# GDP Growth Project

## A report prepared for *emda*

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east midlands
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# GDP GROWTH PROJECT

# Final Report

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**Executive Summary**

*Modelling regional GDP/GVA growth*

*GDP/GVA a 'broad' concept*

GDP/GVA is a broad concept that needs to be made clearly relevant to delivery and strategy development.

*…one of a 'basket' of indicators*

GDP/GVA is not a complete or single indicator for regional development, because it does not account for social, environmental and other non-economic 'externalities'. It should sit, as a result, within a wider 'basket' of measures of regional development – and prosperity and wellbeing.

*GDP/GVA driven by:*

The following 'actors' drive regional, and sub-regional, economic growth:

*Firms*

- Firms, through: (1) expenditure on consumables and other consumption items within a region; (2) investment in premises, equipments and other resources within a region; (3) capital investments coming into a region through re-location.

*Consumers*

- Individuals, through: (4) personal consumption within a region/area.

*Public spend*

- Public and non-private bodies through: (5) procurement expenditure within a region; (6) spend on infrastructure, both 'hard' and virtual.

*Net imports*
*Policy*

- (7) net imports into a region.
- Policy interventions, both: (8) within a region, e.g. through regional strategies and frameworks; and (9) national and trans-national policies affecting a region.

*Other external factors*

- Other exogenous factors (10), i.e. economic, social, technological, natural, and political events, circumstances and conditions that affect a region.

*…'intervention points' for regional strategy*

In terms of regional strategy and intervention, components 1) to 8) represent the dimensions through which regional development can be influenced, <u>within</u> a region. These eight components therefore represent the 'opportunity set' for stimulating economic growth.

*Measuring changes in GDP/GVA*

Section 7 explores how a re-formulation of national GDP measures to focus more clearly on specific economic 'actors' (firms, consumers, government and public spending) can be applied to regional economic development and GDP/GVA growth.

*Economic performance*

| | |
|---|---|
| *Regions slightly below mean* | Existing data (section 4) indicates that the regions fall slightly behind the UK mean, but that the key cities in out-perform both their own regions and the UK average overall. |
| *Variations between regions* | There are differences between the two regions, with the East Midlands performing slightly better than Yorkshire & Humberside, in terms of economic participation, productivity and trade. |
| *Key cities in both regions* | There is evidence of concentration of economic activity in a small number of key cities. These key cities have high densities of labour and firms and high levels of GDP/GVA per capita. |
| *'Greater Leeds' dominates* | In Yorkshire & Humberside, Leeds is the dominant urban economy, but there are smaller cities that are important 'sub-regional' economies in their own rights (Bradford, York, Hull, Grimsby and Scarborough). |
| *4 (or 5) 'core' cities in the East Midlands* | In the East Midlands, three cities are particularly dominant (Nottingham, Leicester, and Northampton). Derby and Lincoln are also important, but with lower densities and sizes. |
| *and 'pockets' of localised competitiveness* | The region also has several settlements with localised firm competitiveness (Kettering, Stamford, Loughborough, Boston, and Wellingborough). |
| *'Market towns'* | This region has a group of 'market towns' that are dynamic economically, and in some cases are likely to be regionally and cross-regionally significant in terms of firm competitiveness. |
| *Regional economies not just key cities* | The mapping of the structures of the regional economies indicates that although the key cities are important foci for regional economic activity, smaller settlements in both regions are also key; both to local development and prosperity, and as 'magnets' for firms. |

### *Stimulating GDP growth*

Consultations with agencies in both regions highlighted several key points that could inform future thinking on stimulating GDP growth:

*Market-firm dynamics*

▪ Firms operate within, and contribute to, broader market dynamics – both firms and markets are significant contributors to and factors within regions, and firm-level targets and analysis should take into account the dynamics of markets within (and across) regions.

*Investment*

▪ Investment – both within the region and incoming – is a critical, and perhaps underplayed, driver of growth and regeneration, with the capacity to effect substantive change and renewal within a regional economy.

*Practical knowledge for the workplace*

▪ Skills and practical/applied knowledge that could be related to the workplace were seen as key aspects of regional labour market dynamics that needed reinforcing in both regions.

*Economic structures & legacies*

▪ Economic structures, including legacies from earlier activity, have a strong influence on current levels of economic development.

*Interventions 'indirect' & enabling*

Many of the responding organisations considered their contributions to GDP/GVA growth to be indirect, in the sense that they engaged indirectly with businesses and individuals and saw their roles as stimulating private sector and labour market activity, and contributing to the emergence of the right conditions for economic growth to occur.

*Attribution of impact a challenge*

In many cases, the direct attribution of their impact and contribution was difficult to determine or measure.

*Needs analysis informing strategy*

In terms of strategy formulation and implementation – both regionally and sub-regionally – most organisations undertook some form of needs analysis, although approaches and scope of such analyses varied.

Most also led on or were instrumental in developing strategies, typically informed by needs analysis.

*But scope for more M&E?*

However, monitoring and evaluation (M&E) was under-developed, with only a small number of respondents indicating this was a primary or core function.

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# Section 1 – Introduction

1.1     This report outlines the findings of a study examining the economic structure and dynamics of the East Midlands and Yorkshire and Humber regions of the UK, using the logic of firm and labour agglomerations and their contribution to GDP as the basis for the analysis.

1.2     The project was undertaken by the Enterprise Research and Development Unit (ERDU) at the University of Lincoln. The main aim of the project was to examine GDP growth in the two regions in order to understand the dynamics and structure of regional economic activity and explore the implications for regional development.

1.3     Because GDP provides a value for an economy's output, changes in GDP can highlight the changing state of a region's economy. Thus, GDP provides a benchmark for the performance of an economy which will be comparable across nations and regions.

1.4     While it is a useful indicator, GDP can be viewed as a set of figures which are the result of an accounting procedure. This reporting of figures covers the dynamics of an economy in that we know the end result, i.e. the total value of the economy but lack an understanding of how that figure is generated. What is also required is an understanding of the structure of an economy and how this may affect changes in GDP.

1.5     The approach adopted in this study has been to 'decompose' GDP in order to understand its component parts and link this to the structure of a regional economy. In doing this we depart from a traditional 'macroeconomic' analysis in that the report also examines policy interventions and the geographic structure of the two region's economies.

1.6     As there are many actors and policy initiatives within a region, it made sense to consider a sample of these organisations to acquire a sense and 'flavour' of the different and distinctive approaches undertaken.

1.7     While the size of regional economies dwarfs the budgets of regional, and sub-regional, agencies involved in policy development and intervention, organisations can play important stimulus, leverage and demonstration roles in regional economic development.  For example, a programme that involves expenditure of £1m will not make a large contribution to a region with GDP of £60bn. However, if the results of the programme improve the productivity of the workforce then there will be 'knock-on' impacts. Keynes termed these 'multiplier effects' and can be an important source of regional economic growth.

1.8     Good and effective practice is also likely to stimulate improvements in practice, and hence impact and knock-on effects, throughout a region (and vice-versa), indicating the importance of development organisations and the premium that can be placed on ensuring their effectiveness and impact.

1.9     The five main goals of the project are to:

- Develop an outline framework of a regional economy in order to understand the relevant actors and processes within regions;
- Summarise and evaluate existing data on both regional economies;
- Identify the sub-regional 'building blocks' of the regions, i.e. the location of economic activity and the reasons underpinning this;
- Map and assess strategic interventions in the regions in order to evaluate the effects of policy interventions on the regional economies;
- Develop a framework for measuring the impact of interventions on GDP.

1.10    Section 2 presents a conceptual framework for examining regional economies.  Chapter 3 examines the concept of GDP and regional economic growth.  Section 4 presents a picture of the current state of the two region's economies using publicly available data. Section 5 maps the economic structures of both regions.  Section 6 assesses patterns in intervention and strategy, based on consultation with agencies across the two regions.  Section 7 proposes a method for assessing the effectiveness of policy interventions with respect to GDP.  Section 8 offers conclusions from the research and highlights key issues for consideration.

# Section 2 – Modelling the Regional Economy

2.1     In order to evaluate regional economic performance it was first necessary to develop a conceptual region for analysis in order to understand the main components of a regional economy.

2.2     The framework developed, outlined in Figure 1, concentrates on endogenous factors, the internal dynamics of a regional economy; exogenous factors, the external influences on a regional economy; and policy interventions, both as individual components and in terms of how they interact and generate GDP.

**Figure 1.1: Conceptualising the Regional Economy**
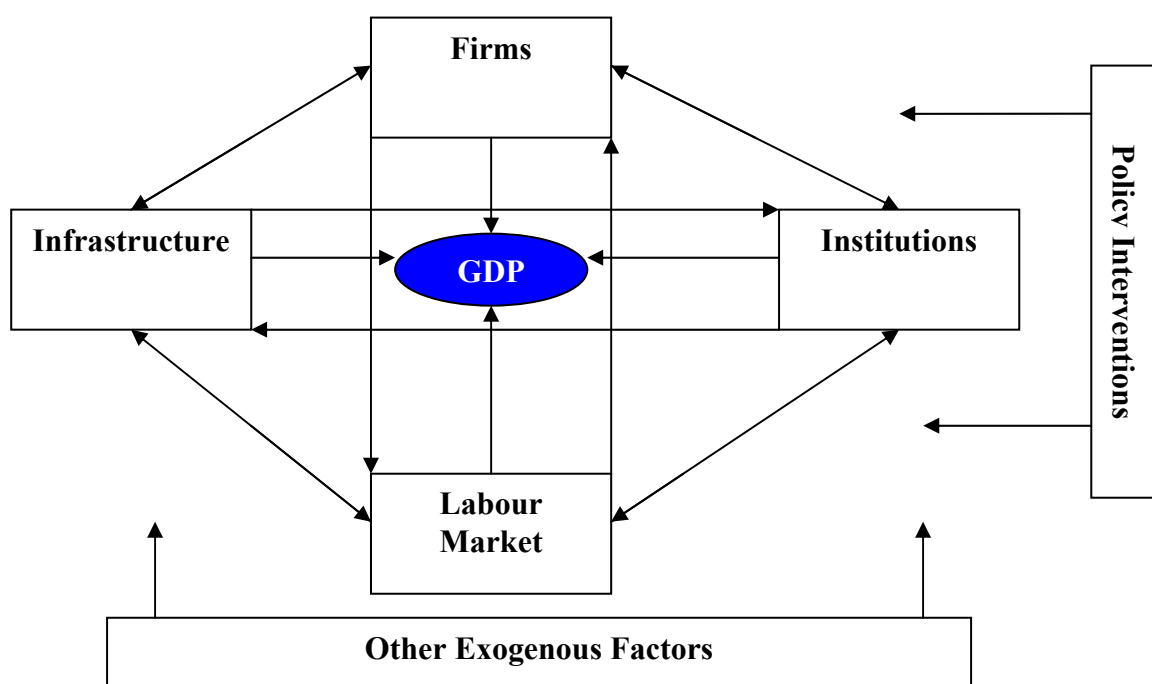


2.3     The framework proposes that a regional economy consists of four distinctive endogenous components:

    1.      Firms;
    2.      Labour (in the labour market)
    3.      Institutions;
    4.      Infrastructure.

2.4     The framework also identifies two exogenous components:

5.      Policy interventions;

6.      Other exogenous factors that are likely to affect internal dynamics.

2.5     The framework assumes that the internal components contribute to GDP <u>directly</u> in the following ways:

- Firms through output;
- The labour market through employment;
- Institutions through providing inputs and governance;
- Infrastructure through facilitating communication and determining shipment and travel costs.

2.6     The components also interact with one another within the regional economy, contributing to GDP. Although the components will be treated initially as separate they are, in fact, dependent upon not only each other but also the exogenous factors. In order to provide a simplified start point they will be examined individually to begin with, and considered in a more holistic integrated manner in the later stages of the project.

2.7     The exogenous aspects of the framework are factors that occur outside the region but directly affect the region's economy, for example domestic macroeconomic policy changes or changes in world demand for goods. Policy interventions are classified as all policies that affect the region whether they derive from local, regional, national or international sources.

2.8     Due to the fact that there are different levels of government producing policies affecting a regional economy, as noted above, it is necessary to classify them. A policy 'hierarchy' will be used to rank the policies in terms of the level of government producing them, i.e. adherence to national guidance in regional policies and adherence to national and regional guidance in local policies. Also differences between direct policies, i.e. direct interventions within and into a regional economy, and subsidiary policies involving indirect inputs will also be built into the hierarchy. This will contribute to the identification of which policies influence GDP growth.

2.9     The framework at present is simplified in order to highlight the components of a regional economy. This is useful in order to:

- Make sense of a regional economy, i.e. to develop the framework and build a working model
- Categorise data in terms of the components in order to understand what the data shows
- Model interventions in terms of the components in order to understand the results and outline their effects clearly

**Spatial dimensions of a regional economy**

2.10    The spatial dimension of regional economies is an important aspect of the model and is incorporated through development of the more detailed framework presented in Section 5 of this report.

2.11    Economic activity is not uniform across a geographic area, with levels and types of economic activity varying from location to location.  In addition, areas of economic activity do not necessarily base themselves on administrative areas – whether counties, districts or metropolitan areas – but rather on the location of economic activity.

2.12    In order to factor this consideration into the analysis, economic areas were identified and mapped based on firm and labour densities, i.e. agglomeration effects where levels of economic activity exceed a minimum threshold level.

2.13    Sub-regional economies, located around these concentrations and foci of economic activity therefore can be considered the building blocks of a region.

2.14    Section 5 of the report develops a spatial map of intensity and concentrations of economic activity across the two regions.  These maps, and the economic concentrations they identify, provide a spatial description of the two regional economies.

2.15 The spatial maps – summarised in Figures 5.1 and 5.2 and explored in detail throughout section 5 – present a view of both regions that confirms the emergence of a strong 'super-city' economy around Greater Leeds in Yorkshire & Humber, but suggests that the distribution of economic activity through other parts of that region does not always tally with administrative boundaries and travel to work areas. In the East Midlands, the maps suggest four or five rather than three 'core cities' and a strong network of local economic centres across the region.

# Section 3 – Regional GDP and GDP Growth

3.1     Calculating the value of a country's economy using GDP allows for comparisons between nations' levels of economic activity. The United Nations has established criteria that national accounts have to adhere to. Within the European Union a standard set of measures has been adopted (EU95) to provide a level of comparability between member countries. Both provide a standardised approach to national GDP accounting that enables benchmarking and comparison.

3.2     GDP is a measure of the value of the total sum of output of an economy. Changes in GDP constitute a means of measuring economic growth in terms of the total value of all outputs. GDP is an indicator of gross economic activity that indicates overall scale of economic activity. As the physical size, and hence scale of economic activity, differs considerably between countries GDP is usually divided by the population of a country in order to generate a more comparable benchmark of economic output (GDP per capita).

3.3     In the UK GDP is calculated using the 'blue book' methodology,[1] which involves calculating the value of output using three approaches:   the expenditure approach, which adds up the value of all expenditure within the

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[1] The Blue Book sets out the three main methods for calculating GDP in detail:

| | |
|---|---|
| The Income Approach: | The income approach sums all the income earned by all individuals and firms within an economy. It involves adding up income from the compensation of employees; taxes on production and imports; the gross operating surplus of private corporations and public agencies and mixed income, i.e. income from quasi corporations and subtracting subsidies. |
| The Expenditure Approach: | This approach adds up all expenditure on goods and services within an economy. It involves adding up final consumption expenditure by households and non-profit serving institutions serving households (expenditure by academic institutions, subscriptions to societies and unions and bodies serving the interests of others, i.e. charities); government expenditure; gross fixed capital formation; changes in inventories; acquisitions minus disposals of valuables, and net exports. |
| The Production Approach: | The production approach uses data from the annual production of supply and use tables for UK firms. It involves adding up the value of total output by all industries minus the sum of all intermediate consumption. Taxes on products are then added to this total and subsidies subtracted to give a final figure for GDP. This figure is also referred to as Gross Value Added (GVA) as it represents the total value of all output in the economy |

economy; the income approach, which adds up total income earned by firms and individuals; and the value added approach, which adds up the value added through the production process.

3.4 GDP in the UK is estimated by the Office for National Statistics (ONS) using a representative sample from different surveys undertaken during the year, including: the Annual Business Enquiry, income tax data, the Family Expenditure survey and the retail Sales Inquiry. By using a representative sample of actors in the economy robust estimates of GDP can be calculated and compared. The ONS seeks to use separate data for each method in order to minimise the risk of statistical discrepancy arising from over-reliance on a single or small number of data sources.

**Decomposing GDP**

3.5 The term Gross Domestic Product (GDP) is used to describe the output of an economy in money terms. As it is used to put a value on the total output of an economy its calculation involves adding up the value all outputs. It can be regarded as an accounting measure, therefore, as it is not analysing the processes and drivers of economic activity *per se*.

3.6 The standard equation representing GDP utilises the expenditure approach, and states that GDP is equal to: (i) total consumption expenditure (C), plus (ii) total government expenditure (G), plus (iii) total investment, plus (iv) total net exports (the value of exports minus the value of imports):[2]

$$Y = C + I + G + (X-M) \qquad\qquad (1)$$

3.7 Consumption refers to all expenditure on goods and services within the economy, investment includes all private sector investment, government expenditure refers to expenditure by all levels of government and government agencies and net exports refers to the trade balance.

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[2] In the standard neo-classical model where GDP is equal to $Y = C + I + G + (X-M)$, consumption is a function of disposable income, that is, total income minus taxes. Thus: $C = C(Y-t)$ or $C = Y(1-t)$, where C equals consumption and t equals proportion of income paid in tax. Therefore as the tax level changes so does consumption. Investment is a function of the interest rate, r, thus $I = I(r)$, where I equals investment and r equals the interest rate. Therefore changes in the interest rate cause changes in the level of investment. The main point the neo-classical model makes is that consumption and investment are determined by taxation and the interest rate respectively.

**Rebasing GDP for a region**[3]

3.8     Increased interest in regional economies and regional economic policy has led to the extension of the concept of GDP to a region.[4]

3.9     Using the current methodology, regional GDP is not measured directly but is an approximation based on relative regional shares of total economic activity. National GDP is apportioned to the 9 UK regions using proportional weighting. Estimating regional GDP in this way involves examining the income generated by industry groups and assessing the distribution of these groups across the regions. In consequence, this 'top down' method can be viewed as an estimate of an estimate, in that national GDP figures are estimated from a 'basket' of other data sources and regional figures are then allocated based on proportional shares of economic activity, measured sectorally.

3.10    Using a sectoral measure to apportion national GDP to regions has two further disadvantages: (1) it will not necessarily reflect divergences within regions between firm behaviour and expenditure by other economic actors (consumers, government); (2) sectoral output is not necessarily uniformly correlated with levels of expenditure, including investment (i.e. ROI may vary from sector to sector as well as from regional sector to regional sector).

3.11    Using an 'estimate of estimates' approach to calculating regional GDP from the 'top-down' produces the possibility of compounded calculation problems and distortions. This suggests a need to assess how regional GDP is

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[3] Regional GDP is measured using the income approach as the ONS argues the data is more widely available and can be apportioned to regions more accurately. This method involves adding up the components listed in note 1, (compensation of employees, gross operating surpluses of private corporations and public agencies and mixed income), using a representative sample of all individuals and firms and then allocating them to the different regions based on the residence of the actor. Thus, if the GDP generated by firms in the steel industry was estimated to be £10bn and 10% of these firms were in the East Midlands and 15% were in Yorkshire and Humber then the £1bn would be allocated to the East Midlands and £1.5bn to Yorkshire and Humber. Therefore it is calculated using an estimate of an estimate.

