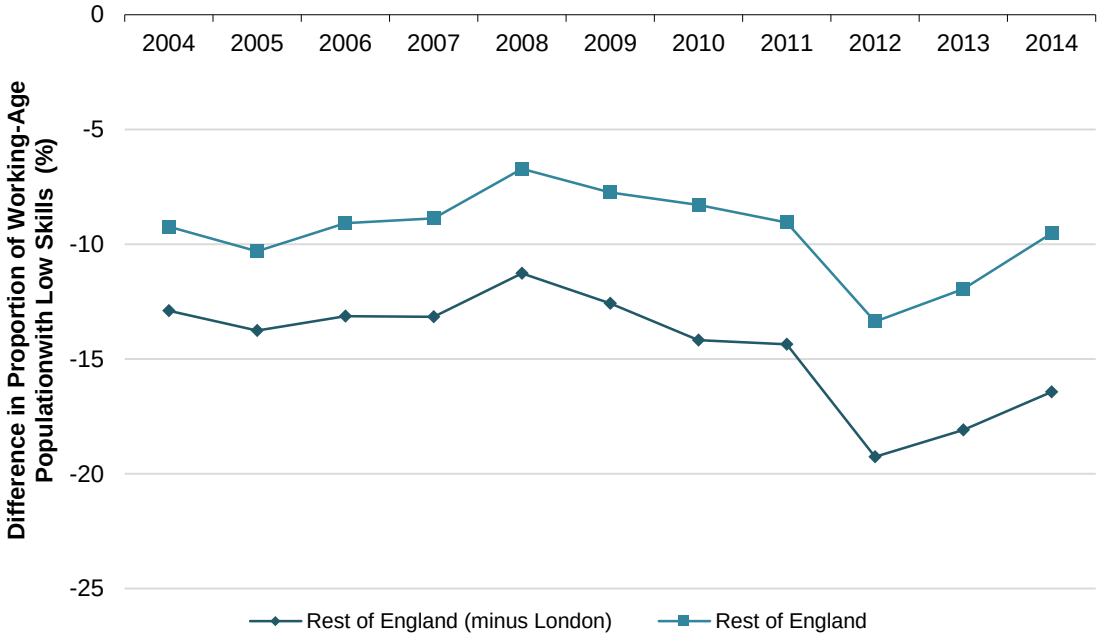
[19] Institute for Transport Studies (2009): Strengthening the Assessment of Transports Wider Impacts on the Economy.

Figure 4-2: Trends in the North's Skills gap (High Skills)



Note: The ratio of the proportion of working-age people with NVQ4+ qualifications in the Northern economy compared to each benchmark. Source: Qualification and working-age population data from the ONS Annual Population Survey.

Figure 4-3: Trends in the North's Skills Gap (Unskilled and Low Skills)



Note: The ratio of the proportion of working-age people with NVQ1 or no qualifications in the Northern economy compared to each benchmark. Source: Qualification and working-age population data from the ONS Annual Population Survey.

4.12 These findings are consistent with those of IPPR North (2015, p25)[20], who state that '*The proportion of employers lacking any sort of strategic approach to the skills of their workforce is higher than the national average in almost all parts of the North. . . a smaller proportion of the*

[20] IPPR North (2015): Rhetoric to Reality: A Business Agenda for the Northern Powerhouse.

northern workforce has a degree and a larger proportion has no qualifications. In some areas this results in a vicious circle of low skills and low productivity: the 'low-skills equilibrium'.'

4.13 A skilled workforce can reflect strength in the demand-side of the economy, as highly-educated people work in sectors that require their qualifications (and so contribute to value-added and productivity performance), but also acts as a supply-side attractor for businesses (through FDI, relocation or new business starts). As noted previously, there is also a link to the employment rate as skilled people are more likely to be in work than their lower qualified counterparts.

4.14 One argument for the Northern Economy's skills gap, posited by Gardiner, Martin and Tyler (2012, op.cit.) and in Champion et al. (2014, op.cit.), is that second-order cities are losing their skilled individuals as better educated people migrate to larger cities (in England's case London). This theory of skilled workers migrating to London would be in keeping Figure 4-2's results which shows that, once London is removed, the skills gap is lessened substantially, though it still follows the general trend. It also fits the findings from the OECD (2010, p28) who state that: *'Strong growth in the south has led to out-migration from the North and captured large shares of private investment, with the North having persistently higher levels of unemployment and an increasing income gap'.*

4.15 Furthermore, those who did return to the Northern region were more likely to be underemployed. Using HESA graduate retention rate data, HECSU (2015)[21] found that although '*Returners made up 15.7% of 2012/13 employed graduates' in the North East, they were 'much the most likely to be in non-graduate employment, particularly in retail*'.

4.16 This indicates that it is not enough to ensure that existing members of the region's population are well educated. Instead, the Northern economy must ensure it is able to retain skilled individuals and attract more from other regions, through continued investment in jobs, infrastructure, and innovation, thus creating an environment and local economy which the highly skilled are attracted to and where they are more likely to stay (MIER, 2009)[22] Such a strategy should include investment in the school and adult education systems.