[4] Evidence for the increased interest in regional economies is provided by the explicit focus of the UK government and the European Union on regional policies such as promoting regional development agencies within the UK regions and the EU's Objective 1,2 and 3 programmes for harmonising regional economic development. HM Treasury publications such as Productivity in the UK: 3 – The Regional Dimension (2001) and Productivity in the UK: 4 – The Local Dimension (2003), highlight the increased interest in sub-national economic development among government policymakers. The work of academics such as Michael Porter, Michael Storper and Allen Scott *inter alia* has also served to focus on regional economies.

measured and explore alternative approaches that have the potential to reflect regional economic activity more precisely.

3.12    Having defined national GDP in the previous sub-section, one approach would be to apply the standard definition used nationally at the regional level. In this instance, the geographic unit merely changes from a nation state to a region within a nation state.[5] Therefore regional GDP can be represented by the following equation, where: r = geographic unit (i.e. region):

$$Y_r = C_r + I_r + G_r + (X-M)_r \qquad\qquad (2)$$

3.13    Regional GDP growth is then equal to changes in $Y_r$;, as follows:

$$\text{GDP Growth} = dY_r = dC_r + dI_r + dG_r + d(X-M)_r \qquad\qquad (3)$$

**Issues in Measuring Regional GDP using the National GDP Formula**

3.14    Measuring regional GDP by applying the national approach to economic accounting to the regional level may be constrained, for the following reasons:

- Regional GDP measures for the UK can be regarded as 'estimates of estimates' as their calculation uses a top down method that estimates GDP for the UK as a whole and then apportions it regionally.[6] This

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[5] Nomenclature Units for Territorial Statistics (NUTS) regions are the geographic units for analysis used throughout the European Union for regional statistics. NUTS regions are divided into a hierarchy of three types; NUTS 1 regions, which are the largest sub-regions within a country and is equivalent to a government office region in the UK; NUTS 2, which is equivalent to a county in the UK; and NUTS 3, which are equivalent to a city or a number of local authority districts in the UK. Despite the existence of three levels of region, it is usually NUTS 1 regions which are the focus of regional economic development and the Allsopp Report recommended that the NUTS 1 region be the standard sub-national unit of analysis. In the UK there are 12 NUTS 1 regions, 37 NUTS 2 regions and 133 NUTS 3 regions [for further information on UK NUTS regions see www.statistics.gov.uk/geography/nuts.asp]. Table 1 outlines the parameters for NUTS regions in terms of population.

| Table 1 Parameters for NUTS Regions | | |
|---|---|---|
| Level | Minimum Population | Maximum Population |
| NUTS 1 | 3,000,000 | 7,000,000 |
| NUTS 2 | 800,000 | 3,000,000 |
| NUTS 3 | 150,000 | 800,000 |

[6] Regional GDP is measured using the income approach as the ONS argues the data is more widely available and can be apportioned to regions more accurately. This method involves adding up the income from different data sources and then using a representative sample of individuals and firms to allocate income to the different regions based on presence and population. Thus, if the GDP generated by firms in the steel industry was estimated to be £10bn and 10% of these firms were in the East

approach has been criticised by the Allsopp Review[7] and the Office for National Statistics (ONS) has undertaken a review of the current methodology as a result.

- The concept of national and regional GDP outlined so far does not include actors or the activities they undertake within the economy, but focuses on measures of this activity (income, expenditure). Understanding the dynamics, processes and drivers of GDP growth requires an understanding of the economic activities, i.e. who a region's economic actors are and what they do. Adding up the value of output and comparing it to the previous year's figures does not show how or why GDP is growing, and provides little insight into which aspects of dimensions of economic activity are driving increases in GDP.

- A shift away from using accounting measures of regional GDP to more direct assessments of the activities of economic actors increases understanding of the ways in which GDP is constituted and how it changes. A focus on regional GDP based on actors can help regional policymakers to identify and determine where and how they can intervene in a regional economy, and improve regional GDP growth. A conceptual model of a region identifying the key regional actors/components is required to do this; targets for policy interventions and their effectiveness can then be evaluated.

- There is also a question over the nature of interventions. The present view of GDP outlined by equations (1) and (2) for a nation and a region respectively offers a broad view of the expenditure or income components

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Midlands and 15% were in Yorkshire and Humber then £1bn would be allocated to the East Midlands and £1.5bn to Yorkshire and Humber. This is why regional GPD figures are described as being calculated using an estimate of an estimate.

[7] The Allsopp Review of Statistics for Economic Policymaking (2004) stated that present estimates of regional GDP are not of 'sufficient quality' and suggested a number of recommendations for generating data on regional economies.

- The regional accounts should be incorporated into the national accounts framework to increase the quality of the data
- Baseline regional GDP estimates based on the production approach should be produced annually
- If there is sufficient demand from regional policymakers for quarterly estimates of GDP these might be provided by the ONS as part of their commitment to upgrading the quality of this data
- The cost of obtaining good quality data on trade patterns between regions would be too costly and prove hard to implement in terms of asking firms to record this information

The Association of regional Observatories produced a report looking at identifying data needs to support regional policy to submit to the ONS's Statistics for Regional Policy Working Group. This report also called for the publishing of quality data on regional GDP/GVA and suggested increasing the presence of ONS/GSS staff in regional agencies in order to produce this data. The report also argued for the need for data on inter-regional trade.

of GDP. However, these terms refer to a wide range of activities by different actors. Consumption, for example, describes a wide range of expenditure by different groups within the economy. Similarly, the term government expenditure does not outline what the money is spent on, how this may influence the economy, and which tier of government is responsible.

- Different economic policies are determined by different tiers of government; for example taxation and interest rates are set at the national level and regional policymakers have to accept these are relatively exogenous factors[8]. Also the disparities that exist between regional economies may be the result of different endowments of resources, economic strengths and structural weaknesses, therefore using broad terms and assuming that economies are homogenous may not assist the evaluation of GDP growth[9].

**Mapping and Modelling Regional GDP Growth**

3.15    The Blue Book methodology for measuring regional GDP highlights two components to economic activity that can be placed at the heart of a framework for describing regional economies: firms and individuals[10].

3.16    The conceptualisation of a region used in this report uses the Blue Book methodology for calculating GDP as a starting point in that it includes firms and individuals as the two primary components. Added to this are institutions and infrastructure to complete the conceptualisation of a region. Therefore the conceptual region has four components, firms, the labour market (individuals),

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[8] Consumption and investment are determined by tax and interest rates respectively. As these are set centrally for the whole economy then for regional policymakers they are exogenous factors. However, they may still affect the growth of regional GDP as any changes in the level of taxation or the interest rate will affect consumption and investment at a regional level. Therefore the level of consumption and expenditure within a region may, to some extent, be determined by national policy. Regional policymakers are, however, able to influence the 'geography' of consumption and investment through encouraging firms and individuals to consume and invest locally in order to increase local GDP.

[9] Standard neo-classical theory assumes economies are homogenous and only differ in the level of capital present. For example, Solow's growth model suggests that growth in output is a function of the growth in capital, therefore if regions differ on the level of capital they contain then they will have different rates of growth. However, in reality regions differ by more than just the level of capital, but by factors such as the size and growth of the labour force, the skills of the workforce, industrial accommodation for firms and access to national and international markets via road, rail, sea and air links.

[10] The income based approach used to calculate regional GDP explicitly includes individuals and firms as the actors in the regional economy as it calculated GDP from the compensation of employees and the gross operating surpluses of private corporations and public agencies.

institutions and infrastructure. These components undertake the following activities within the regional economy:

- Firms consume goods and services in a region as well as invest in a region.
- Individuals within the labour market consume goods and services within a region.
- Institutions procure goods and services in a region as well as investing in regional infrastructure.
- Infrastructure enables the regional economy to function through providing accommodation for firms, transport links and communication facilities.

3.17   Based on the conceptual region outlined above, the functions of each component indicate that regional GDP can be described by the following equation:

$$Y_r = (PC_r + FC_r) + (FIN_r + IIN_r) + (INP_r + INF_r) + (X-M)_r \qquad (4)$$

Where:

| | |
|---|---|
| $PC_r$ | personal consumption expenditure by individuals in region r |
| $FC_r$ | Firms' consumption expenditure in region r |
| $FIN_r$ | net investment by firms in region r |
| $IIN_r$ | net inward investment into region r |
| $INP_r$ | net institutional procurement in region r |
| $INF_r$ | expenditure on infrastructure in region r |
| $(X-M)_r$ | net exports (national and international) from region r |

3.18   Equation (5) rearranges this equation in terms of equation (1) and shows that the two equations are equivalent

$$Y_r = C(P_r + F_r) + I(IF_r + IN_r) + 'G'(INP_r + INF_r) + NX_r \qquad (5)$$

Where:

$C(P_r+F_r)$        consumption expenditure by individuals and firms in region r

$I(IF_r+IN_r)$       net investment by firms in region plus net inward investment

'G'$(INP_r+INF_r)$   government spend - procurement plus infrastructure expenditure

$NX_r$         net inward investment into region r

3.19    Thus, regional GDP growth is described as a positive change in these components and is formalised in the equation below:

$$dY_r = dPC_r + dFC_r + dFIN_r + dIIN_r + dINP_r + dINF_r + d(X-M)_r \qquad (6)$$

3.20    Using these components can clearly show how economic activity is translated into changes in GDP growth at a regional level. For example, if personal consumption within a region were to increase, then GDP would also increase and vice versa, *ceteris paribus.* In terms of policy, this provides a tool for analysing which of these components is likely to be affected by a policy initiative and examine the likely effects on GDP. Thus, this approach links economic activity to GDP growth in terms of behaviour of actors within a region and shows the effects of interventions.

3.21    There are, however, challenges to using this approach to measuring GDP at the regional level:

**Consumption:**    Individuals and firms within a region may not undertake all their expenditure within one region therefore there is a need to model out of region expenditure by individuals and firms resident in the region and expenditure within the region by individuals and firms resident outside the region.

| | |
|---|---|
| **Government spending:** | In terms of government expenditure a distinction needs to be made between expenditure by central government departments and agencies on procurement and 'national' policies/projects within a region and expenditure by regional and local government agencies on procurement and policies/projects within the region. |
| **Net Exports:** | In terms of net imports/exports, data exists for international trade but not inter-regional trade. Therefore there is a need to incorporate a measure of out of region (UK) expenditure, although this was rejected by the Allsopp review as too expensive. |

**Conclusions and Implications**

3.22    National measures of GDP are not wholly appropriate for assessing regional GDP because of: (i) critiques of the calculation method; (ii) a lack of data at the regional level on trade/net exports; and (iii) the lack of consideration of the dynamics of GDP generation and growth, i.e. it is an accounting measure rather than a reflection of actors and activities.

3.23    Regional GDP can be re-framed, by modifying established approaches, so that it is based on the following dynamics:

(i)      Personal consumption within the region by individuals (resident and travelling in);

(ii)     Consumption of expendables and services in the region by firms (resident and travelling in);

(iii)    Investment within the region by indigenous firms;

(iv)    Inward investment into the region by firms located elsewhere

(v)     Non-private (public, charitable, third sector) expenditure in the region;

(vi)    Non-private investment in physical capital and infrastructure within the region.

3.24    GDP growth is the net positive change in GDP, which should be real to represent substantive growth, i.e. above inflation.    Therefore, regional strategies to raise GDP are based, at the margin, on increasing <u>at least</u> one of the six drivers of GDP outlined in 2 above.

3.25    Regional strategy has the option of intervening to encourage increased activity across one, some, or all six areas (and to prevent decline in activity across all areas).

3.26    The implications for regional GDP growth are as follows:

- A more explicit focus on the six sources as the basis for intervention.
- The opportunity for a regional GDP growth strategy outlining intervention strategies and rationales as well as anticipated and predicted impacts and outcomes against the six sources.
- A wider decision on the GDP growth strategy, i.e. scope for intervention and areas of intervention.
- A need for regional measures of growth that (i) are appropriate, (ii) reflect GDP generation and growth and (iii) deal with data collection issues and gaps, particularly in the net export data and inter-regional trade flows.

# Section 4 – Review of Existing data

4.1    This section examines regional level data in order to analyse the state and trends within the two region's economies. This review was undertaken initially in 2004 and updated in 2005 and 2006.  Wherever available, trend data were used to overcome 'snap-shot' analysis based on one or a small cluster of years.

4.2    Data were collected from public sources, mainly the Office for National Statistics (ONS), which is responsible for collecting and publishing regional statistics, as well as HM Treasury, the Department for Trade and Industry (DTI), HM Revenue and Customs, as well as the two regional development agencies, emda and Yorkshire Forward.

4.3    While this section attempts to provide an extensive overview of the regions it must be noted that there are a number of official sources which offer a broader perspective on the two regions. The ONS, HM Treasury, DTI, Emda and Yorkshire Forward have published these overviews and they are readily available should a more in depth look be required. The purpose of this section is not to replicate these publications but to offer a summary of the main indicators in order to provide some context.

4.4    As well as offering a summary, paragraphs 4.45 to 4.56 provide a commentary on the usefulness of the data, highlighting gaps and potential changes to data collection that may aid economic policymaking in the regions.

**Demographics**

4.5    This first section considers the demographics of the two regions in order to examine population size, population dynamics and population structure.

4.6    The population in the East Midlands in 2004 was 4,279,700 and 5,038,800 in Yorkshire and Humber [Nomis]. Table 4.1 examines the rate of population growth in the two regions between 1981 and 2004.

**Table 4.1: Population Growth**

|  | Percentage Change in Population (East Midlands) | Percentage Change in Population (Yorkshire and Humber) |
|---|---|---|
| 1981-1986 | 1.43 | -0.71 |
| 1986-1991 | 2.65 | -0.57 |
| 1991-1996 | 2.41 | -0.28 |
| 1996-2001 | 1.98 | 0.35 |
| 2001-2004 | 2.15 | 0.64 |
| 1981-2004 | 11.08 | 2.45 |

4.7　　Table 4.1 shows that the populations of the two regions have been growing during the period 1981-2004. However, the growth rate in the East Midlands is substantially higher than Yorkshire and Humber, which experienced a decline in population between 1981 and 1996; and a total overall growth from 1981 to 2004 of only 2.45%. The East Midlands' population, in contrast, grew by just over 11% over the same period.

**Table 4.2: Population Age Structure 2004**

|  | East Midlands | Yorkshire and Humber |
|---|---|---|
| 0-15 | 18.01 | 18.34 |
| 16-24 | 12.95 | 13.62 |
| 25-34 | 12.33 | 12.42 |
| 35-44 | 15.33 | 14.98 |
| 45-54 | 12.99 | 12.80 |
| 55-64 | 12.14 | 11.63 |
| 65+ | 16.26 | 16.21 |

4.8　　Table 4.2 shows that the age structure of the in the two regions is similar. The working age population (16-64) within each region was 65.73% of the East Midlands population in 2004 compared with 65.45% in Yorkshire and Humber. The East Midlands working age population is slightly older than in Yorkshire and Humber: 25.28% were between 16 and 34, compared with 26.04% in Yorkshire and Humber. Conversely, 40.46% were aged 35 to 64 in the East Midlands, compared with 39.41% in Yorkshire and Humber.

**Economic Performance**

4.9 The main indicator for measuring economic performance is GDP (as noted in Section 3). These statistics give a broad view of the value of regional economies.

**Table 4.3: GDP (Total and Per Capita)**

|  | **East Midlands (£b)** | **GVA per capita** | **Yorkshire and Humber** | **GVA per capita** |
|---|---|---|---|---|
| 1989 | 30,313 | 7,624 | 35,321 | 7,190 |
| 1990 | 32,746 | 8,201 | 38,244 | 7,772 |
| 1991 | 34,124 | 8,507 | 39,968 | 8,097 |
| 1992 | 35,585 | 8,815 | 41,496 | 8,385 |
| 1993 | 37,310 | 9,199 | 43,276 | 8,735 |
| 1994 | 39,479 | 9,696 | 45,491 | 9,171 |
| 1995 | 41,685 | 10,188 | 48,002 | 9,677 |
| 1996 | 44,270 | 10,776 | 50,916 | 10,263 |
| 1997 | 46,869 | 11,375 | 53,773 | 10,847 |
| 1998 | 49,085 | 11,878 | 56,532 | 11,403 |
| 1999 | 50,879 | 12,253 | 58,363 | 11,776 |
| 2000 | 52,864 | 12,683 | 60,535 | 12,208 |
| 2001 | 55,828 | 13,325 | 63,732 | 12,806 |
| 2002 | 58,908 | 13,950 | 67,456 | 13,510 |
| 2003 | 62,434 | 14,682 | 71,533 | 14,284 |
| 2004 | 65,770 | 15,368 | 75,219 | 14,928 |

4.10 The East Midlands regional economy was worth over £65 billion in 2004, while the Yorkshire and Humber regional economy was worth over £75bn. On a per capita basis the figures were £1,368 and £14,928 respectively. Therefore, despite the fact that the Yorkshire and Humber economy is larger overall, the East Midlands is richer per person.

4.11 Table 4.3 shows that GDP has been increasing in both regions between 1989-2004 per capita, indicating that the two regional economies are growing year on year.

**Table 4.4: GDP per Head Index**

|  | East Midlands | Yorkshire and Humber |
|---|---|---|
| 1989 | 96 | 91 |
| 1990 | 96 | 91 |
| 1991 | 95 | 91 |
| 1992 | 95 | 90 |
| 1993 | 94 | 89 |
| 1994 | 94 | 89 |
| 1995 | 94 | 90 |
| 1996 | 94 | 90 |
| 1997 | 94 | 90 |
| 1998 | 93 | 89 |
| 1999 | 92 | 88 |
| 2000 | 91 | 88 |
| 2001 | 91 | 88 |
| 2002 | 91 | 88 |
| 2003 | 91 | 88 |
| 2004 | 91 | 89 |

4.12 However, indexed GDP per capita indicates that the UK as a whole has been growing markedly more than the East Midlands and slightly ahead of Yorkshire & Humber (Table 4.12). By 2004 the East Midlands regional economy was 91% of the UK level - down from 96% in 1992 - while Yorkshire and Humber was 89% of the UK level (from 91%).

4.13 Indexing regional GDP per capita against the rest of the UK shows that despite the fact that GDP has been increasing during the period there has been a divergence from the UK as a whole. The economies of the two regions are falling behind the country.

4.14 Table 4.5 presents GDP data for the sub-regions that comprise the Yorkshire and Humber region. The data show that while the region may under perform when compared with the UK as a whole, there are pockets of affluence, i.e. Leeds and York where GDP per capita is 120% and 115% of the UK level respectively. These affluent areas contrast sharply with other deprived sub-

regions such as East Riding of Yorkshire and Barnsley Rotherham and Doncaster which have GDP per capita which are less 75% of the UK as a whole. The deprivation is spread across urban centres and more rural areas.

**Table 4.5: Sub Regional GDP (2003)**

| Sub region | GDP per Capita (current prices) | GDP per Capita index (UK=100) |
|---|---|---|
| Leeds | 19392 | 120 |
| York | 18512 | 115 |
| City of Kingston upon Hull | 14860 | 92 |
| Sheffield | 14487 | 90 |
| North and North East Lincolnshire | 14462 | 90 |
| North Yorkshire CC | 14127 | 88 |
| Calderdale, Kirklees and Wakefield | 13326 | 83 |
| Bradford | 13288 | 82 |
| East Riding of Yorkshire | 11782 | 73 |
| Barnsley, Doncaster and Rotherham | 11002 | 68 |

**Table 4.6: Sub Regional GDP (2003)**

| Sub region | GDP per Capita (£) | GDP per Capita index (UK=100) |
|---|---|---|
| Nottingham | 21,285 | 132 |
| Derby | 19,831 | 123 |
| Leicester | 18,036 | 112 |
| Northamptonshire | 16,834 | 104 |
| Leicestershire CC and Rutland | 14,198 | 88 |
| South and West Derbyshire | 13,065 | 81 |
| Lincolnshire | 12,489 | 77 |
| North Nottinghamshire | 12,173 | 75 |
| East Derbyshire | 12,027 | 74 |
| South Nottinghamshire | 11,590 | 72 |

4.15    Table 4.6 presents GDP data for the sub-regions that make up the East Midlands region. In contrast to Yorkshire and Humber there is a marked split

between the urban centres and rural areas. Cities and urban areas such Nottingham, Derby, Leicester and Northampton all out perform the UK in terms of GDP, i.e. above 100 on the index. Nottingham in particular appears to be outperforming the UK as GDP per capita is almost one-third higher than the UK level. In contrast the rural areas of the region suffer from below average levels of GDP.

**Labour Market Statistics**

4.16    This section examines data on employment, economic activity rates, skills and qualifications to provide a brief overview of the regional labour markets in both regions.

**Table 4.7: Employment and Unemployment 2005**

|  | **East Midlands** | **Yorkshire and Humber** | **UK** |
|---|---|---|---|
| Economic Activity Rate | 79.0% | 77.5% | 78.1% |
| Economic Inactivity Rate | 21.0% | 22.5% | 21.9% |
| Unemployment rate | 4.3% | 4.4% | 4.8% |

*As a proportion of working age population (2005)*

4.17    Within the East Midlands region 79% of the working age population are economically active. In Yorkshire and Humber the figure is slightly lower as 77.5% of the working age population are economically active.

4.18    The economic activity rates in the two regions do not differ substantially from the UK as a whole. In the East Midlands the economic activity is slightly above the UK and economic activity slightly below. For Yorkshire and Humber this pattern is reversed.

4.19    Unemployment in both regions is below that of the UK as a whole; 4.3% of the working age population were unemployed in the East Midlands in 2005 and 4.4% in Yorkshire and Humber, compared with a figure of 4.8% for the UK as a whole.

**Figure 4.1: Qualifications in the East Midlands Region 2004**
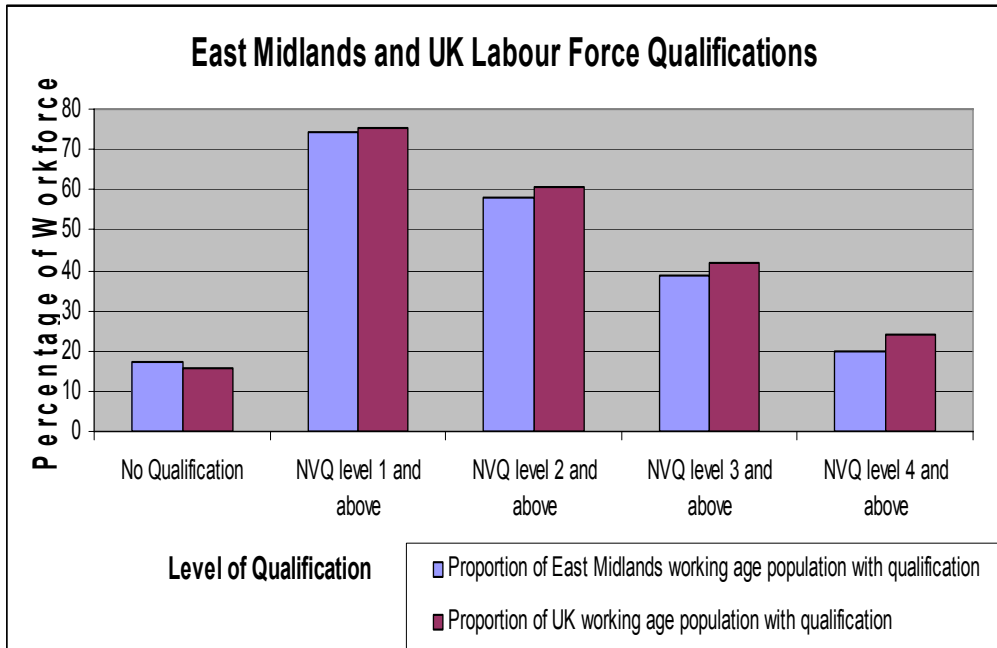


*Source: NOMIS (Local Area Labour Force Survey)*

4.20    Figure 4.1 shows that the working population of the East Midlands tend to have lower qualifications than the UK as a whole. There is also a larger proportion of the East Midlands workforce with no qualification.

**Figure 4.2: Qualifications in Yorkshire and Humber 2004**
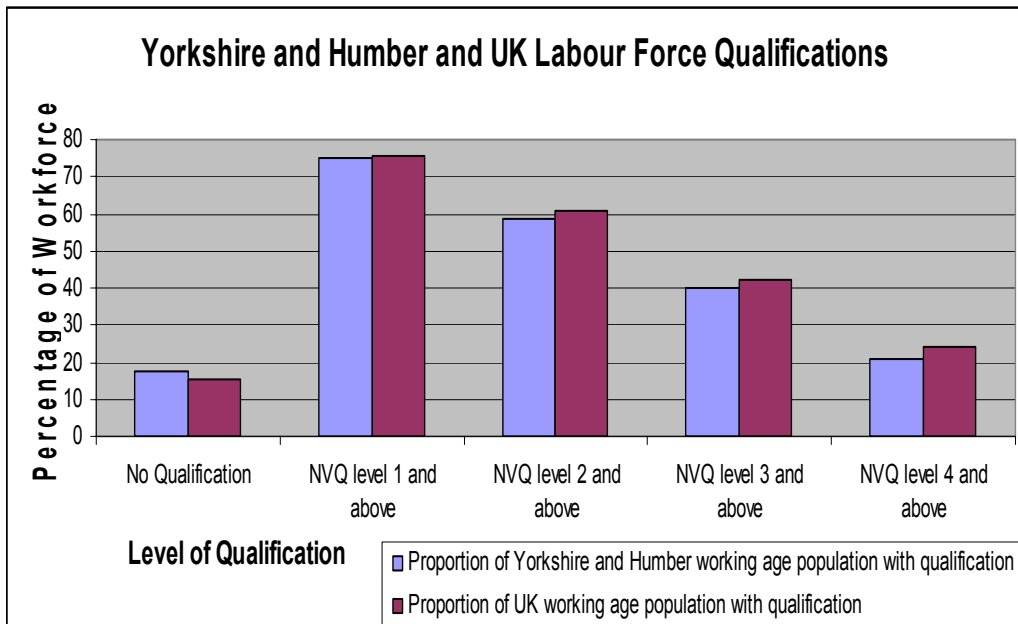


*Source: NOMIS (Local Area Labour Force Survey)*

4.21    Figure 4.2 shows the Yorkshire and Humber labour force possess fewer qualifications than the UK as a whole. As with the East Midlands, there are a higher proportion of the working population with no qualifications that in the UK as a whole.

4.22    Employment rates and qualifications provide a picture of participation in the labour market. It is also useful to examine the types of jobs available in each region in order to assess the quality of jobs. Table 4.8 outlines the occupational breakdown of the two regions.

**Table 4.8: Occupational Breakdown of Regional Workforce (2003)**

| Percentage of Regional Workforce in: | East Midlands | Yorkshire and Humber | UK |
|---|---|---|---|
| SOC Groups 1-3<br>• Managers and Senior Officials<br>• Professional Occupations<br>• Associate Professional and Technical Occupations | 34.9 | 34.6 | 39.7 |
| SOC Groups 4-5<br>• Administrative and Secretarial Occupations<br>• Skilled Trades Occupations | 24.9 | 24.9 | 24.6 |
| SOC Groups 6-7<br>• Personal Service Occupations<br>• Sales and Customer Service Occupations | 15.2 | 16.6 | 15.3 |
| SOC Groups 8-9<br>• Process, Plant and Machine Operatives<br>• Elementary Occupations | 25.1 | 23.9 | 20.4 |

*Source: NOMIS (Local Area Labour Force Survey)*

4.23    The two regions have a higher proportion of manual and elementary occupations and a lower proportion of professional occupations than the UK as a whole. This suggests the quality of the jobs within the region is lower than average and could be the result of the low skilled workforce and be partly responsible for lower levels of GDP per capita.

4.24    Regional productivity rates are outlined in Table 4.9, below, and show that the two region's labour force is consistently less productive than the UK average.

**Table 4.9: Regional Productivity Rates 1998 – 2004**

| Year | GVA Per Hour worked East Midlands (UK =100) | GVA per hour Worked (UK=100) Yorkshire and Humber |
|------|---------------------------------------------|---------------------------------------------------|
| 1998 | 95.0 | 93.4 |
| 1999 | 93.9 | 94.1 |
| 2000 | 94.8 | 94.1 |
| 2001 | 96.6 | 94.7 |
| 2002 | 97.1 | 93.0 |
| 2003 | 96.8 | 92.2 |
| 2004 | 98.5 | 91.4 |

4.25    Productivity, in terms of GVA per hour worked, in the East Midlands was 98.5% of the UK in 2004. The workforce is less productive in Yorkshire and Humber as productivity was 91.8% of the UK level.

4.26    Table 4.9 shows that while productivity in the East Midlands is below the UK level it does exhibit an upward trend and there is evidence of divergence with the UK.

4.27    Productivity rates in Yorkshire and Humber exhibit a downward trend over the period suggesting there is substantial divergence with the rest of the UK.

**Firm Registrations**

**Table 4.10: VAT Registered Firms in the East Midlands 1994 – 2004**

|  | **Total VAT registered Firms** | **Firms per 10,000 population** | **Percentage Change in Total Firms** |
|---|---|---|---|
| 1994 | 111,125 | 272.92 | -0.36 |
| 1995 | 110,860 | 270.94 | -0.24 |
| 1996 | 111,290 | 270.90 | 0.39 |
| 1997 | 113,120 | 274.54 | 1.62 |
| 1998 | 115,215 | 278.80 | 1.82 |
| 1999 | 116,865 | 281.44 | 1.41 |
| 2000 | 118,610 | 284.57 | 1.47 |
| 2001 | 120,205 | 286.91 | 1.33 |
| 2002 | 122,405 | 289.86 | 1.80 |
| 2003 | 124,300 | 292.31 | 1.52 |
| 2004 | 125,170 | 292.47 | 0.70 |

4.28    In 2004 there were over 125,000 VAT registered firms in the East Midlands in 2004, which represents a 12.61% increase on 1994 (Table 4.10).

4.29    There are 292.47 firms per 10,000 people in the region, fewer than the UK average of 312.95.

4.30    Firm registrations have grown over the period 1994-2004, although there was a decline in 1994 and 1995 as the effects of the recession of the early 1990s could still be felt. It is also apparent that growth in the firm population has been slowing since 2002.

**Table 4.11: VAT Registered Firms in Yorkshire & Humber 1994 – 2004**

|  | Total VAT registered Firms | Firms per 10,000 population | Percentage Change in Total Firms |
|---|---|---|---|
| 1994 | 121,535 | 245.03 | -0.82 |
| 1995 | 120,220 | 242.35 | -1.10 |
| 1996 | 120,635 | 243.15 | 0.35 |
| 1997 | 121,890 | 245.86 | 1.03 |
| 1998 | 123,435 | 248.98 | 1.25 |
| 1999 | 124,605 | 251.41 | 0.94 |
| 2000 | 125,835 | 253.77 | 0.98 |
| 2001 | 126,630 | 254.45 | 0.62 |
| 2002 | 127,870 | 256.09 | 0.97 |
| 2003 | 130,345 | 260.21 | 1.90 |
| 2004 | 130,950 | 259.88 | 0.46 |

4.31   There were over 130,000 VAT registered firms in Yorkshire and Humber in 2004, which represents a 7.7% increase on 1994.

4.32   There are 259.88 firms per 10,000 people in the Yorkshire and Humber region, fewer than the UK average of 312.95.

4.33   Table 4.11 shows that firm registrations increased in Yorkshire and Humber between 1994 and 2004, although this growth has been slower than in the East Midlands. Despite having a larger overall stock of firms, there are fewer firms per 10,000 people in Yorkshire and Humber than in the East Midlands.

**Regional Trade**

4.34   International trade data highlight the contribution made to a regional economy by imports and exports. A positive trade balance will add to a region's economic growth, as income will be flowing into a region.  Conversely, a negative trade balance will have a negative effect on a regional economy as it represents income flowing out of the region.

**Table 4.12 East Midlands Trade Balance**

|  | Value of Total Imports (£m) | Value of Total Exports (£m) | Trade Balance (£m) |
|---|---|---|---|
| 1999 | 10,271 | 11,903 | 1632 |
| 2000 | 10,869 | 12,448 | 1579 |
| 2001 | 12,073 | 13,561 | 1488 |
| 2002 | 12,275 | 12,864 | 589 |
| 2003 | 12,599[11] | 14,196[1] | 1597 |
| 2004 | 6,095[12] | 6,495[2] | 400 |

4.35 The trade balance for the East Midlands was over £1.5 billion in 2003, and was £400 million in 2004; the latest year for which complete data are available.

4.36 Table 4.12 shows that the East Midlands had a positive trade balance between 1999 and 2004. Therefore international trade makes a positive contribution to the economy.

**Table 4.13 Yorkshire and Humber Trade Balance**

|  | Value of Total Imports (£m) | Value of Total Exports (£m) | Trade Balance (£m) |
|---|---|---|---|
| 1999 | 8980 | 7837 | -1143 |
| 2000 | 10,697 | 8779 | -1918 |
| 2001 | 10,259 | 8901 | -1358 |
| 2002 | 10,662 | 9077 | -1585 |
| 2003 | 11,253[13] | 9357[3] | -1896 |
| 2004 | 5883[14] | 4809[4] | -1074 |

4.37 By contrast, Yorkshire and Humber had a negative trade balance of over £1bn in 2004; the latest year for which complete data are available.

4.38 Table 4.13 highlights the fact that Yorkshire and Humber had a negative trade balance for the entire period 1999-2004.

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[11] provisional data subject to revision
[12] provisional data for Q1 and Q2 only

[13] provisional data subject to revision
[14] provisional data for Q1 and Q2 only

**Summary**

4.39    Table 4.14 provides a summary of findings based on the main indicators considered to analyse both regions.

**Table 4.14: Summarising the Indicators**

| Indicator | East Midlands | Yorkshire and Humber |
|---|---|---|
| GDP per capita | • Generally lags the UK as a whole.<br>• Major cities have substantially higher GDP per capita than the UK. | • Generally lags the UK as a whole.<br>• Some pockets of affluence, e.g. Leeds and York |
| Economic Activity Rate | • Economic activity rates are higher than the UK average | • Economic activity rates lower than the UK average |
| Unemployment | • Unemployment is lower than the UK average | • Unemployment is lower than the UK average |
| Qualifications | • Labour force possess fewer qualifications than the national average | • Labour force possess fewer qualifications than the national average |
| Productivity | • Productivity rates are 98.5% of the UK level | • Productivity rates are 91.8% of the UK level |
| VAT registered Firms per 10,000 people | • Lower than the UK average | • Lower than the UK average |
| Trade Balance | • Positive trade balance | • Negative trade balance |

4.40    On many of the main indicators the two regions lag the rest of the UK. Per capita GDP shows an upward trend but is below the UK average, in the following ways:  the workforce in each region is less qualified; productivity is lower, possibly as the result of a lack of qualifications; the stock of VAT registered firms is increasing but is still lower than the UK average; and unemployment is below the national average in both regions.

4.41    Overall the East Midlands economy performs slightly better than Yorkshire and Humber economy does. GDP per capita is higher - driven by several high

performing cities. In addition, productivity and economic activity rates are higher, unemployment is slightly lower, and there is a positive trade balance.

4.42 GDP is increasing in both regions. However, there is still divergence from the overall UK performance, which suggests that growth is not as high as UK trend growth.

4.43 The data provide a useful snapshot of the economies and highlights some interesting results. While the regions lag the rest of the UK in terms of GDP there are cities within both regions that have higher levels of GDP. This poses the question as to why cities have higher levels of GDP per capita.

4.44 The data also highlight the relevant policy issues in each region, i.e. the need to: increase skills and qualifications for productivity; encourage businesses to locate in the region; stimulate higher levels of start ups; and encourage more firms to export their output.

**Assessing the data**

4.45 There is a wide range of data available at the regional level that provides a reasonable benchmark for the regional economies. The data is readily available and easily obtainable. However, some of the data collection only started in the late 1990s creating a short time series that does not cover the period before this. Thus, it would not be controversial to claim that regional data collection is still in its early stages.

4.46 Increased activity in terms of regional policymaking since 1997 has increased the need and demand for relevant data to inform policy choices. It is essential this data is wide ranging in that it covers a number of policy targets in order to inform a broad set of policy decisions.

4.47 A large proportion of the analysis undertaken by regional policymakers seeks to understand the relationship between variables. The aim is to make inferences between variables in order to understand a problem and analyse the likely effects of a problem. Therefore robust and accurate data are required for accurate forecasting.

4.48    A continuous set of high quality, accurate, data will enable a base of information to be built up, at regional and sub-regional levels, that can be used to inform policy thinking, development, implementation and monitoring.

4.49    The reliability of regional data has been questioned among policymakers and subject to official investigation and review by Christopher Allsopp. GDP data is one of the key indicators which has come under scrutiny with respect to its accuracy. The problem is that GDP for smaller local areas is an estimate of an estimate. The methodology is geared up for measuring GDP at a national scale.    Therefore producing equivalent data for smaller territorial units involves apportioning estimated GDP to regions based on their share of industry.

4.50    One of the key recommendations of the Allsopp Review is that rigorous estimates of regional GDP should be developed based on a larger sampling process. Allsopp stops short of arguing for GDP to be measured regionally or making regional estimates as accurate as national estimates on the basis of cost.

4.51    Another criticism put forward by Allsopp is the over-reliance on manufacturing in the sampling process. GDP estimates involve a higher proportion of manufacturing of manufacturing industries and are underrepresented in terms of services. This is also the case with productivity data.

4.52    There are two key omissions from the analysis in this section; regional inflation/price estimates and inter-regional trade figures. ONS have made some progress towards providing regional price estimates which show indices of how the prices for various goods differ between regions. Yet this does not show changes in price on an annual basis, which would, when accompanied by regional growth data, enable *real* growth rates to be recorded. The ability to calculate regional inflation and growth rates would be of value to regional policymakers.

4.53    Another omission in the available data is inter-regional trade flows. While international trade flows are able to show injections and leakages from a regional economy they do not show the net effect of inter-regional trade. While regional exports may be regarded as an artificial concept within a

nation state, analysing their magnitude and flows would provide a key policy tool for establishing the ability of a region to produce outputs related to development and growth.

4.54    Policy has become increasingly focussed on local multipliers and ensuring that local supply chains benefit from the emergence of new firms and inward investment into a region.  Regional trade figures would be useful to show the benefit to local supply chains of a region through highlighting the types of goods and services which are 'imported' and 'exported'.

4.55    Allsopp, however, does not back the case for the introduction of inter-regional trade data despite several respondents to the initial findings arguing in favour of this development. The main argument is that the complexity of the data required means that collection would be expensive and difficult.

4.56    What is clear is that with an increased focus on regional and local policymaking there is a need for robust statistics to enable policymakers to make an informed policy choice.  Continued development of more robust and reliable statistics on economic indicators will generate clearer understanding of regional and local economies and more appropriate and better targeted policy solutions.

# Section 5 – Mapping the structure of regional economies

**Introduction**

5.1 "Most industrial activities tend to be clustered together in space."[15] This makes some economic activity 'sticky', in that it will locate where competitive advantage arises from concentrations of firms and customers and will remain at that location while these advantages remain profitable.

5.2 Flows of inputs and outputs within and across regions also shape regional development. The primary rationale for looking at 'flow effects' as the second key driver of spatial distribution of economic activity is the existence of what can be termed 'dispersal effects', i.e. economic drivers for consumption of inputs and outputs over distances. These effects indicate that most firms and consumers will seek inputs and outputs from more distant markets should there be commercial advantage in doing so or should the particular good not be available in their immediate market(s).