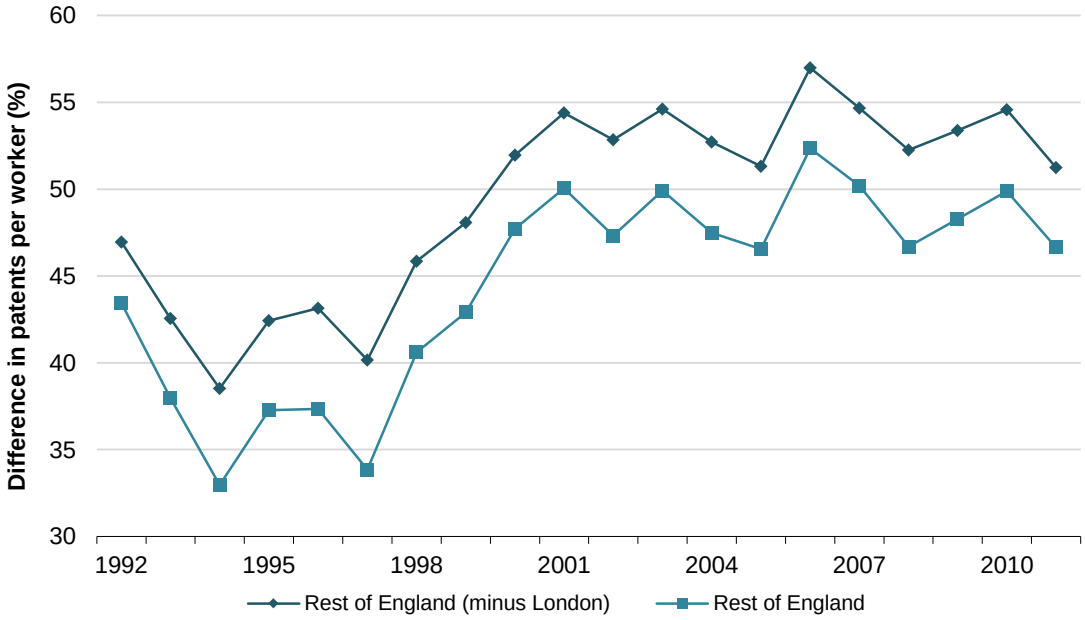
Innovation and Technology

4.17 Differences in patents per worker can provide an indication of the technology gap between areas, and this is shown in Figure 4-4. Again, a persistent gap is present which has increased in the mid-1990s but which has stabilised since the early-2000s.

4.18 MIER (2009, op.cit.) states '*a lack of 'innovation endowments' in MCR [Manchester] relative to the most productive parts of the UK, underlined by limited private sector R&D specific firms and limited non-university public sector research and development capacity in the city region,*' are preventing '*innovation to spread across and become 'domesticated' within the city*'. A lack of innovation could lead to not only a slower development in productivity advances, but could also make the Northern Economy less attractive to highly skilled employees who are looking to work in high- productivity sectors.

[21] HECSU (2015): Loyals, Stayers, Returners and Incomers: Graduate migration patterns.
[22] MIER (2009): Reviewer's Report.

Figure 4-4: Long-Term Trends in the North's Technology Gap



Note: The ratio of the number of patents per worker in the Northern Economy compared to each benchmark. Source: OECD data on number of patents per NUTS 3 region. CE data for workers based on ONS Mid-Year Population Estimates.

4.19 As with patents per employee, the gap in R&D between the Northern Economy and its benchmarks is positive and persistent, although there is some evidence of a downward trend, as Figure 4-5 highlights. IPPR (2015)[23] argue much of the R&D in England is focused around the Golden Triangle (Oxford, Cambridge, and London), and this diverts resources (including policy) away from other regions such as the North and its component parts.

4.20 This persistent gap in innovation, reflected in both patents and R&D, could '*lead to missed opportunities with good ideas not being exploited, assets and capabilities not fully developed, and resources being channelled sub-optionally*' (SQW 2008)[24].

[23] IPPR (2015): The Missing Pieces Solving Britain's productivity puzzle.
[24] SQW (2008): Major Innovation Assets in the North of England, for The Northern Way/OECD.

Figure 4-5: Trends in the North's Research Spending

Note: The ratio of R&D intensity in the Northern Economy compared to each benchmark. R&D intensity is defined as R&D expenditure (made up of government, higher education, and business expenditure on R&D) as a % of GVA. Private non-profit R&D expenditure is excluded due to lack of data. Source: ONS Gross Domestic Expenditure on Research and Development (GERD) data

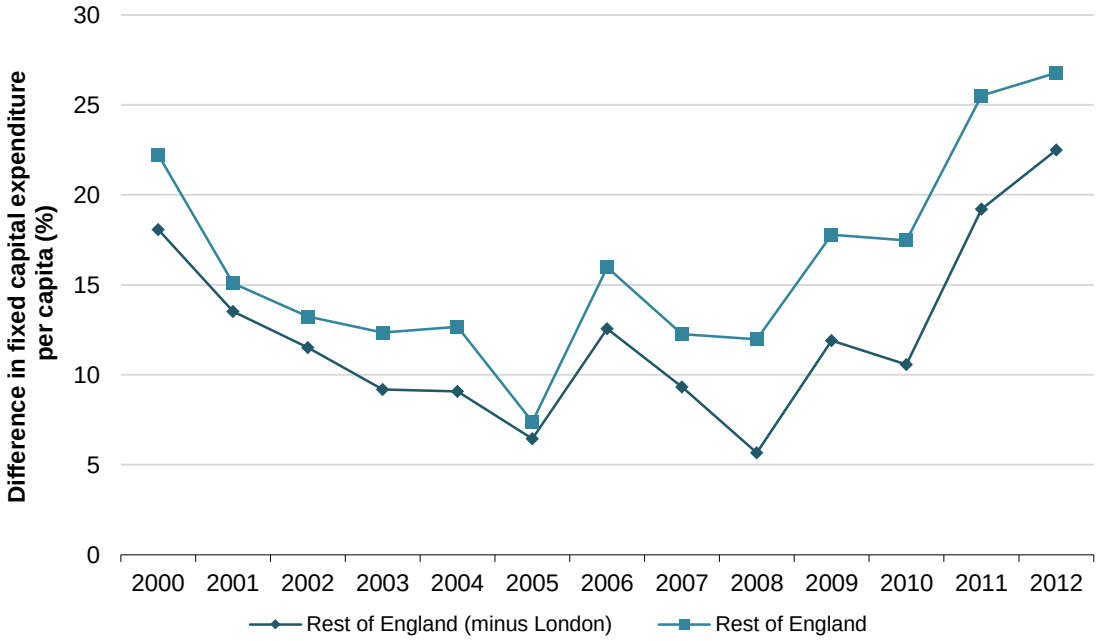
Investment

4.21 Investment is an important factor behind improving labour productivity. LSE (2013, op.cit.) state '*Creating a dynamic economy requires investment of three basic kinds: in people (human capital), in equipment, and in physical structures (infrastructure)*'. Not only is the level of investment important, however, the area which is invested in is also key. LSE (2013, ibid) argue investment spending in areas which boost the economy such as science, technology and infrastructure is lower considerably in the North than in other regions of the UK.

4.22 Figure 4-6 shows the investment[25] gap between the Northern Economy and the rest of England. The gap is positive and mostly stable until 2008, after which it increases, which is consistent with the pattern of the overall productivity performance gap.

[25] The majority (on average over 80% during the 2000-12 period) of investment is by the private sector, and it is perhaps not surprising that private sector investment largely explains the overall trend seen in Figure 4-6. For public sector investment a positive gap is also evident for most years although this turned negative during the 2008-12 period.

Figure 4-6: Trends in the North's Investment Gap



Note: The ratio of total investment in the Northern Economy compared to each benchmark. Investment is measured as gross fixed capital formation per capita (all sectors, private and public). Source: Eurostat.

Foreign Direct Investment (both new, and reinvestment), is an important component of investment more generally. While inward investment data by UK region is not available, there are numerous references[26] in the literature which show how transport infrastructure, FDI and economic performance are closely related. Usually, however, these studies tend to focus more on countries (e.g. Africa, India) where transport infrastructure is more lacking/important in its developmental role. Closer to home, the 2015 UK Attractiveness survey published by Ernst & Young[27] states that: *'When considering investment in the UK regions, transport and the skills of the local workforce are the key factors influencing decisions'.*

4.23 The authors go on to say that *'Our research shows foreign investors see roads as the most important transport infrastructure, although this varies by nationality and sector of investor.'*

4.24 Access to investment funds is also cited as an inhibiting factor. SQW (2011)[28] state one reason for the Northern Economy's lag in investment is the heavy concentration of venture capital (VC) in the South East, demonstrated by the fact that the Northern Economies have approximately a third of investment executives which would be expected given its population size. The effect of this is twofold with the South East region experiencing positive externalities where more VCs lead to higher deal flows, which encourages greater entrepreneurship. This effect is compounded by the fact that greater levels of entrepreneurship leads to a greater supply of VCs. The second effect is that the Northern Economy faces negative externalities where the lack of VCs leads to lower deal flows, which lessens the demand for VCs and therefore the supply.

[26] See for example Pradhan et al (2014) and Khadaroo and Seetanah (2010).
[27] See http://www.ey.com/UK/en/Issues/Business-environment/2015-UK-attractiveness-survey
[28] SQW (2011): Evaluation of the Northern Way 2008-11 Final Report.