**The 'Stickiness' of regional economies (agglomeration effects)[16]**

5.3 Agglomeration economies arise when location in proximity with other firms and in larger urban settlements produce advantages and benefits that would not be available outside these settlements. Concentrations of firms, customers and employees generate 'location-specific economies of scale' that can benefit companies within an area. As Jacobs noted, cities contribute to the wealth of nations as a result of these agglomeration effects.

5.4 In any region, as a result, it is reasonable to expect that the major urban settlements will account for, and dominate, economic activity. It is also probable that this phenomenon will increase over time, as economies of scale through agglomeration generate superior benefits to businesses in these settlements.

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[15] McCann P. (2001) *Urban and Regional Economics* Oxford University Press.
[16] The term 'stickiness' refers to and is stimulated by previous work by people such as Massey, and 'slippiness' to Markusen. The terms are used differently in this paper to the ways in which they have been defined and developed by these two authors.

5.5     Concentrations in urban settlements, therefore, create 'stickiness' in regional economies as firms and consumers locate to these dense areas of economic activity.  Agglomeration economies suggest that this 'stickiness' will intensify as location-specific economies of scale generate ongoing competitive advantage to firms.  The 'stickiness' of cities and larger settlements creates a logic that regional economic activity will concentrate in urban concentrations over time.

5.6     A corollary of this is that the disparities between areas enjoying agglomeration economies and those where economic activity is dispersed, i.e. concentration effects do not exist or are not significant, will increase over time.

5.7     'Stickiness', in other words, leads to greater concentrations of economic activities – and wealth – in cities and large settlements and both relative and absolute reductions of economic activity in rural areas where consumers and producers are highly dispersed.

**Limits to regional concentrations of economic activity in major cities**

5.8     Standard explanations of regional distributions of firms identify three constraints, or limits, on agglomeration economies that tend to counteract the concentration of economic activity in major settlements.

5.9     The first is the tendency for land cost to rise in cities, as more firms seek to locate in these settlements in order to benefit from location-specific economies of scale.  Agglomeration economies only hold while their benefits outweigh the costs of location to take advantage of such effects.  Should location costs exceed benefit, what may be termed agglomeration 'dis-economies' take hold, and firms are placed in a position where they have to pay to continue to enjoy the benefits from agglomeration.

5.10    Under these conditions, it is possible that firms will accept that location costs exceed agglomeration economies, but will choose not to re-locate because this will entail loss of benefits from agglomeration effects.  Decisions like this are likely to occur if firms perceive the loss of agglomeration effects as

resulting in the loss of business to firms that choose to stay within cities in order to benefit from proximity to customers.

5.11    The second limit on agglomeration relates to congestion, and in particular increases in transportation costs and time that arise in dense settlement areas. Some of these congestion costs arise out of the concentration of economic transactions in small and potentially confined areas. Others may be imposed, such as constraints on the movement of freight through settlements or imposition of a congestion or entry charge. Combined, they indicate that once agglomeration reaches a certain locational concentration or density, congestion costs can rise above and beyond the benefits of agglomeration. In these instances, the additional transaction costs arising through congestion effects off-set agglomeration economies.

5.12    The third factor that may limit, or mitigate against, agglomeration in major urban settlements arises when economic activity gains benefit from location outside these areas. Natural resources are a common driver of dispersed locations for businesses, particularly those in agriculture and extraction industries. Logistics companies also tend to locate themselves away from the centres of cities and urban concentrations, in order to be close to the wider travel infrastructures that provide access to multiple urban settlements and a larger hinterland.

5.13    Factor rigidities, such as those that place skilled labour in certain locations for historical reasons (such as recent closure of a major employer), also create non-central locational advantage, in the short-term. While these factors are 'stuck' or concentrated in a non-central location, they will attract firms seeking to exploit these factor inputs.

5.14    To some extent, gaining benefit from 'non-central' location generates multiple, local agglomeration economies, and in some cases such as the logistics concentration around Heathrow airport, major concentrations of firms.

5.15    These three factors represent limits to agglomeration. They indicate that regional distribution of economic activity cannot be explained by agglomeration effects alone.

5.16    The three factors suggest that: (1) there are constraints to agglomeration in cities, due to costs of location in central areas and congestions effects; (2) alternative and typically smaller agglomeration effects occur around natural resources and infrastructure that are determined by the location of these resources and infrastructure.

5.17    The implications for examining a regional economy are two-fold:

1)    In most regions,[17] it is that it is likely that there will be several major settlements that generate competitive advantage arising from agglomeration effects.  This is because there are limits on concentration of firms in a single area, and as a result there is an optimal and maximum threshold size for a city (recognising that firm behaviour may cause enterprises to locate in cities where agglomeration economies are perceived to outweigh land price and congestion costs, even though these costs outweigh the benefits from scale economies). The existence of multiple cities and towns in a region is underpinned by modelling of different rank-sizes of cities (e.g. Fujita), which suggest that there will be multiple cities in an area, but they will not be of uniform size and may demonstrate a hierarchy or broad rank-size relationship.

2)    There will also be smaller agglomeration effects, due to firm location around natural resources and infrastructure in particular, which create local economies of localisation and, to an extent, localised economies of urbanisation.  These smaller agglomeration effects, around smaller settlements, will be characteristic of any regional economy.

**'Slippiness' in regional economies (flow effects)**

5.18    Underpinning many assessments of regional distributions of economic activity is the modelling and calculation of the transportation, or shipment, costs of goods and inputs, to customers and to producing firms respectively. Transportation costs, and in particular their role in influencing firm location so

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[17] The major exception appears to be regions that have a single, dominant urban concentration.  These regions, which can be seen in the UK's South East and the Ile de France around Paris, as well as in many developing countries, have become dominated by a single city, or metropolis.

that shipment costs are minimised and income maximised (as far as possible), are as a result a key determinant of firm location.

5.19    Inputs and goods flow along physical infrastructure, such as roads, rail and air, as well as through information and communication technologies, i.e. via e-mail and the web.  Transportation flows, and costs, are therefore determined by the channels of communication, physical and virtual, that exist within a region.

5.20    These flow effects, of goods and inputs through infrastructure, will determine regional patterns of activity.  Regions in which there are high levels of economic connectivity because infrastructure enables these flow effects are more likely to see higher levels of flows in economic activity than regions where infrastructure is not as enabling of shipments of inputs and goods.

5.21    The extent of regional communications infrastructure, therefore, influences the extent to which economic activity moves within the region and across regional boundaries (should positive flow effects from infrastructure development continue into other regions).

5.22    Variations between regions in terms of the effectiveness and efficiency of flow effects will be determined by the existing, 'sunk' investment in communications and infrastructure and by ongoing expenditure to enhance the mobility of factor inputs and goods.  A more efficient regional infrastructure reduces the costs of shipment by reducing the costs accruing to firms of transportation.

5.23    The costs for enhancing infrastructure are borne by government and so spread across the broader population, rather than being paid for solely by the businesses using the infrastructure (in part because of the wider usage of infrastructure for socioeconomic purposes).

5.24    Public investment in infrastructure and communications, therefore, reduces the cost per mile of transporting goods and inputs, and so extends the distance over which firms can purchase inputs and dispatch goods. Increasing the efficiency of regional infrastructure increases the flow effects

within and across regions, in that it enables firms to transport inputs and goods over greater distances without increases in shipment costs.

5.25    Flow effects, as measured by the efficiency (transportation cost per mile for firms), will make economic activity more or less 'slippy' in different regions, in that they will be determined by variable levels of investment from region to region.  Increased efficiency, through expenditure, will extend and increase the flow of inputs and goods and so enhance 'slippiness', i.e. flow effects.

**A framework for assessing regional economies**

5.26    Both 'sticky' and 'slippy' effects can be seen in regional economic activity and its distribution.  'Stickiness' leads to enhanced agglomeration economies in cities, but is constrained by several factors, pointing to multiple settlements enjoying these economies, as well as the existence of specific instances of dispersal and smaller-scale economies of localisation and urbanisation. 'Slippiness' enables the flow of activities between settlements and across and through regions.

5.27    'Stickiness' and 'slippiness' can be seen as influencing, and to some extent, counter-balancing effects in regional economic activity and interaction.  They represent a broad representation of regional economic activity that can be used to assess regions and the relative distributions and patterns of these activities.

5.28    The framework outlined in this report starts, as a result, with the following two working assumptions, both based on the analysis of 'stickiness' and 'slippiness':

I.    Regional economic activity will be either dominated by or focused on several cities and larger settlements that provide the benefits of agglomeration economies to firms, as well as to customers and workers. The concentration of regional economic activity to benefit from agglomeration will, however, be limited due to land cost, congestion and non-central location effects.

II.     The efficiency of transportation will determine the volume and distance of flow effects, i.e. how far firms will go to buy inputs and sell goods. Regional efficiencies in transportation are likely to vary because of qualitative differences in regional infrastructures, and so flow effects will vary as a result of differences in efficiency. Some regions, as a result, are likely to be less integrated due to flow effects than others.

5.29    The second stage in development of the framework is to posit that there will be effects from both agglomeration and flow effects that will influence distributions of economic activity in a region. In essence, agglomeration effects will lead to concentration, to a limit, in major settlements. The constraints to excessive agglomeration that have been identified suggest that it is likely that multiple settlements will emerge that enjoy these economies.

5.30    However, flow effects, and in particular the efficiency of the regional infrastructure, will serve to either reinforce agglomeration in and around urban centres, or will function as dispersal effects, which make transportation more efficient, reducing advantages from central place location. In regions that have highly efficient infrastructures, costs of transportation are significantly reduced, making central location in cities in order to enjoy agglomeration economies less beneficial than in regions where the infrastructure is inefficient. Flow effects, therefore, either amplify agglomeration effects if there is inefficiency, or mitigate it where there is efficiency.

**Figure 5.1: An Example Case of Regional Distributions of Economic Activity**
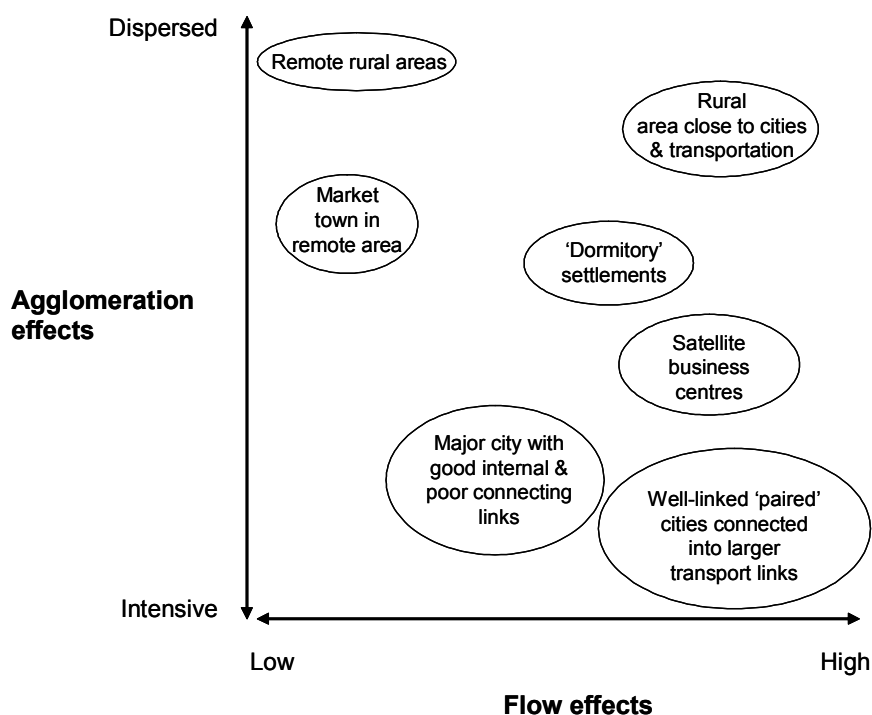


5.31    Figure 5.1 provides an indicative 'map' of regional economic distributions using hypothetical categories of settlements and areas that may exist in a region.  It provides and example of the ways in which a regional economy can be assessed in terms of its spatial patterns, using agglomeration and flow effects as key parameters.

5.32    The framework, as summarised in Figure 5.1, represents regional distribution of economic activity in terms of both agglomeration and flow effects.  This produces a representation of regional economies based on two factors, or variables, with one axis assessing patterns of agglomeration effects across the region, and the other flow effects.

5.33    When applied at the regional level, and specifically to examine the distribution within the region of economic activities, agglomeration effects are likely to vary considerably.  Such effects will be most evident in cities and major settlements, which are likely to benefit extensively from location-specific

economies of scale as laid out in section 2 of this section. The major cities within a region can be seen as having high agglomeration effects.

5.34    Areas where firm densities and residential population levels are low are liable, conversely, to benefit from low agglomeration effects, and so gain little or no benefits from location-specific economies of scale through localisation and urbanisation. The agglomeration effects in areas that are sparsely populated by firms, and people, will be low.

5.35    Agglomeration effects, as a result, can be considered along a spectrum from very high, or intensive, to minimal or dispersed. These effects can be measured by firm densities and population levels, in that these measures reflect levels of agglomeration, i.e. that extent to which close or dense location of firms can create economies of localisation and urbanisation that attract in-coming populations seeking employment.

5.36    The relationship between levels of agglomeration economies and firm-population densities can be held, in broad terms, across a region. There are, however, three particular instances where specific, localised agglomeration economies may arise in otherwise sparsely-populated areas:

I.    A major company is located outside a central location and generates 'internal returns to scale', which attract capital and labour, and perhaps other firms

II.   Infrastructure creates local concentrations of firm activity, for example around a major arterial route or airport

III.  Firms group around 'natural resources' that they exploit.

**Applying the framework: analysing the East Midlands and Yorkshire & Humber regions**

5.37    Application of this approach requires the development of a broad set of 'metrics' to plot regional distributions of economic activity. It also points to a need to develop a categorisation of components of a regional economy, using standardised methods that can be applied to all parts of a region (and across regions).

5.38    Agglomeration effects represent dense concentrations of firms, in the first instance.  They also point to dense concentrations of people, in cities and urban settlements.  The broad measures that can be used for determining agglomeration economies are therefore densities of firms per square kilometre, in the first instance, and population densities as supporting evidence.  The following approach to using these indicators is proposed:

I.     Banding firm densities per square kilometre in both regions.  A starting point for this will be to identify areas with the greatest local firm densities. Analysis will also be undertaken to identify areas with the lowest densities of firms.  These represent the polar extreme, namely conditions where agglomeration effects are slightest.  The range developed by identifying the locations of greatest and lowest densities will determine the scale for assessment of other parts of the region.  At this stage, we will use ward level data as the smallest geographical entity where data are available.

II.    Population densities, as measured by people of working age (i.e. the available workforce), can be used to validate firm densities.  Urban areas where firm densities are high and population densities are also high are likely to have the greatest agglomeration economies as this represents concentration in the workforce as well as amongst firms.  The converse, however, may point to dispersed or minimal agglomeration effects, in that high population densities are not reflected by locational concentrations of firms, and vice-versa.

5.39    Flow effects will be modelled around road and rail links, in particular.  By mapping rail and road links across the region, and assessing their capacity and efficiency, locations across the two regions can be assigned typical values or ratings for their accessibility and linkage to key infrastructure.  Using a similar approach to the one used to calculate agglomeration effects, the best linked and worst linked locations in both regions will be used as the two end points of the spectrum, and the range of ratings or values allocated accordingly.

5.40    A detailed taxonomy of sub-regional economic areas will be developed, based on the modelling methodology, using two sources of data:

I.     Examination of firm and population densities, and linkages ratings and values, to create 'contour maps' that point to local and sub-regional concentrations of economic activity.

II.    Consultation with regional stakeholders to test and explore the preliminary typology arising from this mapping process.

**Overview and summary of results**

5.41   This report uses agglomeration effects, i.e. the tendency for economic activity to 'stick' together, and flow effects, i.e. the extent to which regional infrastructure and communications enable shipment and delivery of products and services over wider areas, to analyse the regional economic structures of the East Midlands and Yorkshire & Humberside.  The key implications of this approach for analysis are:

1)    Economic activity will concentrate itself in settlements where firm densities are high, and so the likelihood of and opportunities for agglomeration economies are greater than in more dispersed areas.

2)    There are limits to regional concentrations in major cities that indicate that other settlements may enjoy and generate 'local' or lesser agglomeration economies.

3)    Regional infrastructure and communications will affect the flow of goods (products and services), and so will determine the extent to which and distance that firms can efficiently transport goods without a loss in profit.

4)    Regional, and local, variations in agglomeration and flow effects will produce profiles and dynamics of regional economic structures and configurations that reflect current conditions.  Such patterns are likely to vary across as well as within regions.

5.42    Three forms of data are used to identify agglomeration effects and model the
        existence of flow effects: (1) firm densities (number of firms per square
        kilometre); (2) total number of firms per settlement; and (3) Economically
        Active Population, per square kilometre and per firm per square kilometre.
        The data deployed provide evidence for agglomeration effects, as measured
        through firm density and population, and indications of flow effects for labour.

**Developing regional maps of spatial economic structure**

5.43    A starting point for the analysis was the identification of settlements where
        agglomeration economies had the potential to exist.  Numbers of firms per
        ward for all wards in the East Midlands and Yorkshire & Humberside were
        analysed, using 2001 census data.  Based on analysis of the number of firms
        per square kilometre in wards, different densities of firm populations were
        identified.  Maps 1 and 2 (provide summary data for the analysis (attached at
        the end of this document).  These maps show settlements that consist of
        contiguous wards with greater than the minimum threshold density
        (represented in the maps by the white areas).

5.44    The mapping of firms per square kilometre for each ward in the two regions
        found that concentrations of firms were located in settlements and larger
        urban areas.  Most rural areas, apart from market towns and larger 'service
        centres', posted firm densities of fewer than 30 businesses per square
        kilometre.  Based on the conceptual argument that agglomerations occur in
        areas where firms co-locate in dense populations, firm agglomerations were
        therefore defined as occurring where local densities were above 29 firms per
        square kilometre.

5.45    The use of a minimum threshold of firm density identified concentrations of
        firms across both regions.  As can be seen in Maps 5.1 and 5.22, they relate
        closely to urban areas and larger settlements.  In most cases, larger
        settlements recorded higher concentrations of firms, of up to 865 per square
        kilometre, and so were clearly distinguishable from areas where firm
        populations were sparse.  This supported the broad contention that cities and
        larger towns enjoy agglomeration economies.

5.46    The mapping identified settlements and areas where firm densities were high, and noticeably greater than those where firms were dispersed.  For each settlement, or area, contiguous wards where firm densities were above the minimum threshold were included.  As a result, firm densities vary *within* settlements, from high density, typically at the heart of the settlement, to low density on the margins.  This approach provided a more coherent locational pattern to the mapping of settlements (as is evident in Maps 5.1 and 5.2, where local variations are apparent).

**Map 5.1: Settlements by Firm Density in the East Midlands**



Region

Ward

## Firm Densities

- 867 to 8,710
- 224 to 866
- 91 to 223
- 30 to 90
- 0 to 29
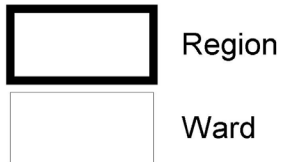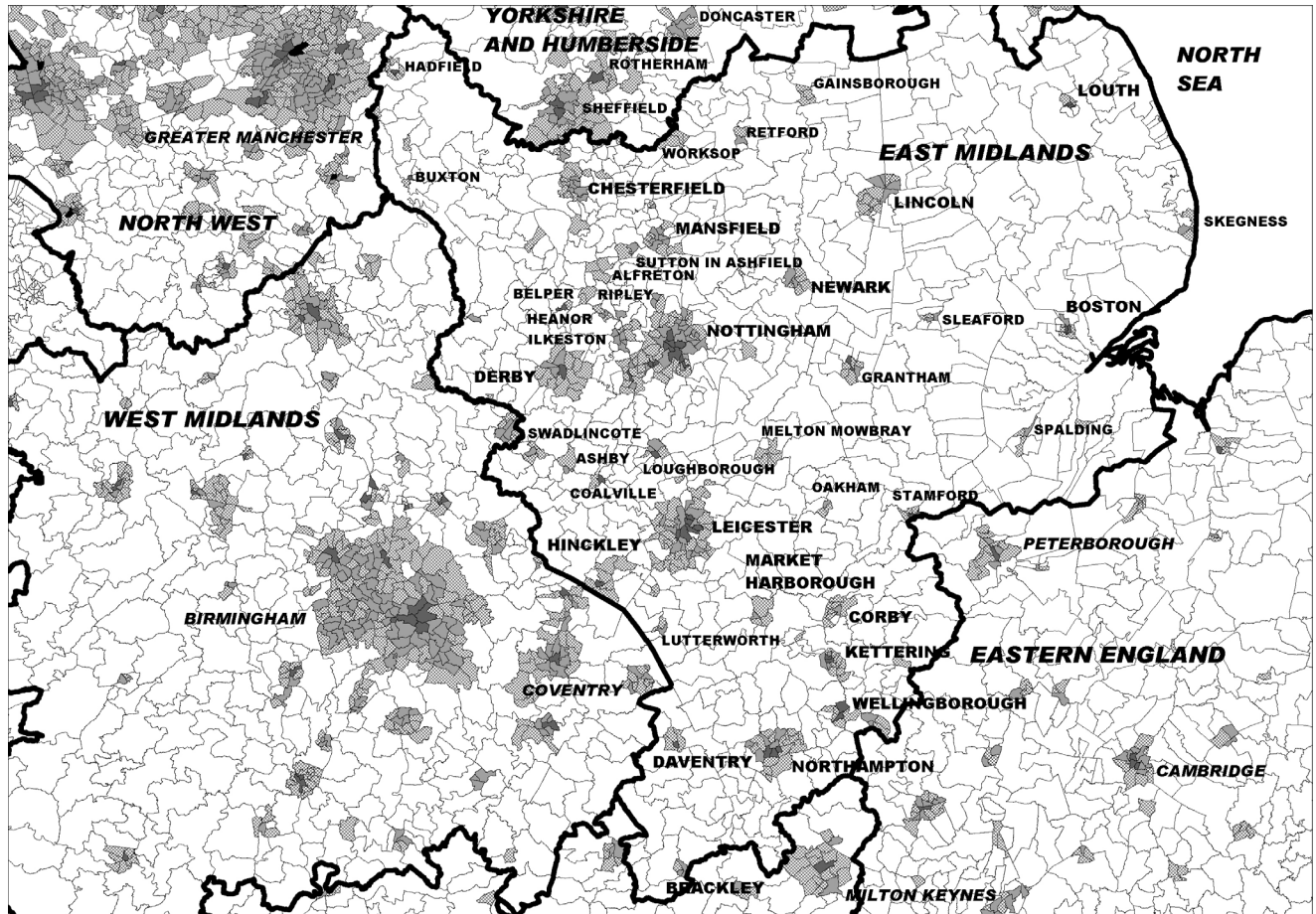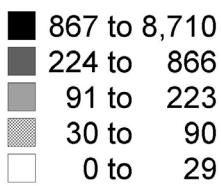
**Map 5.2: Settlements by Firm Density in Yorkshire & Humberside**



Region

Ward

Firm Densities

867 to 8,710
224 to 866
91 to 223
30 to 90
0 to 29
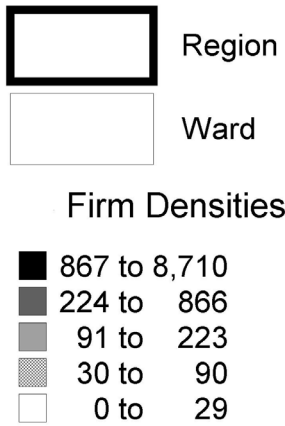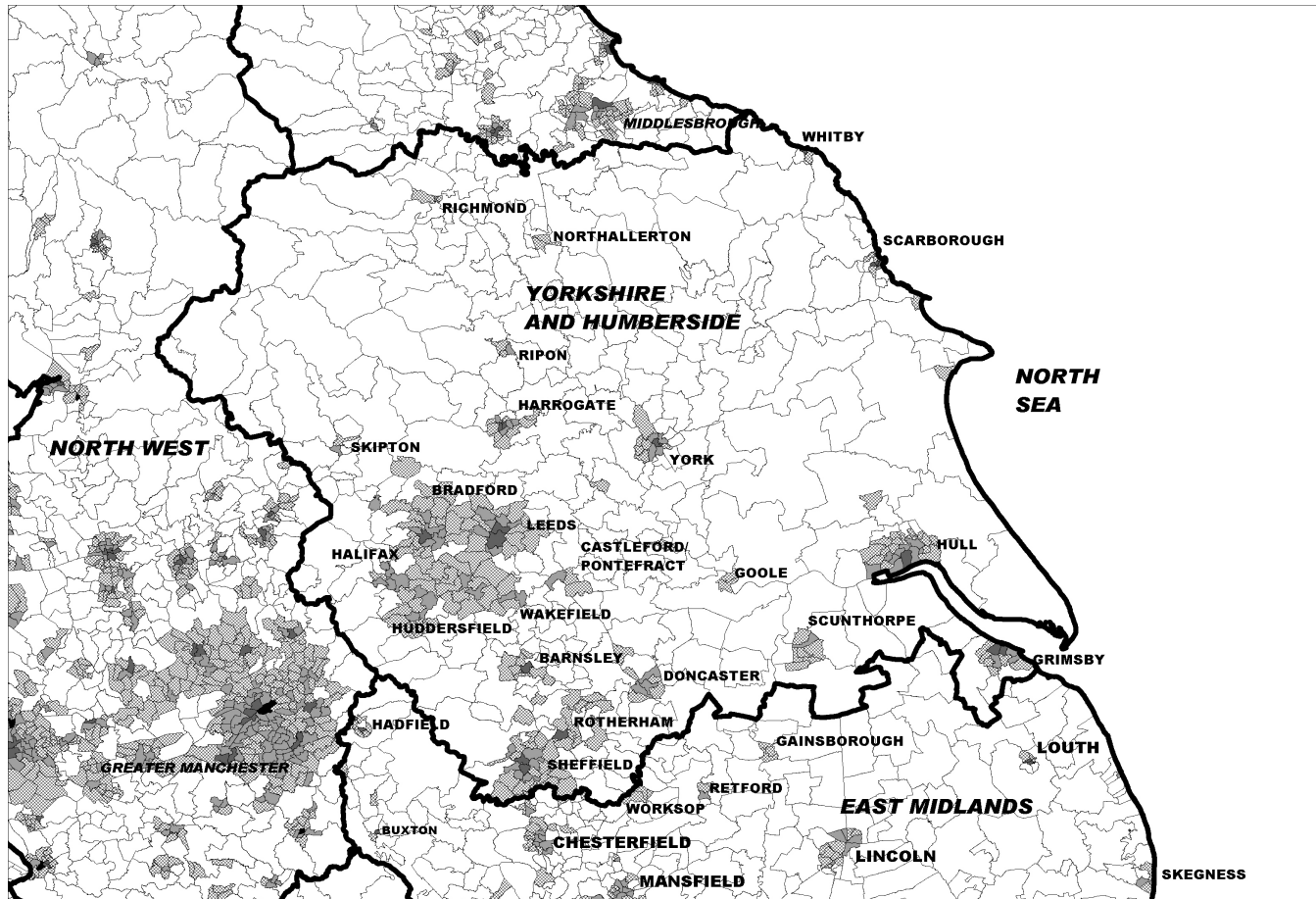
5.47    The results indicate that the East Midlands economy has four major settlements where agglomeration economies are likely to exist.  It also has eleven smaller, local' agglomeration economies that have high firm densities.

5.48    The region faces two 'structural' issues: (1) there are settlements that, according to the data, lack 'critical mass' in firm and workforce densities, and so are unlikely to benefit from significant agglomeration economies; (2) Derby has a less dense firm population than comparable settlements in the East Midlands, suggesting that it is the least likely of the major economic nodes of the region to enjoy agglomeration economies.

5.49    Yorkshire & Humberside is dominated by three major settlements with large firm populations, Leeds, Bradford and Sheffield-Rotherham.

5.50    The region also has several settlements where agglomeration economies are likely to occur, but that are not large enough to be major regional centres. These include: Hull, Grimsby, Doncaster and York.  Of greatest significance to the regional economy is the 'Greater Leeds' concentration of settlements that includes Leeds, Bradford, Halifax, Huddersfield and Wakefield-Dewsbury. Regional mapping of firm densities suggests that this area could be considered a single economic entity, which would concentrate much of the region's economic activity in a single 'super-city economy.'

5.51    Table 5.1 summarises the identified settlements in the East Midlands, by total number of firms, total population and total area in square kilometres, from largest settlement to smallest as measured by total number of firms:

**Table 5.1: Identified Concentrations of Firms in the East Midlands**

| Settlement | Total Number of Firms | 2001 Population | Area (km$^2$) |
|---|---|---|---|
| Nottingham | 16724 | 500555 | 153.45 |
| Leicester | 13724 | 371391 | 120.79 |
| Northampton | 7455 | 186990 | 70.79 |
| Derby | 6779 | 221708 | 78.04 |
| Wellingborough | 3466 | 53929 | 32.48 |
| Lincoln | 3396 | 92693 | 41.26 |
| Chesterfield | 2502 | 65291 | 30.93 |
| Hinckley | 2464 | 54569 | 40.11 |
| Mansfield | 2269 | 63283 | 45.74 |
| Kettering | 2104 | 54405 | 22.36 |
| Loughborough | 1523 | 28557 | 12.22 |
| Newark | 1454 | 35452 | 20.38 |
| Ilkeston | 1405 | 36172 | 18.13 |
| Grantham | 1360 | 33918 | 15.73 |
| Corby | 1282 | 41988 | 20.45 |
| Market Harborough | 1058 | 20127 | 19.76 |
| Boston | 1012 | 19250 | 9.21 |
| Daventry | 993 | 21731 | 14.68 |
| Stamford | 898 | 19525 | 7.96 |
| Alfreton | 884 | 19412 | 16.16 |
| Melton Mowbray | 880 | 20558 | 19.38 |
| Hadfield | 834 | 23924 | 10.46 |

5.52    Table 5.2 summarises the identified settlements in Yorkshire & Humberside, by total number of firms, total population and total area.

**Table 5.2: Identified Concentrations of Firms in Yorkshire & Humberside**

| Settlement | Total Number of Firms | 2001 Population | Area (km$^2$) |
|---|---|---|---|
| Leeds | 20068 | 517098 | 226.37 |
| Sheffield | 17909 | 558742 | 254.23 |
| Bradford | 10208 | 332703 | 118.34 |
| Wakefield | 9512 | 268248 | 141.09 |
| Hull | 8184 | 248360 | 83.56 |
| Halifax | 4629 | 105919 | 58.11 |
| York | 4420 | 105718 | 45.36 |
| Huddersfield | 4184 | 118622 | 58.91 |
| Grimsby | 3631 | 113101 | 33.62 |
| Doncaster | 3055 | 80862 | 35.91 |
| Harrogate | 2877 | 71869 | 37.33 |
| Barnsley | 2566 | 71894 | 39.16 |
| Scunthorpe | 2187 | 69321 | 40.94 |
| Castleford-Pontefract | 1871 | 42043 | 26.82 |
| Scarborough | 1721 | 35952 | 10 |

5.52    The settlements for Yorkshire & Humberside highlight two major characteristics of firm densities and distributions. The first is the pattern of firm distribution across Sheffield and Rotherham. Firm densities indicate that in terms of businesses, the two settlements fall within the same local agglomeration. As a result, we have used Sheffield-Rotherham throughout this analysis.

5.53    The second is the dominance of two major local agglomerations in the Yorkshire & Humberside region. As well as Sheffield-Rotherham, there appears to be a 'Greater Leeds' concentration that includes: Leeds, Bradford, Wakefield, Halifax, Huddersfield (and Dewsbury, which is included in Wakefield). We separated Leeds and Bradford for analytical reasons (combining them would make Leeds-Bradford by far the largest agglomeration in the region).

5.54    However, the implication of this approach, which was adopted for purposes of
        clarity of data analysis, is that a 'Greater Leeds' agglomeration of firms can be
        identified, which includes the settlements identified in 8.8 above.  The
        mapping also indicates that the Yorkshire & Humberside region is dominated
        by two 'binary' cities, Leeds-Bradford and Sheffield-Rotherham.

**Estimating agglomeration and flow effects**

5.55    A series of indicators were developed for further analysis of the identified
        concentrations of firms.  Each is discussed below, in terms of how it is
        calculated and its potential significance:

5.56    *Firm Density*:  total number of firms divided by total area, as measured in
        square kilometres, built up from ward data.  Firm density provides an
        indication of the *likelihood* of agglomeration economies occurring.  High
        densities suggest a greater likelihood for economies of localisation and
        urbanisation than in areas where firm densities are low.

5.57    *Workforce Density*:  total 'economically active population' (part-time and full-
        time employees, self-employed, unemployed, and students) divided by total
        area, in square kilometres.  This provides an overall indicator of the density of
        the available workforce within a settlement, independent of the presence and
        density of firms.

**Figure 5.2: Modelled agglomateration effects through firm densities and expected labour flour effects through local market dynamics**



Firm Density
(Mean number of firms per square kilometre)

**Regional Firms Agglomerations:**
1. Likely to have in-flows of labour because firm densities are relatively higher than local densities of local workforce
2. High relative firm densities indicate this is a 'local' concentration that has partial or localised agglomeration effects.

**Regional Agglomeration Economies:**
1. 'Critical mass', in terms of above average firm densities and workforce densities
2. Likely to be key settlements in regions
3. Likely to be major concentrations of economic activity that attract in labour and other inputs.

**Low Agglomeration Effects:**
1. Below average densities of firms and available workforce indicate lack of 'critical mass' of concentrated economic activity
2. Unlikely as a result to have significant agglomeration effects, although may have partial effects (especially when firm density is relatively greater than workforce density)
3. These settlements may be important foci for sub-regional and local economies.

**Regional Labour Agglomerations:**
1. Lower firm densities combined with higher than average available workforce densities are likely to lead to outflows of labour to 'local' and regional agglomerations
2. Settlements with large numbers of firms but lower firm density are less likely to have agglomeration effects, but are still important to the regional economy.

Mean

**Labour Density**
(Economically Active Population per Square Kilometre)

5.58    Distinctions are made on the basis of where settlements 'sit' in relation to regional means.

5.59    The logic underpinning this figure, and the analysis of results in this paper, can be summarised as follows:

1)    Agglomeration effects are likely to occur where local firm densities are high, and particularly when the overall number of firms in a settlement is high (providing scope for greater 'economies of urbanisation').

2)    Labour, as a key 'factor input', is an indication of wider levels of economic distribution, and so provides insight into concentrations and distributions of economic activity in a regional economy.

3)    In situations where labour densities are high, as measured by the number of people available for work, and firm densities and overall firm population are also high, agglomeration effects are most likely to occur.

4) Where firm densities are higher than the regional mean and workforce densities are lower (when compared with the regional means), the local relationship between demand for labour (firm densities) and supply (workforce availability) is one where demand is likely to be greater than supply (because there are relatively more firms and relatively lower levels of available workforce within the settlement). This will lead to recruitment searches and hence employment beyond the settlement, and so to an influx of labour into the settlement.

5) Where firm densities are below the mean and workforce availability above the mean, local supply of labour is likely to be greater than local demand from employers. Under these conditions, individuals seeking work are more likely to look outside the settlement, in areas where there is an excess of demand for labour over supply. This will lead to an outflow of labour from these settlements to settlements where firm densities are relatively greater than available workforce densities (see 3 and 4 above).

5.60 **_Average Employment per Firm_**: total number of part-time, full-time and self-employed divided by the total number of firms. This gives a mean average firm size for each settlement.

5.61 **_Available Workforce per Firm per Square Kilometre_**: total 'economically active population' divided by total number of firms divided by total area in square kilometres. This provides an assessment of the relative availability of the workforce for each firm in terms of density for each settlement. It provides broad insight into the extent to which firms have a local workforce available within the settlement.

5.62 Three analyses were undertaken of the data sets of identified firm densities and populations: (1) firm densities compared with densities of the 'available workforce', in order to test for overall indications of agglomeration economies;

(2) firm densities compared to average number of employees per firm in each settlement, in order to assess whether large employers are having disproportionate effects on local agglomerations; and (3) firm densities by available workforce per firm per area, in order to estimate likely inward and outward flows of labour into and out of the settlements.

**Identifying Agglomerations:  Firm Densities and Available Workforce Densities**

5.63    Figures 5.3 and 5.5 compare firm densities with 'available workforce' densities, i.e. the number of firms in a settlement compared with the number of people available, as an average, across all parts of the settlement.  Firm densities provide an indication of the *likelihood* of agglomeration economies occurring as a result of proximate location of businesses in a constrained or defined area.

5.64    For each figure, the total number of firms in each settlement is represented by the size of the data 'bubble' provided.  This allows for relative comparison of densities and distributions with actual sizes of each 'local' economy (c.f. Tables 5.1 and 5.2 for actual numbers of firms, as represented by size of bubble in the figures below).

5.65    In addition, mean averages are calculated for all x and y axis value totals. This provides a relative means of comparing settlements to determine whether they are above or below the mean for each set of indicators. Because firm density is held as a constant y axis, settlements above the mean on this axis will have higher than average densities of firms.

5.66    For several figures, including the ones in this section, a 'Best Fit Line', with calculated $R^2$, is included in order to assess the broad association between the two variables and where the settlement 'sits' in relation to the x and y axes.

**Figure 5.3: Firm and Labour Densities across Both Regions**
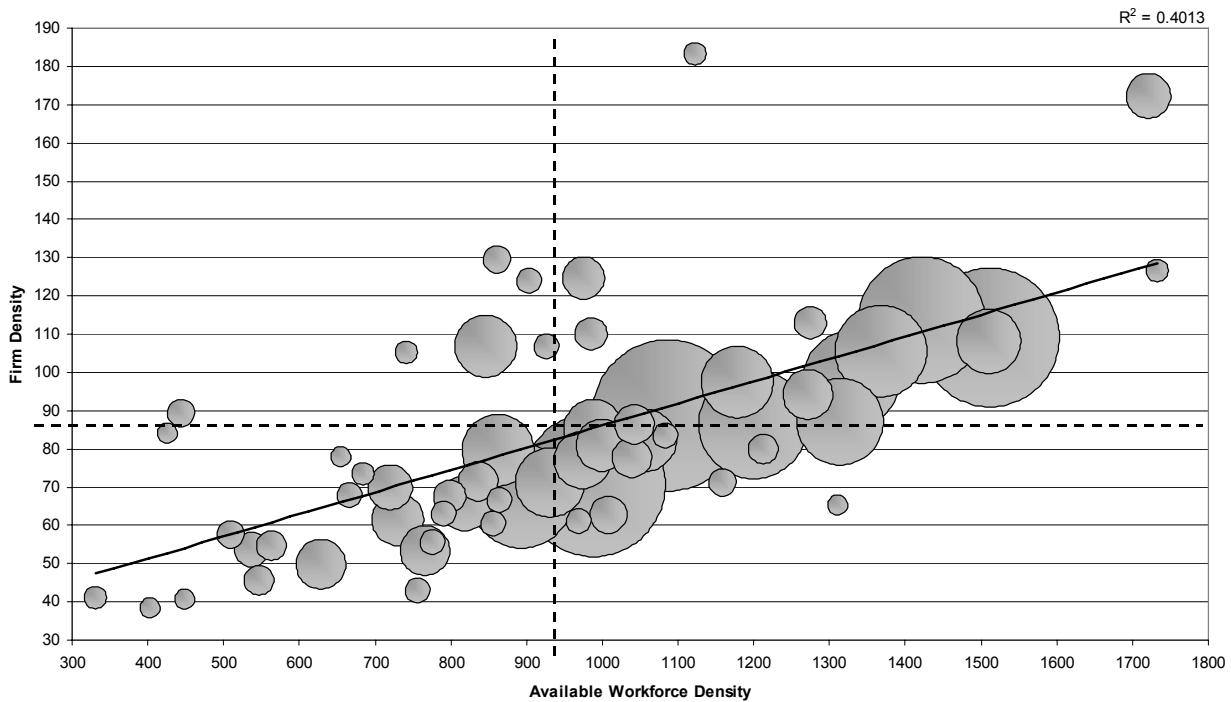


5.67    Figure 5.3 provides a summary of firm densities compared with densities of the 'available workforce' (as measured by total 'economically active population') for all identified settlements in the regions of the East Midlands and Yorkshire and Humberside.  Each settlement is named, and the total number of firms in that settlement identified by both the size of the bubble and the number following the settlement name.  Wellingborough, for example, has a total of 3,466 firms in the wards included in this settlement as a result of mapping threshold densities.