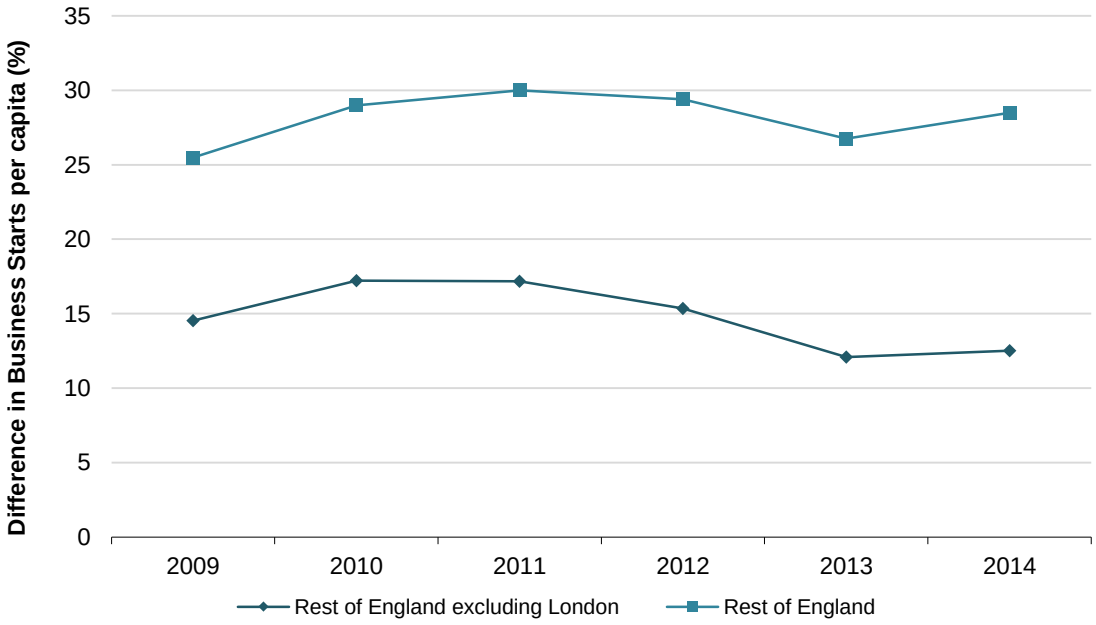
Enterprise

4.25 As noted previously, investment and entrepreneurship are closely linked, and the creation of new businesses is vital to the regeneration and continual success of regions (LSE, 2013, op.cit.). The creation of new firms introduces new products and practices to local economies, leading to a process of 'creative destruction' where new, more efficient firms take the place of older, less efficient ones. IPPR (2015, op.cit.) found there were low levels of company failure experienced in the North, potentially denying the North the 'creative destruction' needed to introduce more innovative and efficient business and processes.

4.26 One of the largest barriers for entrepreneurship in the Northern region is the difficulty to find funding. IPPR (2012)[29], found that in 2007 the South received 41% of all investment (although only making up 32% of the total number of businesses), while the North received 23%. This creates a 'barrier to entry' for potential new companies, meaning the North has faced a positive gap between the number of business starts per business unit and the rest of England (including London).

4.27 Based on the data presented in Figure 4-7, the gap between the Northern region and its comparators seems persistent, although with such a limited sample size it is difficult to identify any trends and impossible to gauge any recessionary impact.

Figure 4-7: Trends in the North's Entrepreneurship Gap



Note: The ratio of business starts per capita in the Northern Economy compared to each benchmark. Source: ONS for data on business starts (Business Survival Rates) and for population based on ONS estimates.

Agglomeration

4.28 Agglomeration economies are broadly defined as those where the benefits of firms (and consumers) being close to one another can be realised fully. Lack of agglomeration is mentioned frequently as a reason for the North's performance gap with the rest of the England, due to Northern cities being too small to take full advantage of the '*positive*