5.68    Figure 5.3 indicates that a broad relationship holds between firm densities and available workforce densities in most settlements in both regions.  Most fall along or close to the 'Best Fit Line' mapped on to the figure.  There is, as a result, a broad positive association between firm densities and available workforce densities that indicates that agglomeration effects of firms coincide with greater concentrations in the labour market.[18]

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[18] This does not indicate which way causality lies, i.e. whether firm agglomerations lead to and stimulates migration of the workforce to these agglomerations, or whether concentrations in the workforce attract firms.

*An initial finding, therefore, is that agglomeration effects tend to coincide and so are likely to be self-reinforcing, i.e. over time regional economic activity is likely to concentrate in settlements with higher firm and workforce densities.*

5.69    Major agglomerations tend to follow the broad fit line, suggesting that proportionate relationships between the densities of firms and available workforce are broadly similar in both regions' major cities. The five largest cities, Nottingham and Leicester in the East Midlands and Leeds, Sheffield-Rotherham and Bradford in Yorkshire & Humberside, sit close to the best fit line.

5.70    However, there are differences between these large cities.  Leeds and Sheffield-Rotherham have more firms overall (20,068 and 17,909) than Nottingham and Leicester (16,724 and 13,724), indicating that the overall size of the business population in the two Yorkshire conurbations is greater than those for the East Midlands' cities.  Densities of firms and available workforce are greater in the East Midlands' cities than in the Yorkshire settlements.

*Agglomeration economies appear more likely in Nottingham and Leicester than in Leeds and Sheffield-Rotherham, due to their higher firm and labour densities.  In Leeds and Sheffield-Rotherham, economic activity is relatively more dispersed, but the overall size of the agglomeration, in terms of number of firms, is noticeably higher.*

5.71    Although the association between firm and labour densities holds for larger settlements and for some smaller agglomerations, there are several cases where the relationship is not as strong.  Specific groupings will be considered in their regional context (see Figures 5.4 and 5.5 below), but it is worth noting that there are settlements that have: (i) above average firm densities and below average available workforce; (ii) below average in both densities; (iii) above average in both densities.

### *Yorkshire & Humberside*

5.72    Figure 5.4 summarises firm and available workforce densities for Yorkshire & Humberside.  'Available workforce' is defined as the Economically Available Population, and so reflects individuals within the settlement who are available for employment.  There is a strong association between these two variable ($R^2 = 0.8$), indicating a broad 'fit' in local labour markets, in that *available* labour appears to have a comparable relationship with firm density across different settlements.[19]

5.73    This association is broad, however, and local variations can be identified.  In particular, there are clear differences between Leeds and Sheffield-Rotherham.  Leeds has firm and available workforce densities that are above the regional mean, suggesting that agglomeration economies are likely for firms in the city.  The city is also above the best fit line, which indicates a relatively stronger representation of firm density than workforce density.  As well as supporting the prospects of agglomeration effects amongst firms, this indicates that there is a likely in-flow of labour into Leeds to compensate for the proportionately greater representation of firms than labour.

*Leeds demonstrates high prospects of firm and labour agglomeration effects, and hence agglomeration economies of urbanisation.  Combined with the large number of firms within the settlement, this indicates that Leeds is a major agglomeration in the region.  The city also has a slightly greater firm density than available workforce density, indicating some in-flow of labour for employment.*

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[19] This is based on *available* workforce data, i.e. those considered economically active, and so does not include the economically active; a population that is relatively large in some of these settlements.

**Figure 5.4: Firm and Labour Densities in Yorkshire & Humberside**[20]
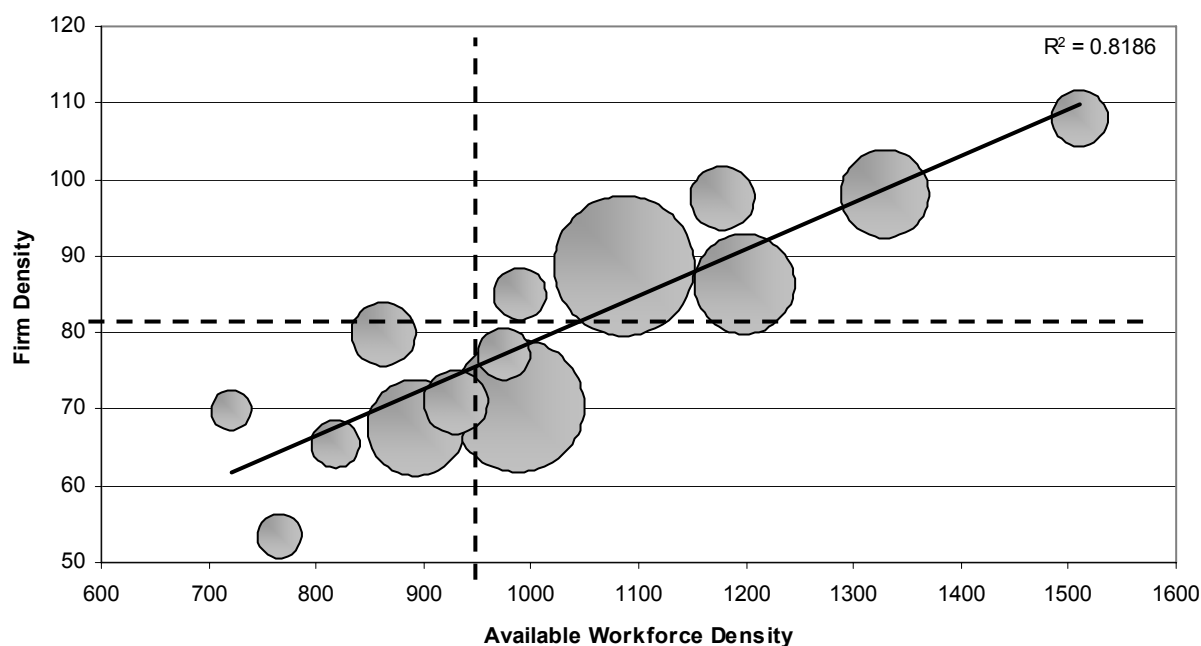


Note: Settlements with more than 800 firms identified. Scarborough excluded for data presentation purposes.

5.74    Sheffield-Rotherham has firm and labour densities below the mean, but workforce densities above the mean. In part, the overall firm density reflects the relatively lower densities in the wards linking the two cities (although still significantly above the minimum threshold). The position of the area below the best fit line indicates, however, that firm densities are not as great, in comparative terms, as local workforce densities. This suggests that a proportion of the available workforce is likely to travel out of the area to work, i.e. there is an outward flow of labour.

*Sheffield-Rotherham lacks the firm density of Leeds, but is still a major focus for firms in the region. The settlements positioning 'below' the best fit line indicates that some will travel out of the settlement to work.*

5.75    Most of the smaller cities in Yorkshire & Humberside have relative densities that indicate that they experience outward flows of their indigenous workforces to work in other settlements and areas. There appear to be two broad patterns:

[20] Mean firm density and available workforce density are for all settlements identified within the Yorkshire and Humber region; the figure only identifies those containing over 800 firms.

1) Cities that are below the regional mean for firm densities, and below the best fit line, i.e. they have a proportionately denser available workforce than firm population. These settlements have a greater proportionate share of available workforce and so are likely to see some labour flow out for employment. These cities (Huddersfield, Wakefield, and Barnsley) appear to have similar firm and labour agglomeration and flow effects as Sheffield-Rotherham.

Scunthorpe is markedly under the regional means for densities and noticeably below the best fit line, suggesting both out-flow of the workforce to find employment and a lack of a local critical mass in the local economy.

*Huddersfield, Wakefield, Barnsley and Scunthorpe appear to have similar agglomeration-flow dynamics as Sheffield-Rotherham, albeit at a lower overall firm population size. These cities have a relative out-flow of their workforce, but are still significant in terms of overall firm population.*

2) Cities that are similar to Leeds, in that they have above the regional mean for both firm and available workforce densities, i.e. they demonstrate enhanced prospects for agglomeration effects locally. Of these cities, only Doncaster and York have a proportionately greater density of firms than available workforce, suggesting an inward flow of labour. The other three cities – Bradford, Hull and Grimsby – sit under the best fit line, suggesting some flow out of labour, although probably marginal in terms of overall effect on these local economies.

*As well as Leeds, Doncaster, York, Bradford, Hull and Grimsby all have relatively high densities of firms and labour, indicating increased prospects of agglomeration economies in these settlements.*

> *Doncaster and York appear likely to have inward flows of labour.*
> *Bradford, Hull and Grimsby appear likely to have outward flows.*

### East Midlands

5.76     Figure 5.5 below compares firm densities with available workforce densities in identified settlements in the East Midlands.  The relationship between the two variables is less clear than in Yorkshire & Humberside, and there is more variation between settlements.  The more varied picture indicates clearer distinctions between the probable agglomeration and flow effects in settlements.

5.77     Nottingham, Leicester and Northampton have firm and workforce densities above the regional means.  They also have the three largest total populations of firms in the region.  These cities have, as a result, clear indications of a critical mass of firms and labour, as well as high prospects for agglomeration economies due to above average densities.

> *Nottingham, Leicester and Northampton all demonstrate high densities and so prospects for agglomeration economies.*

5.78     Derby and Kettering have densities of available workforce above the mean and are close to the regional mean in terms of firm densities.  Both are likely to have out-flows of labour, as they sit below the firm density mean as well as below the best fit line.  The high concentration of firms in Derby, combined with its above average workforce density and close to average firm density, indicate that it is one of the four most significant settlements, in terms of agglomeration effects, in the East Midlands.

> *Derby is one of four settlements in the East Midlands that are major concentrations of firms that are likely to demonstrate agglomeration economies.*

**Figure 5.5: Firm and Labour Densities in the East Midlands**[21]
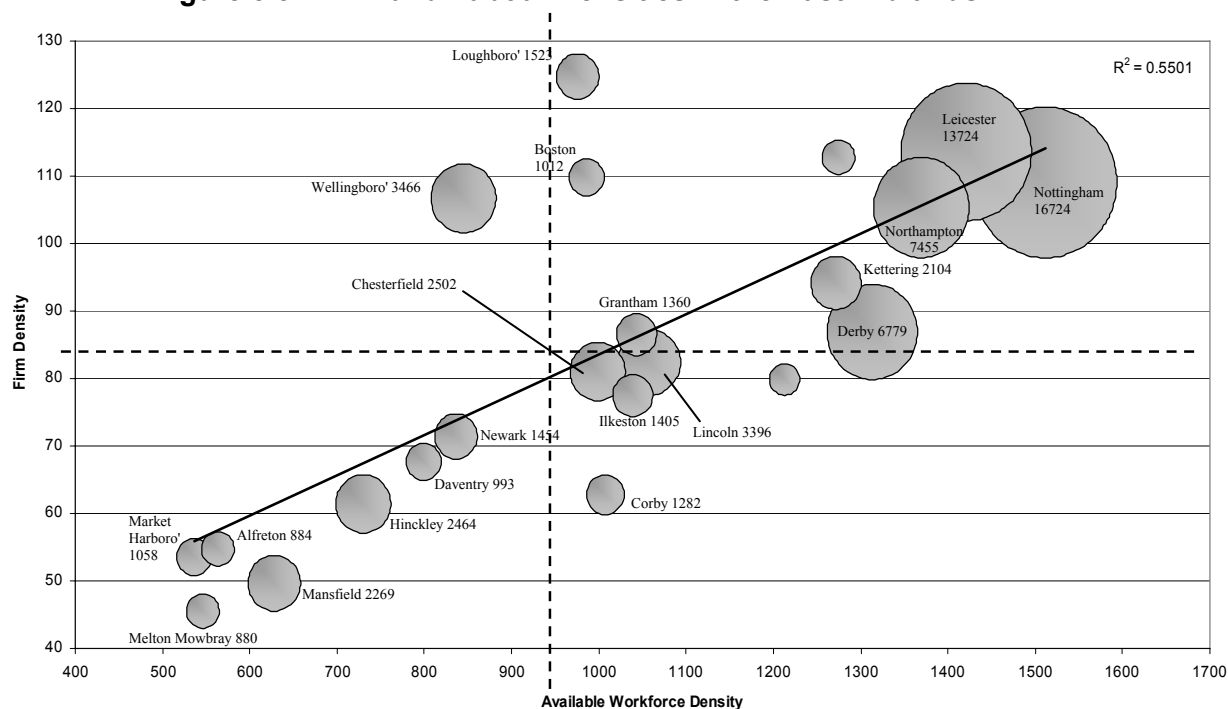


*Note: Settlements with more than 800 firms included.*

5.79 Several smaller settlements have high firm densities, and sit 'above' the best fit line. They signify, as a result, local economies where there is the prospect of agglomeration effects. Given the markedly greater density of firms than available workforce, it is likely that there will be inflow of labour to benefit from high firm density. Two – Loughborough and Wellingborough – are well connected through road links to major regional and national arterial routes, which appears to indicate infrastructure for labour inflows. Two – Boston and Stamford – are towns in rural areas, and so are more likely to demonstrate greater firm densities due to their isolation from other settlements and their rural hinterlands, i.e. they function as 'service centres' for wider, rural areas.

*Loughborough and Wellingborough appear to have firm agglomeration effects that attract labour in through efficient transport infrastructure.*

*Boston and Stamford (and to a lesser extent other Lincolnshire 'market towns' such as Louth) appear to have high local firm agglomeration effects because they have a large rural hinterland.*

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[21] Mean firm density and available workforce density are for all settlements identified within the East Midlands region; the figure only identifies those containing over 800 firms.

5.80    Chesterfield, Grantham, Ilkeston and Lincoln are slightly above the regional means for firm densities, and are on or just below the mean for labour densities. These settlements appear to have localised agglomeration effects, with the possibility that there is outward travel of resident labour to work.

5.81    Seven settlements have densities that are markedly below their respective regional means (Melton Mowbray, Market Harborough, Alfreton, Mansfield, Hinckley, Daventry and Newark). These settlements may function within small local economies, or as 'dormitory' towns in which the local workforce travel to other areas to work.

*Summary and Differences between the Two Regions*

5.82    The East Midlands economy appears to have a different economic structure to the Yorkshire & Humberside region, when examined from the perspective of firm densities and available workforce densities. Whereas the Yorkshire & Humberside economy is dominated by two major concentrations of firms – 'Greater Leeds', including Bradford, Halifax, Huddersfield and Wakefield (including Dewsbury), and Sheffield-Rotherham - the East Midlands has four large cities that demonstrate likely agglomeration effects (Nottingham, Leicester, Northampton, and Derby). The overall economic structure, as measured by local agglomeration effects appears more dispersed in the East Midlands, and the relatively smaller size of the major cities suggests that in overall terms agglomeration effects are more spread out amongst a larger group of smaller cities and larger towns.

*Testing for 'Larger Employers Effects: Firm Densities and Average Employment per Firm*

5.83    One factor militating against agglomeration effects is the role that one or a small number of important local employers play in sustaining the local economy. In settlements dominated by, or housing major employers that account for a large share of local economic activity, firm densities may be relatively low. This section tests for 'larger employer' effects by examining average firm size against firm densities. Larger employer effects should occur when densities are relatively low and firm size high.

*Yorkshire & Humberside*

**Figure 5.6: Yorkshire & Humberside Firm Densities to Average Employment per Firm**
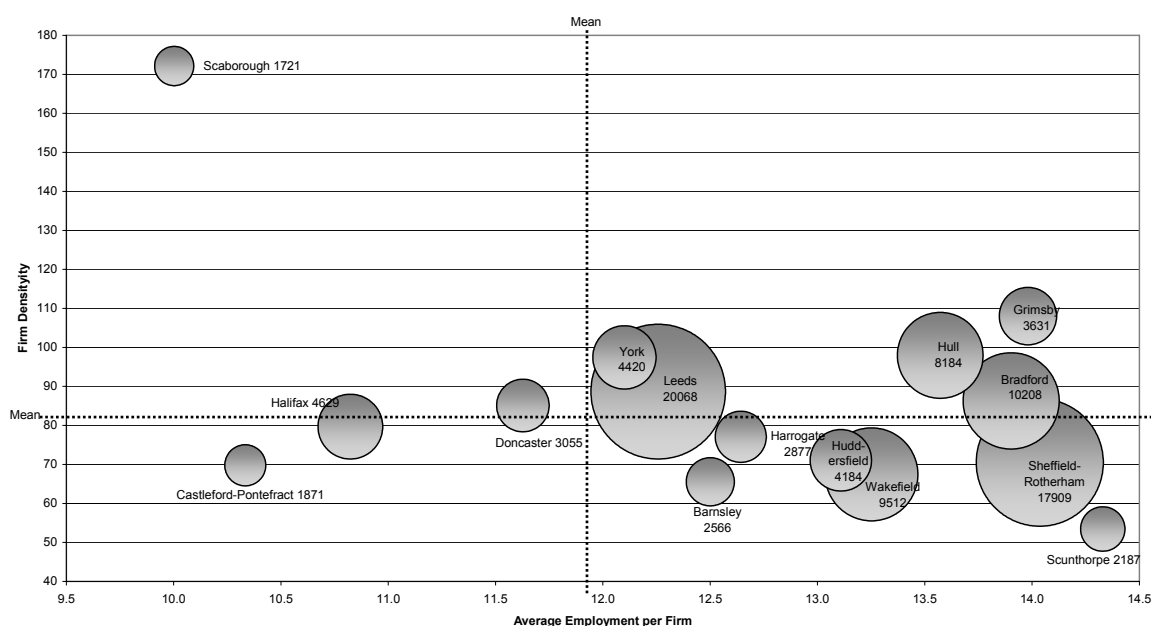


5.84    Firm densities and average firm size in each settlement in Yorkshire & Humberside are presented in Figure 5.6.  This figure suggests that there is a large employer effect in some settlements (Scunthorpe, Sheffield-Rotherham, Bradford, Grimsby and Hull – and to a lesser extent Wakefield and Huddersfield).  Firm densities are broadly around the regional mean, apart from Scarborough which functions as an outlier, suggesting that there is little effect on average firm size by settlement firm density, i.e. there is little relationship between agglomeration effects from firm density and larger employers as determined by average firm size.  Indeed, the $R^2$ with Scarborough removed, due to its 'outlier' effect, is very close to zero. Larger employer effects can be seen when the average firm size is high and the number of firms, as well as firm density, in a settlement are relatively low.

5.85    Scunthorpe demonstrates the strongest case of larger employer effects, because it has a smaller number of firms, a low density of firms and the highest average firm size.  Compared with Scarborough, which has a similar number of firms but a much more densely concentrated, Scunthorpe's firms are on average almost half as large again.

5.86    Sheffield-Rotherham, Wakefield and to a lesser extent Huddersfield and
        Barnsley, have some larger employers effect, in that average firm sizes are
        higher than the regional mean and firm densities lower.