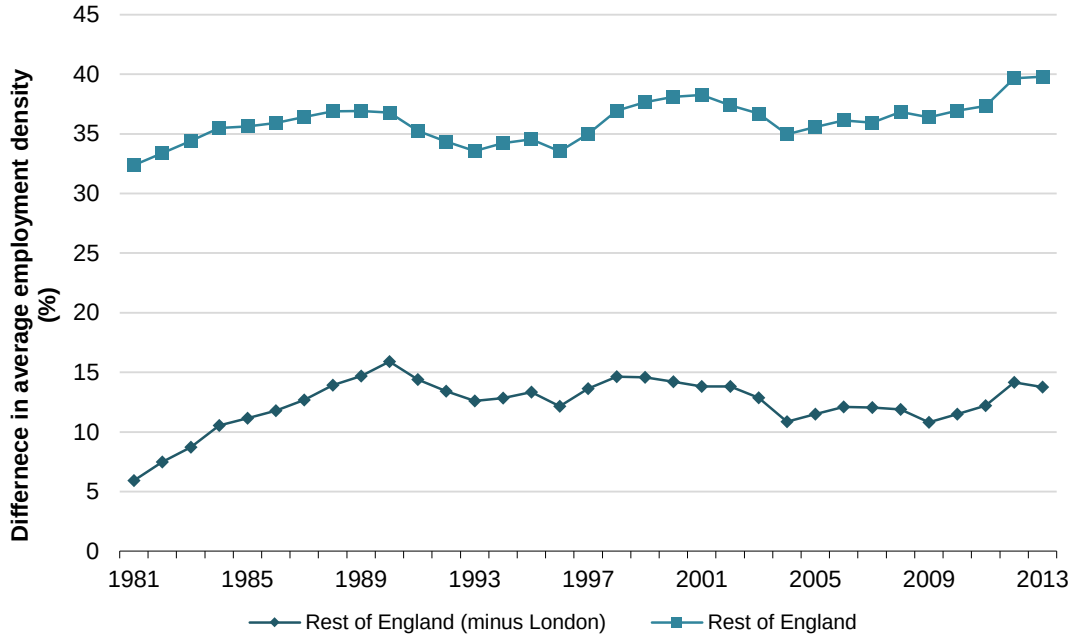
[29] IPPR (2012): Northern Prosperity is national prosperity.

externalities from the spatial concentration of economic activities' (IPPR, 2011, op.cit). Issues of agglomeration are discussed more fully in the Review's report for Workstream 4.

4.29 Creating larger city regions creates '*Better access to economic mass*' and thus '*increases productivity because it allows firms and workers to benefit from agglomeration*' the three main sources of which are '*linkages between intermediate and final goods suppliers, labour market interactions, and knowledge spillovers.*', MIER (2009)[30]. In this respect the benefits of agglomeration can manifest themselves in other indicators such as innovation.

4.30 In addition, while looking at the Northern Region as a whole, Overman (2015)[31] argues that the North suffers from having its population spread out across a number of cities, as opposed to having people concentrated in a smaller number of larger areas. Accordingly, Figure 4-8 uses average Primary Urban Area (PUA) employment density as a proxy for regional agglomeration to see how the Northern economy fares against its southern benchmarks. On this basis, when London is excluded the gap has largely remained stable since the early 1990s, while with London included a gradual widening of the gap can be seen.

Figure 4-8: Long-Term Trends in the North's Employment Density Gap



Note: The ratio of employment density in the Northern Economy compared to each benchmark. Regional employment density is defined as the average employment density (jobs per km2) across Primary Urban Areas (PAU) located within each region. The PUA areas are based on LAD-level aggregations. Source: Cambridge Econometrics.

Connectivity

4.31 There is a strong link between agglomeration economies and connectivity. Tyler (2015)[32] states that because the North is fragmented by poor transport links between each city region, the Northern Economy as a whole is failing to gain the agglomeration effects which would help grow its productivity. A better connected Northern Economy could act more like a single economy thus benefiting from greater agglomeration. SDG (2014)[33] state similarly there is

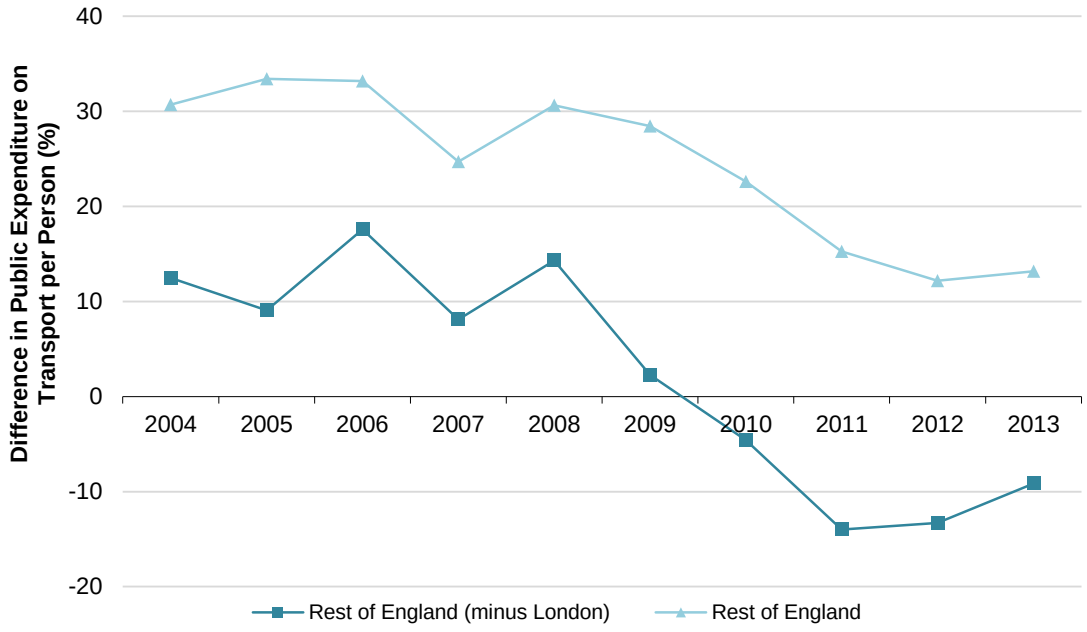
[30] MIER (2009): The case for agglomeration economies.
[31] Overman, H. (2015): The Economic Performance of UK Cities: Can urban and regional policy make a difference to the North-South divide?
[32] Tyler, P. (2015): UK and China Cooperation on Cluster Development and formation.
[33] SDG (2014): General transport – Transport Constraints and Opportunities in the North of England.