5.87    Leeds, York and Doncaster, in contrast, appear to have a greater number of
        smaller enterprises.  All three settlements were identified in Figure 3 as
        demonstrating higher than average prospects for agglomeration effects,
        based on 'critical mass' in firm and available workforce densities.  This
        suggests that agglomeration effects arising in these three settlements are
        likely to come from and be enjoyed by smaller businesses than the regional
        average.  The implication is that 'small business economies' exist in these
        three settlements.

5.88    In summary, there appear to be minor larger employer effects in Yorkshire
        and Humberside, probably in more industrial areas where economies of scale
        exist in engineering and manufacturing (unlike in many services).  Some of
        the settlements with the greatest prospects of agglomeration economies
        being more occupied with smaller enterprises.

        *Minor 'larger employer effects' can be seen in Sheffield-Rotherham,
        Wakefield and to a greater extent, Scunthorpe. Settlements that demonstrate
        relatively high prospects of agglomeration economies tend to be populated by
        smaller businesses.*

        **East Midlands**

5.89    Figure 5.7 below provides comparable larger employer data for the East
        Midlands.  In most cases, average employment per firm does not vary widely
        by firm density, indicating that larger employer effects are not widespread or
        especially significant.  Unlike Yorkshire & Humberside, there appears to be a
        positive (rather than neutral) relationship between overall firm population, firm
        density and average employment per firm.  All four major urban settlements in
        the region are high in both firm density and average employment per firm,
        suggesting that in the East Midlands agglomeration effects are self-
        reinforcing, i.e. that there continue to be benefits from agglomeration in urban
        areas.  This appears to be especially so for Nottingham and to an extent

Northampton, both of which are above the regional means for firm density and average employment.

*Agglomeration effects appear to be self-reinforcing in the East Midlands, with settlements with higher firm densities and populations having larger average firm sizes.*

5.90     Three other broad groupings of settlements can be identified. The first

**Figure 5.7: East Midlands Firm Densities to Average Employment per Firm**
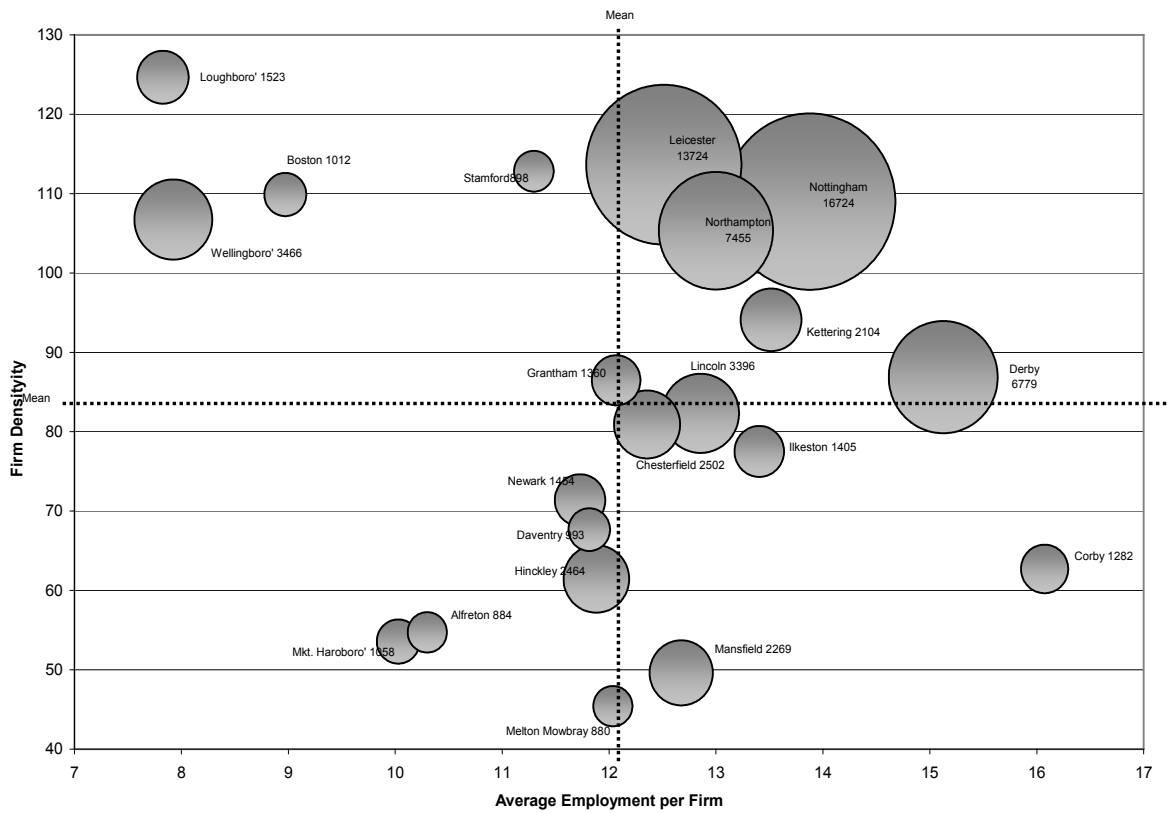


consists of the four settlements that were identified in Figure 4 as having high prospects for local agglomeration effects (Loughborough, Wellingborough, Louth and Boston). These settlements have higher than average firm densities and much lower than average firm sizes. They can, as a result, be described as local small firm economies enjoying agglomeration effects.

*Loughborough, Wellingborough, Louth and Boston appear to function as 'local small business economies' with good prospects of agglomeration economies.*

5.91    There is also a group of settlements that have around the same average firm size, of around eleven employees, that is just below the regional average. These settlements demonstrate varying firm densities, all below the regional average, ranging from very low (Melton Mowbray) to relatively low (Grantham, Lincoln and Chesterfield). These settlements appear to enjoy little by way of agglomeration effects or larger employer effects. Some, such as Grantham, Chesterfield and Lincoln, may have partial or local agglomeration effects, given that they lie relatively close to both regional mean averages.

5.92    The only settlement that appears to demonstrate larger employer effects in the East Midlands is Corby. This settlement has a relatively low firm density and a relatively high average firm size (the highest in the region).

*Only Corby in the East Midlands appears to have a larger employer effect.*

**Modelling 'Inward' and 'Outward' Labour Flow Effects: Firm Densities and Available Workforce per Firm per Square Kilometre**

5.93    Figures 5.8 and 5.9 assess the extent to which firm density and availability of workforce in a settlement are linked. The proportion of economically active people per firm per square kilometre provides an indication of how many people in the available workforce are available for each firm, on average across the settlement. This is different to available workforce density because it calculates the availability, per square kilometre, of economically active people for each firm in a settlement. It provides, in other words, an assessment of how 'tight' the local labour market is for employers, in that it is an indicator of the number of economically active people available for each employer. As a result, it also presents a local limit on employment expansion, assuming no in-flows of labour from outside the settlement.

### *East Midlands*

5.94    Figure 5.8 below analyses local availability of workforce per firm against firm densities for settlements in the East Midlands.  The best fit line suggests there is no clear association between firm density and economically active people per firm per square kilometre.  However, the figure indicates that there is a reverse effect between overall size of the settlement, in terms of number of firms, and economically active people per firm per square kilometre.  The four cities with the highest firm densities – Leicester, Nottingham, Northampton and Derby respectively – also display the lowest number of economically active people per firm per square kilometre.

**Figure 5.8: East Midlands Firm Density by Available Workforce by Firms per Square Kilometre**
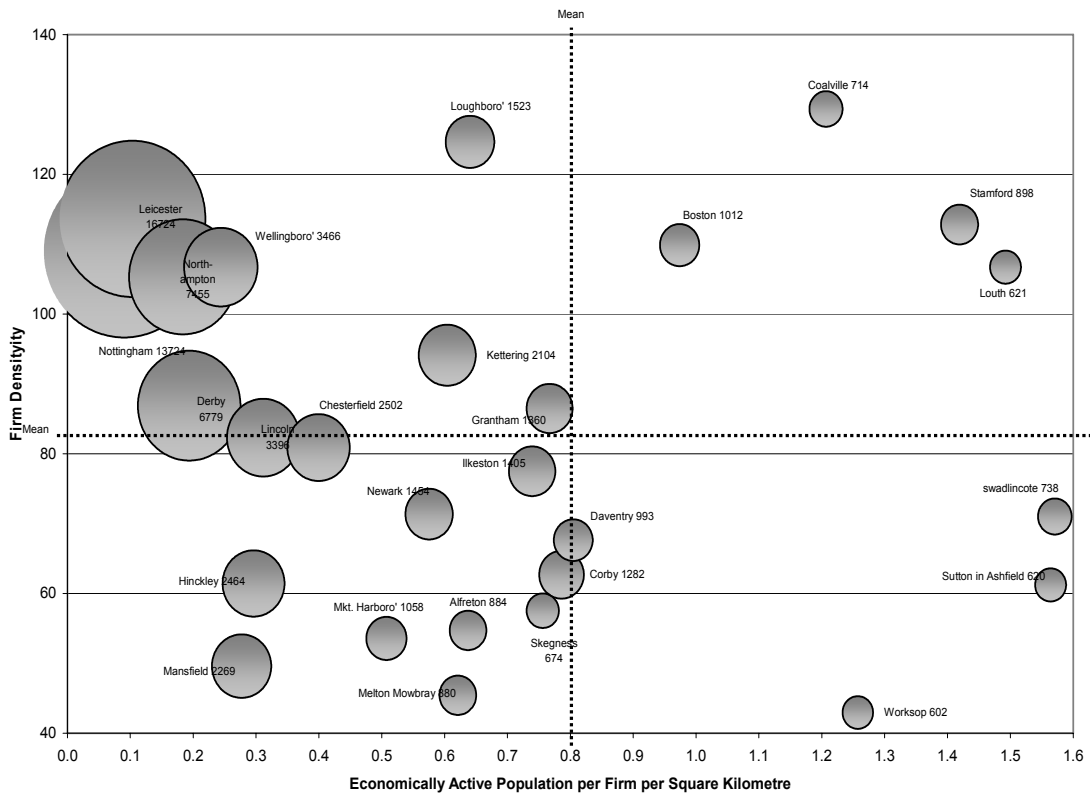
5.95    This suggests several possibilities and scenarios:

1)      Labour markets are 'tighter' in settlements demonstrating the potential for higher levels of agglomeration, i.e. 'real' competition for employment is high in economies with agglomeration effects.

2)      Land, and hence house, prices are higher in settlements enjoying greater agglomeration effects.  This is consistent with demand modelling for real estate, which would expect living costs to increase the higher the local agglomeration effects.  This will 'crowd out' residents with lower incomes and lower expectation of sufficient returns to employment, i.e. individuals with lower prospects of higher incomes.

3)      More people travel into these four settlements for employment.  This is partially consistent with Figure 4, for Leicester at least because it sits above the best fit line, i.e. there is greater local firm density than available workforce density.

4)      It may reflect a larger proportion of people who are economically inactive and so do not register on these metrics.

5.96    The implications of this analysis, for regional flows of labour, are as follows:

1)      In the East Midlands, the major settlements in terms of firm populations and the likelihood of agglomeration effects have a lower available workforce per firm and so are more likely to attract in labour from other areas.

2)      Settlements where firm densities are lower than the regional mean, and low overall, are more likely to experience flows of labour out to other settlements.

*Analysis of economically active population per firm per square kilometre supports the proposition that larger settlements with the prospects of enjoying agglomeration economies are more likely to attract in labour from other areas and settlements.  Conversely,*

*settlements with lower firm densities and higher proportions of economically active people to firms per square kilometre are more likely to 'export' labour, presumably to the settlements described above.*

### *Yorkshire & Humberside*

**Figure 5.9: Yorkshire & Humberside Firm Density by Available Workforce per Square Kilometre**
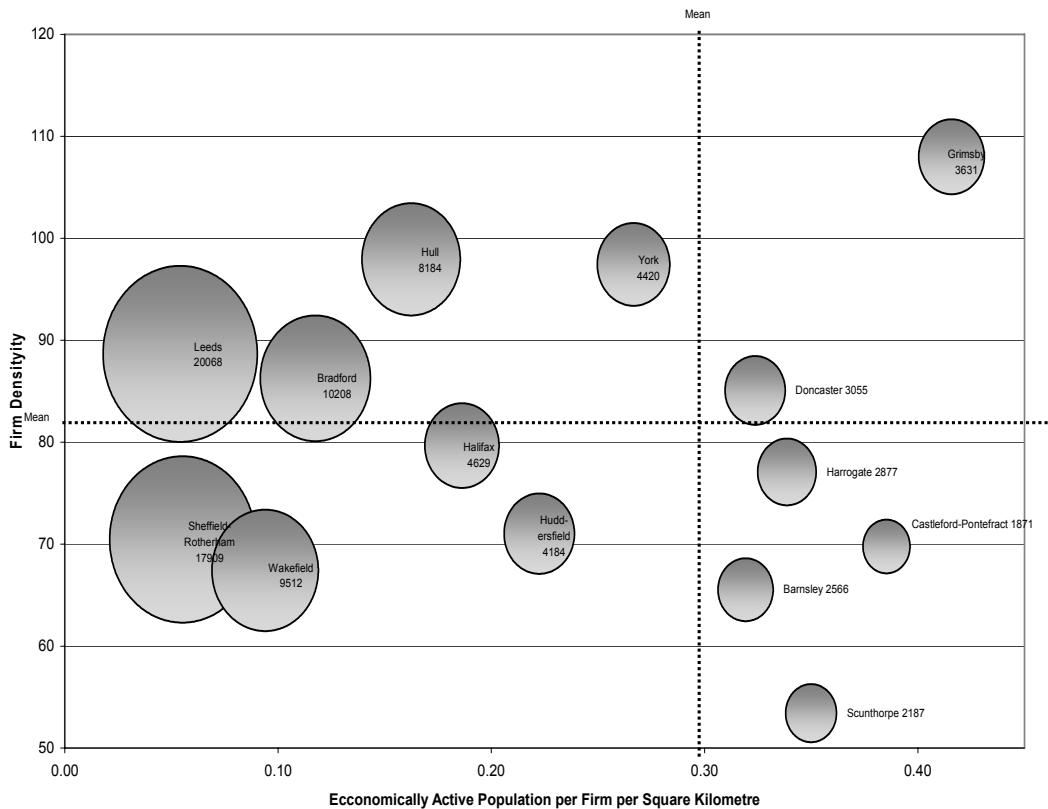


*Note: Scarborough excluded for data presentation purposes.*

5.97    A similar, although not identical, effect appears to occur in Yorkshire & Humberside (see Figure 5.9 above). The largest firm populations demonstrate the lowest levels of economically active people per firm per square kilometre.

Unlike the East Midlands, however, firm density is not above the mean for all these settlements. Sheffield-Rotherham and Wakefield have firm densities and numbers of available workforce per firm per square kilometre below the regional means.

Given that both have amongst the largest firm populations in the region, this suggests that although there are a large number of firms in these two settlements, they are relatively dispersed (and so less likely to enjoy agglomeration economies) and there is little 'slack' in the local labour market, i.e. levels of economic participation are low for the size of the economy.

5.98    Leeds, Bradford and Hull appear to attract in labour to work in settlements where firm densities are relatively high but proportions of economically active people are not.  Conversely, settlements such as Scunthorpe, Barnsley and to some extent Harrogate are more likely to see residents travel to other areas to work.

*In Yorkshire & Humberside, some settlements attract in labour.  However, two major settlements of firms appear to face structural problems of low firm density and low levels of economic activity per firm.*

**Conclusions**

5.99    The analysis of firm densities by available workforce densities has identified settlements where regional agglomeration effects, through economies of urbanisation, are likely because of: (1) high firm densities; (2) large overall firm populations; (3) high local workforce densities.  Cities that have this profile include Nottingham and Leicester in the East Midlands, and Leeds and Bradford in Yorkshire and Humberside.  These settlements represent the major nodes of economic concentration and activity in each region.

*East Midlands*

5.100   The three cities that fulfilled the conditions for regional agglomeration economies to be likely to exist in the East Midlands are Nottingham, Leicester, and to a lesser extent Northampton.  All three cities have firm densities and workforce densities above the regional mean, and also have a large overall population of firms.  Nottingham and Leicester are particularly

significant, given the markedly higher numbers of firms within these cities than other settlements in the region (around double the population of Northampton and Derby, the next two largest cities).

5.101   Derby has a relatively large firm population and a higher than average available workforce density.  For these reasons, it is one of the four major economies in the East Midlands.  Its firm density, however, is slightly below the regional mean, which suggests that agglomeration effects are likely to less evident than in the three other regional agglomerations.  A relatively high firm population with below average firm density and a high density of economically active people suggests that the structure of Derby's economy is less likely to capture agglomeration economies than cities such as Nottingham and Leicester.

*A major implication of this analysis is that the East Midlands has four 'core cities' and not three.*

5.102   The East Midlands also has four smaller settlements that have high firm densities and below average densities of available workforce.  Likely to attract in labour from surrounding areas, these towns look likely to have 'strong' local agglomeration effects.

5.103   The region also has eight settlements that are below the regional mean densities for firms and available workforce.  All of these settlements are unlikely to have agglomeration effects, and appear to lack local 'critical mass' in terms of density of economic activity.  Three (Lincoln, Chesterfield and Grantham) are only slightly below the regional means, however, suggesting that there may be potential for agglomeration effects to emerge.  Lincoln has a large local population of firms (sixth largest in the East Midlands) and, due to its wide rural hinterland, may experience some agglomeration effects already.

**Figure 5.10: Grouped Settlements in the East Midlands**
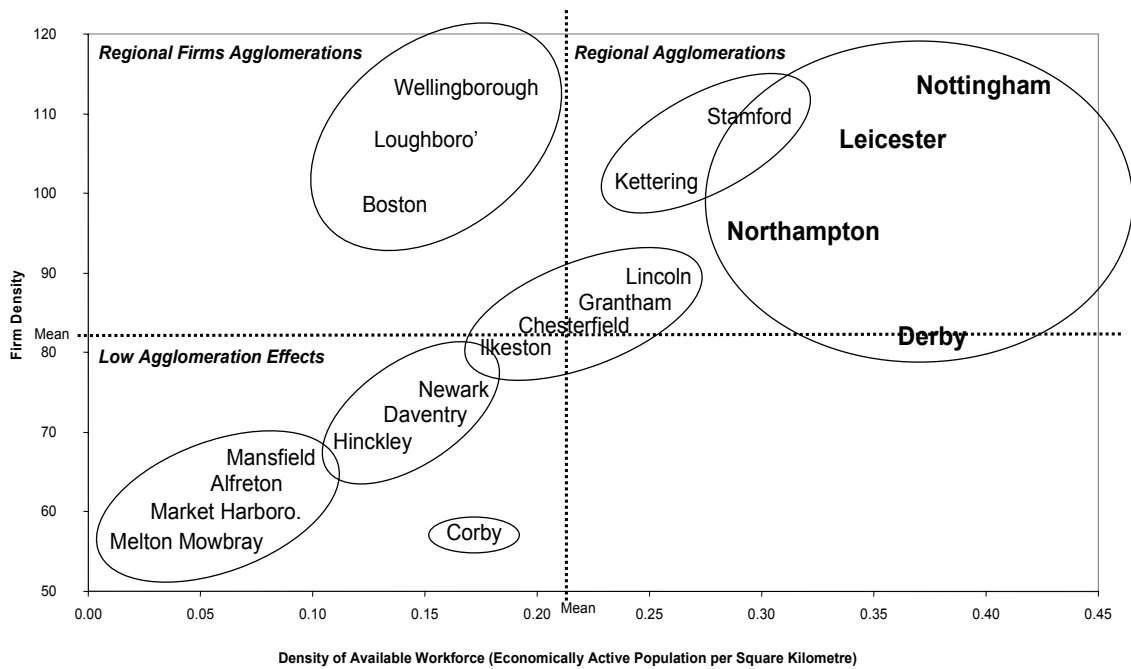


5.104   In all these settlements, there is a relative excess density of the available
        workforce over firm densities, suggesting that there is an outflow of labour to
        other settlements and areas.  This appears to especially strong in the case of
        Corby, which in relative terms has a very low firm density compared to
        available workforce.