a need for better transport links within the North, as well as links to other regions, especially London and the South East. This is because, as the Northern Economy restructures, there is a greater need for it to be able to access London to take advantage of its worldwide expertise in areas such as finance, law and business support services.

4.32 Connectivity is not an easy concept to measure, however, particularly at a pan-Northern level. The challenge with trying to come up with an aggregate measure is that connectivity is fundamentally a localised measure. Connectivity is essentially about how well a place is connected to another place or a number of places or to all other places. The connectivity of a particular location will be different from another, even if on a map they look close together. This could be because of differences in transport supply (one is on a very frequent bus route, the other isn't) or geography (there's a river between them). Because of this, aggregate measures of connectivity are built bottom up, not top down, and thus have less meaning for aggregate regional analysis.

4.33 Figure 4-9 uses public transport expenditure per capita [34], and shows that before 2008 the per capita spending gap was fairly stable, but since then it has narrowed and went negative (with London excluded) from 2010 onwards. However, it should be noted that using investment is itself very limited as it only measures the flow, not the stock, of transport infrastructure spending[35].

Figure 4-9: Trends in the North's Transport Infrastructure Spending Gap



Note: The ratio of public expenditure on transport per capita in the Northern Economy compared to each benchmark. Public expenditure on transport is measured in current prices and represents only capital spending. Source: ONS data for public expenditure on transport, CE data for the population data based on ONS Mid-Year Population Estimates.

4.34 Rail links between London and the North have improved over the last decade, including over the recent recession. This is in part because London's airports are currently at, or near,

[34] Although the per capita spending measure is, on the surface, an attractive one, it should be interpreted with caution. It does not take account of available capacity, cross-over benefits between areas (e.g. investment in one region also benefits another), and different costs of investment in new capacity (typically greater in the South).
[35] Other disadvantages are a lack of disaggregation by type of infrastructure (e.g. road, rail, air) or by type of area (e.g. urban vs rural).

capacity and there are environmental and financial concerns over the viability of increasing motorway capacity.

4.35 International travel is another important dimension of the North's connectivity, with Manchester airport being the region's largest international hub and airport outside of the London/South East region. Manchester airport currently has a capacity of 27 m passengers pa, and this is planned to rise to 55 m by 2050 (SDG, 2014 ibid.). However, Manchester airport remains less-well connected than its Southern counterparts with direct connections to 42% of global airports compared to the 80% served by London airports (IPEG, 2008)[36]. Additionally, Manchester airport only makes up 4% of the national freight market (behind both Heathrow and the East Midlands airport). Many have argued the largest constraint on Manchester airport becoming a larger international hub is the access to the airport, especially public transport (SDG, 2014 op.cit.; Jarvis, 2012[37]; SQW, 2011 op.cit.; and IPEG, 2008 op.cit.). Improvements to rail and bus access to the airport will bolster recreational and business travel and improvement to road access (which is currently underway with the M56 to A6 link road) will increase both passenger and freight capacity (SDG, 2014 op.cit.).

4.36 Capacity is not the only issue facing the North's transport infrastructure, there is a question of its usability and the level of efficiency. While London has introduced smart ticketing which increases the ease of use of transport and the efficiency of use (especially in bus travel where boarding times have been drastically cut), the North is yet to have a wide scale implementation of such schemes (One North East, 2011)[38].

Sectoral Mix

4.37 Shifts in sectoral mix are reflected in some of the previously mentioned factors, so it is important to see whether this has an impact on the North's productivity gap. To investigate this, the Reviewers analysed the different sectoral employment structures in the Northern economy and the comparators, to determine what level of productivity the Northern economy would have had if its employment had been distributed across sectors in the same way as the rest of England.

4.38 In fact, this accounts for very little of the productivity gap[39]. Differences in productivity for each sector matter much more than the mix of sectors, not least because specialisation by function within a sector (e.g. front vs back-room functions in the financial sector, or global vs national focus) drives productivity differences between regions, and for the most part these are not identifiable in the sector classification. In other words, the North's productivity gap is not explained by the particular mix of sectors in which the North is specialised, but rather by the nature of the activities that go on in those sectors. In any case, in the long term this selection of activities is not fixed, but rather reflects the wider skills and competitiveness of the firms and workforce in the North.

[36] Institute for Political and Economic Governance (IPEG), (2008): The Northern Connection: Assessing the comparative economic performance and prospects of northern England.
[37] Jarvis (2011): Strategic Economic Evidence and Rail Devolution in the North.
[38] One North East, (2011): The Northern Way Transport Compact: The Economic Case for Transport Investment in the North.
[39] At least when the analysis is carried out for the 45 sectors distinguished in Cambridge Econometrics' regional database.

4.39 Sectoral strength is also investigated by Rowthorn (2010, op.cit.) who uses the lens of the 'export base' to see how this affects performance, where in the absence of useful regional trade data the export base '*consists of all those activities which bring income into the region by providing a good or service to the outside world, or provide locals with a good or service which they would otherwise have to import.*' Rowthorn argues that with the advent of increased communications, the ability to export services has increased in recent years. This has enabled the export base in the South East and London to increase while, conversely, the North has seen a fall in the size manufacturing sector and below average growth in the service sectors (IPPR North, op.cit.). Thus '*the private export base of the North has shrunk in relation to that of the South. In relative terms, the cumulative decline of employment in the northern private export base since 1971 has been around 30%*' (Rowthorn, 2010, op.cit.).

4.40 The North saw similar within sector productivity levels to the rest of the UK in the manufacturing and public sector industries (Health, Education and Social Work), however '*there are productivity performance gaps in other sectors, such as construction and hotels, and a much larger gap emerges in knowledge sectors, such as financial intermediation and other services*' (IPPR, 2011, op.cit.). This lack of productivity in the Knowledge and Financial Mediation sectors has also created a perception that Northern cities are unable provide jobs for young skilled workers, thus causing skilled indigenous workers to move to London and the South East (Champion et al, 2014)[40].

Governance

4.41 As with connectivity, Governance is another factor which is increasingly cited as important in place performance and yet is notoriously hard to measure. SQW (2011)[41] state that good governance is a key part of promoting growth through its ability to ensure certainty and predictability, which in turn can encourage the retention of skilled individuals as well as encouraging the creation of new companies. Volterra (2014)[42] add that good governance is key in encouraging private investment to a region, and cite the centralised nature of English governance and expenditure on transport as an example of a top-down system incapable of properly identifying local requirements. With a focus on transport, Crescenzi et al (2015)[43] look at the relationship between the returns to transport investment and quality of governance across Europe's regions. They conclude that weak institutions affect the return on both the infrastructure investment and the subsequent maintenance.

4.42 Unfortunately, robust metrics do not, at present, exist on which to base any comparison of the quality and quantity of governance in the North against comparator regions. This is a pity given the changes in governance structures currently going on at UK sub-national level, with devolution deals already agreed for Greater Manchester in November 2014, Sheffield (December 2014), Tees Valley and the North East Combined Authority (both October 2015), and most recently Liverpool City Region (November 2015). The deals cover a wide range of responsibilities for skills funding and provision, housing, and (in the case of Greater Manchester) health and social care budgets. While it is too early to measure what impact the

[40] Champion, T., Coombes, M., & Gordon, I. (2014). How Far do England's Second-Order Cities Emulate London as Human-Capital 'Escalators'?. Population, Space and Place, 20:5, pp 421-433.
[41] SQW (2011): Rebalancing the economy sectorally and spatially: an evidence review.
[42] Volterra (2014): Investing in City Regions: The Case for Long-Term Investment in Transport.
[43] Crescenzi, Riccardo and Di Cataldo, Marco and Rodríguez-Pose, Andrés, Government Quality and the Economic Returns of Transport Infrastructure Investment in European Regions (December 2015). CEPR Discussion Paper No. DP10988.

devolution of spending and finance-raising capacity will have in these areas, the general expectation is that providing more incentive to local government to grow their tax bases (and thus their revenue-raising potential) will most likely provide a boost to growth, not hinder it.

5. Summarising the Performance Gap and the links to Transport

5.1 This closing Section summarises the body of evidence established above which allows the Reviewers to make certain statements about the size, permanence, and drivers of the Northern Economy's performance gap. The performance drivers identified above do not stand in isolation from one another, however. Rather, they tend to operate together and reinforce one another. Regions with more successful economies tend to attract more investment and higher skilled workers; they tend also to place greater demand on transport connectivity and hence present a convincing case for higher levels of public investment in infrastructure. The section concludes by summarising the evidence on the facilitating role that transport plays in this regard.

Key Messages

- Over the last 30 years, there has been a persistent gap between the Northern Economy and the rest of England in terms of GVA per capita. This gap has shown no sign of lessening, and in the last five years has increased in the wake of the recent global recession.
- This gap reflects both a lower employment rate and lower productivity per worker. Underlying each of these is a range of factors, among which the skills gap features strongly.
- 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 pool of workers available to work in higher productivity urban locations, and increasing the effective scale of cities and the associated benefits of agglomeration.

Evidence on the North's Performance Gap

5.2 Although the North has seen GVA and employment grow over the last 30 years, its growth has been slower than that of the rest of England (including or excluding London). Population and working-age population growth remained relatively stagnant in the 1980s and 1990s, only increasing since the early 2000s and then less rapidly than in the rest of England.

5.3 The main driver for the Northern Economy's growth in GVA per capita over the last 30 years has been change in productivity. In the most recent period assessed (2009/13) an increase in productivity outweighed the decrease in the employment rate to still result in positive, albeit small, GVA per capita growth in the North.

5.4 A number of drivers are linked to productivity. The North has clear gaps with respect to the rest of England (including, and excluding, London) in skills, innovation, investment, and R&D intensity. The North has also tended to see lower public investment in transport infrastructure, particularly when comparison is made with London, although there are measurement and representation issues to bear in mind when interpreting this indictor.

5.5 The literature has indicated that many of the drivers are interlinked and thus must be looked at in conjunction with each other. The complex web of causality shows that there is no one single driver which must be targeted, but rather progress needs to be made on several fronts.

The role of skills is particularly important, but this is not just a matter of the quality of educational provision: demand from employers also plays a role, and this in turn is influenced by the overall performance of the regional economy.

The particular role played by Transport

5.6 This sub-section summarises the evidence from the literature on the links between the main performance drivers identified above and, in particular, looks at how transport and connectivity play a role in their development.

5.7 One issue preventing the North from acting as a single economy is the poor transport links between each city region. SDG (2014, op.cit.) state that better connectivity could allow the whole North to act as a single economy, thus reaping the benefits of greater agglomeration. Better connectivity is vital in creating and magnifying the positive effects of agglomeration while decreasing the negative side effects (such as increased congestion and pollution) (Martin 2008)[44]. IPPR (2015, op.cit.) state *'The cities of the North are individually strong, but collectively not strong enough. If we can bring our northern cities closer together – not physically, or in some artificial political construct – but by providing modern transport connections, supporting great science and our universities here, giving more power and control to civic government; then we can create a northern powerhouse with the size, the population, the political and economic clout, to be as strong as any global city'.*

5.8 When reviewing the impact of transport links (with cities and city-regions as the hubs to be connected) there are arguably four different types to consider namely links:

- Within cities (intra-city transport)
- Between cities within the same region (inter-city regional transport)
- Between cities within the same country (inter-city national transport)
- Between cities in different countries (international transport).

5.9 Each of these types of transport is important, but each will affect employment and productivity in different ways. Many of the arguments for the Northern economy acting as a single region focus on the inter-city regional linkages, such as the proposed east-west rail link (HS3), while the employment benefits of better matching of employee skills and available jobs also brings intra-city and inter-city linkages into play. Meanwhile, better linkages to London and beyond should allow improved access to finance and global transport hubs which can help to create new market opportunities. These themes are developed further in Workstream 4 which looks at alternative futures for the North and the role that transport infrastructure plays in enabling them.

5.10 The Department for Transport's approach to appraising the impacts of potential improvements to transport networks is described in WebTAG guidance. This approach involves estimating all impacts of the scheme (i.e. the 'welfare' approach) whether or not they

[44] 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.

take directly the form of measured economic activity (i.e. GDP). This follows the established requirement for government appraisal in HMT's Green Book. While steps have been taken to broaden the range of economic impacts that can be monetised within transport appraisals (most notably the inclusion of factors such as access to economic mass (ATEM)[45]), there is a perception that some impacts such as those on investment and employment are missing and/or not well understood[46] (Overman and Venables (2014)[47]). Since business surveys consistently rank access to markets and transport infrastructure among the most important factors when making location and investment decisions[48], understanding how transport schemes affect the attractiveness of a region for investment is an essential input for good decision-making regarding transport priorities.

5.11 Although there are difficulties in measuring it at a pan-regional level, 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 pool of workers available to work in higher productivity urban locations, and increasing the effective scale of cities and the associated benefits of agglomeration.

5.12 While it is clear that improved transport connectivity can play an enabling role in rebalancing the economy and closing the performance gap between the North and the rest of England, it is impossible to put a figure on this and say *'X £m of transport spending will close the performance gap by Y%'.* 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.

5.13 Instead, we can use the evidence base to 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 Northern economy to work out the best match between transport needs and supply. These are themes that are developed further in Workstream 4.

[45] ATEM is given by:
$ATEM_i = \Sigma_j f(d_{ij}) Emp_j$ Where the right hand side is the sum of the corresponding regions/city areas employment (Emp_j) multiplied by weighting factor ($f(d_{ij})$) which is decreasing in distance or the reciprocal of general transport costs.
[46] There may also be limitations regarding transformational infrastructure investment which can change behaviour and economic activity in ways not understood through a simplified modelling system.
[47] Venables, A., Laird, J. J., & Overman, H. G. (2014). Transport investment and economic performance: Implications for project appraisal
[48] Ernst & Young European attractiveness survey (2014), CBI Infrastructure Survey (2014), CBRE Occupier Survey (2014).

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