5.105   In summary, the East Midlands economy has four major concentrations of
        firms that are likely to have significant or likely agglomeration effects.  The
        region also has several local agglomerations that attract in labour and so
        serve as local 'magnets' for economic activity.  However, the region also has
        half of its settlements with low or very low densities, suggesting 'structural'
        issues for these towns and small cities.

*Yorkshire & Humberside*

5.106   Leeds, Bradford, and to a lesser extent Hull, all enjoy high densities of firms
        and available workforce along with large populations of firms.  These cities
        are likely to experience agglomeration effects, especially in Leeds and
        Bradford.

**Figure 5.11: Grouped Settlements in Yorkshire and Humber**
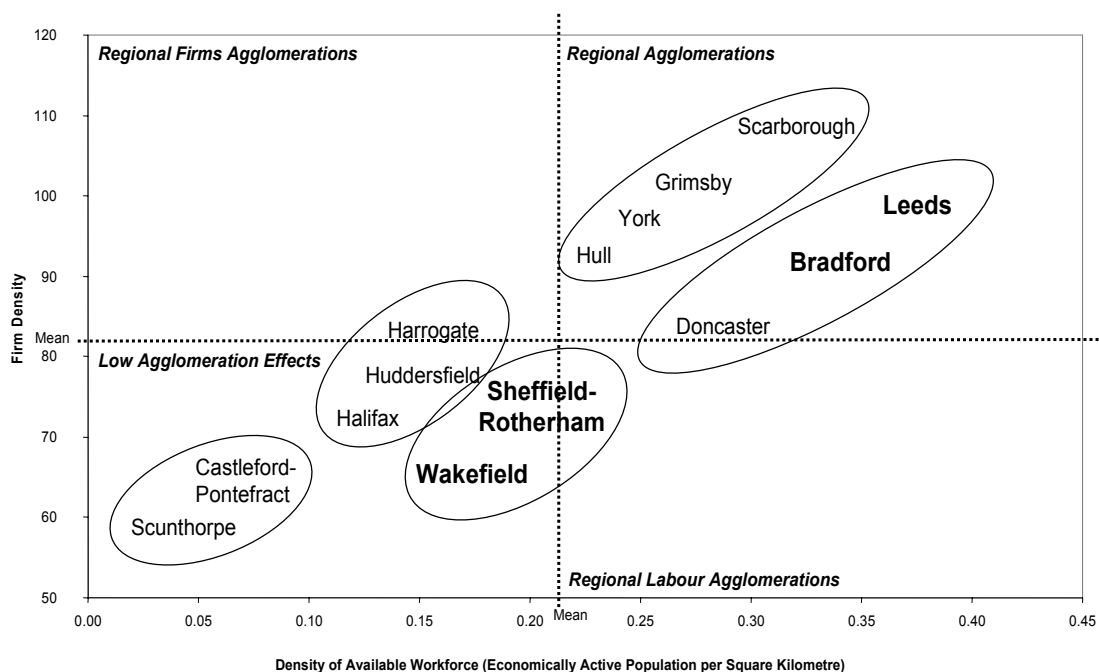


5.107 Scarborough appears to be small but very densely populated settlement, in terms of firms and available workforce, suggesting a local economy that has a high likelihood of agglomeration economies.

5.108 The region also has three settlements that, although having smaller total numbers of firms, have higher than average densities of firms and labour and so can be considered instances where 'local' agglomeration economies are likely to occur. These are: Grimsby, York and Doncaster.

5.109 Sheffield-Rotherham, although it has a high firm population and above average workforce densities, has a lower than mean firm density (a profile similar to that of Derby). This means that it is less likely to enjoy agglomeration effects than other major urban areas in the region. It appears, as such, to have a 'structural' issue which works against the emergence of agglomeration economies.

5.110 Yorkshire & Humberside has few settlements that are markedly below the mean for both firm and available workforce densities. Only Scunthorpe, and

to a lesser extent, Barnsley, have densities of firms and labour well below regional averages, indicating few settlements where there is insufficient 'critical mass' in economic activity. Wakefield-Dewsbury and Halifax are slightly under both means, but not notably so.

5.111 In addition, the overall size of the Wakefield-Dewsbury population of firms suggests that some agglomeration effects may exist in this settlement, making it the fifth major agglomeration of firms in the region.

### *Larger Employer Effects: Summary*

5.112 There is little by way of larger employer effects, i.e. of dominance of settlements by large local employers, found in this analysis. Where it appears to occur – Scunthorpe in Yorkshire & Humberside and Corby in the east Midlands – the local settlements are relatively less prosperous, and have traditional dependence on a single key company (Scunthorpe) or low levels of local economic activity (Corby).

5.113 There are some indications of larger employer effects in Sheffield-Rotherham and Derby, the two regional agglomerations that also have lower relative firm densities. This suggests that 'structural' issues in these local economies may be linked with greater dependence on a smaller number of more dispersed larger employers, operating autonomously from each other and possibly from part of the local economy.

## Availability of Employees per Firm

5.114 There is a reverse effect between availability of workforce per firm and total number of firms in settlements, and to an extent firm density (particularly so in the East Midlands). This suggests that the major economic concentrations and agglomerations in both regions may experience labour market 'tightness' because of the low levels of available workforce per firm over their areas. This 'tightness' occurs in those settlements that are most likely to experience agglomeration economies.

5.115  Given that agglomeration economies are likely to lead to local growth, through economies of localisation and urbanisation (section 2), this indicates that labour market 'tightness' in these settlements is likely to be a barrier to such economies, and so a limit on future development.  Addressing labour market 'tightness' in major agglomerations, and enhancing labour market mobility, therefore appear to be major strategic issues for the economic development of both regions.

# Section 6 – Mapping Interventions and Development Rationales and Approaches

6.1     *Rationale*. Within each region there are a number of stakeholders involved in economic development activities. Economic development is taken in its widest sense to include all institutions involved in activities such as training or business support as well as strategic policymaking activities.  In order to get a broad overview of the policies and activities that affect the two regions, a group of circa 30 organisations were approached and representatives interviewed on the subject of GDP and GDP growth.

6.2     *Approach*.  In order to gain an overview of policies and activities undertaken by key stakeholders face to face interviews were undertaken with 29 organisations across the 2 regions.  Interviews took the form of a semi-structured meeting where a respondent from each organisation was asked questions on the organisation's role, main activities and key contribution(s) to the region, as well as how this was measured and evaluated, the other institutions with which they interact, and their views of GDP and the drivers of economic development. The semi-structured nature of the interviews meant that each interview could be tailored to each organisation but overall consistency between interviews maintained.

6.3     Highlights of these interviews are summarised in Table 6.1, which focuses on four specific dimensions of GDP growth:[22]

- What is GDP growth in a regional or sub-regional context, and how can it be defined?
- What drives or generates GDP growth?
- What role do firms and labour play in GDP growth and regional development?
- What role do institutions and infrastructure play in GDP growth?

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[22] The extent to which individual agencies measured, or sought to measure, impact varied considerably.  In many, if not most cases, impact was considered difficult or impossible to assess, and so focus was placed on measuring outputs and activities.

**Table 6.1: Identified Drivers of Regional GDP Growth**

| Firms & Markets | • Productivity/profitability of firms |
| | • Innovation/increases in value-added |
| | • Exports/import substitution |
| | • Growth in services sector |
| | • Market competition |
| Investment | • New investment |
| | • Inward investment |
| | • Significant projects: |
| | → stimulate expenditure |
| | → stimulate investment |
| | → facilities for firm growth |
| Enterprise | • Start-up rates and quality |
| | • Culture of enterprise |
| Labour Market Dynamics | • Skills and knowledge levels |
| | • High level skills |
| | • Preventing skills losses |
| | • Levels of inclusion/economic activity |
| Economic Structure | • Cities as a key generator of growth |
| | • Clusters |
| | • Sub-regional make-up (local competitiveness) |
| Enablers | • Business support |
| | • Business services |
| | • Strategies and frameworks |
| | • Infrastructure |

**Defining GDP**

6.4    Most respondents provided a description, or definition, of GDP; although their nature and content varied considerably. Overall, three issues can be identified:

I.    GDP is a broad concept that is difficult to apply uniformly or consistently at regional and sub-regional levels. Its focus on the national 'account' may not be transferable to regions and their constituent parts without some re-formulation of the concept (see Section 3 of this report).

II.     The concept can be described from various perspectives, creating a degree of ambiguity about its core meaning and use in developing and shaping thinking on regional and local development.   Some respondents defined it in terms of overall size and volume of economic activity, whereas others used it as a means of describing the performance or quality of economic activity (see 6.6 below).

III.    It is not a complete indicator of regional development, in that it does not account for social, environmental and other 'externalities' that relate to but are not considered in economic growth measures.[23]   A key implication of this parameter appears to be that GDP Growth explains part, albeit a significant aspect, of regional growth and development, and so should be used alongside other indicators.

6.5     These three issues suggest that GDP, and GDP Growth, are useful concepts, but not exclusive descriptors of regional development.   This approach is reflected in the Regional Economic Strategies for both regions, and so points to broad consensus around a multi-dimensional approach to regional development that includes GDP growth and other 'hard' economic output and activity indicators, but that also considers broader considerations related to community, environment and culture as well as infrastructure, institutions, relationships and other 'softer' factors.

6.6     The feedback also indicates variation in definitions and descriptions of GDP and GDP growth.   Across the interviewees, GDP was most commonly characterised in output or turnover terms, i.e. as 'wealth created' within or by a region (12 instances).   GDP was also associated closely with GVA (6 instances) and was seen as a benchmark or performance measure of economic performance (3 instances) or broader notions of 'wellbeing' (2 instances).

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[23] It should be noted that the New Economics Foundation in the UK, and the United Nations Development Programme have developed and tested broader 'wellbeing' measures of development and growth that incorporate economic 'externalities' such as education, social and community development, and the environment.

6.7     There was confusion about the term and difference in opinion.    Three
        particular issues can be identified:

- The concept itself is confusing, in part because of the three different
  definitions that can be used.    Most respondents tended to adopt a
  production-oriented description or definition.
- There was some debate around whether GDP is a 'net' or 'gross' figure
  (and calculation).
- GDP does not measure key 'externalities' (i.e. non-market effects) such as
  environmental impact, and does not consider particular social development
  challenges such as local disadvantage.

6.8     However, the use of GDP – and GDP growth – as a means of measuring
        performance and benchmarking was seen as a useful monitoring tool by
        many respondents.

**Drivers of GDP Growth**

6.9     Respondents identified six dimensions of GDP growth (see Annex for
        summary analysis):   the competitiveness of firms and market competition
        within the region; levels of investment into and within the region; levels of
        enterprise; labour market dynamics and the labour force's human capital; the
        economic structure of the region; and enablers of growth and development.

6.10    Although not a complete list, the broad framework identified from the
        interviews provides a comprehensive, and holistic, consideration of the
        multiple factors likely to influence and drive GDP growth.   Of particular
        interest, and note, are the following points:

- Firms operate within, and contribute to, broader market dynamics – both
  firms and markets are significant contributors to and factors within regions,
  and firm-level targets and analysis should take into account the dynamics
  of markets within (and across) regions.

- Investment – both within the region and inward – was seen as an important driver of growth and regeneration, with the capacity to effect substantive change and renewal within a regional economy.

- Skills and practical/applied knowledge was seen as a key aspect of regional labour market dynamics.

- Economic structures, including legacies from earlier activity, have a strong influence on current levels of economic development.

**Table 6.2: Areas of Input and Contribution into the Regional Economy**

| Regional agenda and strategy (RES) | Alliance SSP, EMRA, emda, Yorkshire Forward |
|---|---|
| Sub-regional and local development agendas | Hull City Council, Leeds Chamber of Commerce, Leeds Initiative, Lincolnshire Enterprise, MYCCI, Objective 1 South Yorkshire, Renaissance South Yorkshire, Sheffield Chamber of Commerce |
| Direct SME engagement and Services | BL Derbyshire, BL Leicestershire, BL Lincolnshire and Rutland, Nottingham Business Venture, *North Lindsey District Council*, *Nottingham City Council* |
| Premises and space | Barnsley Development Agency, Calderdale District Council, Chesterfield Borough Council, Hambleton District Council, Leicester URCo, North Lindsey District Council, Nottingham City Council, Sheffield City Council |
| Skills | Leicestershire LSC, Nottinghamshire LSC, West Yorkshire LSC |
| Internationalisation | East Midlands UKTI |

**Contribution to the Regional Economy**

6.11  Respondent organisations were asked to identify their primary, or key, role in regional economic development, and indicate the nature of impact of these contributions (see Table 6.2 above for a summary of responses by interviewees). Table 6.2 summarises six primary areas of focus that can be identified as broader themes, i.e. the highlighted priority concerns of these organisations:

6.12    The institutional configuration of some of these organisations has undergone significant change over the last two years, in particular with the advent of EMB as a region-wide interface for SME support and development and the changing structure of the LSC network and provision.   These findings therefore reflect the duration of this project, which has taken place over the last two years.

6.13    These findings therefore provide indicative insight into the nature of regional and sub-regional provision and its contribution to regional development in the East Midlands and Yorkshire & Humber.

6.14    There are agencies with either a regional or sub-regional focus on holistic, or overall, development.

6.15    Regional Development Agencies and assemblies, not surprisingly, see themselves as operating at the regional level, developing strategy and frameworks.

6.16    Councils of larger cities see themselves as local leaders in development of these settlements (and to an extent surrounding and connected areas).

6.17    This raises two points:

1)    Holistic approaches to economic (and social) development are evident, at both local and regional levels;

2)    The level of connectivity and interaction between these two levels is often unclear and in certain cases did not appear to be as strong and explicit as they could be.

6.18    Organisational 'type' influences the type of contribution made.   Local authorities – at district and borough level – focused on premises and the provision of space.   Business Links, and the successor organisation, see themselves as engaging directly with SMEs; typically offering services as well as referral and brokerage inputs.   Learning and Skills Councils were focused on skills and their development, mainly on a leaner-responsive basis of delivering personal accreditation opportunities.

6.19   There seems to be some indication that organisations are not necessarily 'joined up' in provision, but are aware of the broad areas of activity of other providers and agencies.  For example, several Learning and Skills Councils saw their activities and role in skills development as complementary to, but distinct from, the SME support activities of Business Link, the provision of premises by local government, and the local coordinating role of local and sub-regional partnerships.

6.20   Responses on the 'type of contribution' highlight three themes:

- Many (if not most) considered their contributions indirect, rather than direct, in the sense that they engaged indirectly with businesses and individuals.  In many cases, the direct attribution of their impact and contribution was difficult to determine or measure.
- Some organisations defined indirect as a low impact, rather than as difficult to attribute or quantify.
- In both cases, there was extensive evidence that organisations sought to 'leverage' additional funding from other agencies to match against or enhance their own funding streams and mechanisms.

**Local and Regional Strategy Formulation and Implementation**

6.21   *Needs analysis –informing strategy development*.   There is indication across most of the interviewed organisations that needs analysis is undertaken to inform and guide policy and strategy development and formulation (17 of 26 respondents stated as such).  Needs analysis tended to be concerned with: (1) formulation of overarching strategies, e.g. the RES; (2) understanding specific thematic or sectoral development plans, e.g. community plans, employment strategies, and sites development; (3) to provide intelligence for localised planning, typically at city level.

6.22   *Strategy Development* and *Identification of Priorities*.   Most of the interviewed organisations identified strategy development and prioritisation as a core role and activity.  The range of strategies and priorities highlighted

varied considerably across the organisations, and focused around three areas: (1) regional strategy development, and implementation, in particular related to or linked with the RES; (2) sub-regional and local strategy development; (3) and representation or coordination of local or organisation-specific interests.

6.23    There was a tendency for organisations that developed, or led on, strategy to undertake needs analysis and identification.  This indicates that strategy formulation in both regions was underpinned by analytical evidence, indicating an 'evidence-based' or –informed approach.

6.24    *Measurement and Evaluation*.  A small number of respondents identified 'M&E' as a primary or core function of their organisations (8 of 26).  Regional agencies tended to have an M&E function tasked with assessing the impacts of implementation of regional study, and typically incorporated some form of needs analysis into strategy development and assessment.  At a sub-regional level, M&E tended to be undertaken by partnerships and structures that incorporated multiple organisations.  These cross-institutional partnerships appeared to adopt a leadership or 'champion' role for their 'local' economy, and so identified a need to understand the effects of intervention by member agencies and others on their locality.

6.25    *Capacity Building*.  Almost all respondents identified some form of capacity building – i.e. enhancement of current capacity within an organisation or across a network– as a key function (24 of 26).  Typically, capacity-building focused on: (i) engagement of the private sector in local and regional development strategies and frameworks; (ii) coordination of activities with other publicly-funded agencies; (iii) aligning with, or ensuring complementarity with, other agencies and what they do.

6.26    *Summary*.  Overall, there is indication that strategy development is generally informed by needs-focused analysis, and that at a regional level monitoring and evaluation of such strategies is also undertaken.  There appear to be two development opportunities, and possible constraints on the development frameworks in place in both regions:

1. Scope to increase M&E activities at sub-regional and local level, i.e. creation of greater capacity locally to develop 'intelligence' around effects and impacts as well as targets and outputs.

2. Scope to feed extensive analysis into wider debates and assessments of effectiveness and impact of interventions, i.e. mechanisms to share and disseminate the extensive analysis undertaken by many of the interviewed organisations.

# Section 7 – Assessing Regional Growth using GDP

**How can interventions be measured and evaluated?**

7.1     Consultations with key stakeholder organisations across both regions indicate that the concept of GDP is a useful means of assessing regional economic development, and structures.

7.2     The use of GDP, and changes in its constituent parts, does not however indicate that this is an exclusive means of assessing regional economic performance.

7.3     Respondents saw GDP as a useful indicator and concept – to sit alongside other measures and indicators, and in particular those that extended understanding and modelling of regional development beyond the purely economic to incorporate community and social, environmental and quality of life, and cultural.

7.4     The application of GDP to regional economies developed in Section 2 of this report provides a useful basis for development of a methodology for understanding, and measuring, changes to GDP and hence economic (rather than broader definitions and conceptualisations of) growth.

7.5     The starting point for this section, as a result, is the re-framed GDP 'equation' developed in Section 3 of the report.

7.6     This formulation of GDP concluded that regional economic is made up of <u>changes</u> in the following components:

- Personal consumption by individuals
- Firm consumption – expenditure on consumables by firms
- Net investment by firms in a region
- Net inward investment into a region by firms

- Net institutional procurement (by the non-private sector)
- Net spend on infrastructure
- Net exports (exports less imports).

7.7    Any change to any of these components therefore constitutes a change to regional GDP. Regional GDP growth, in consequence, is defined as any overall net positive effect as a result of changes in one or more of these components:

$$dY_r = dPC_r + dFC_r + dFIN_r + dIIN_r + dINP_r + dINF_r + d(X-M)_r$$

Where:

| | |
|---|---|
| $PC_r$ | personal consumption expenditure by individuals in region r |
| $FC_r$ | Firms' consumption expenditure in region r |
| $FIN_r$ | net investment by firms in region r |
| $IIN_r$ | net inward investment into region r |
| $INP_r$ | net institutional procurement in region r |
| $INF_r$ | expenditure on infrastructure in region r |
| $(X-M)_r$ | net exports (national and international) from region r |

7.8    In terms of analytical method, GDP can be seen to grow when increases in one or more of the components listed above are greater than zero or any contractions.

For example, if net exports increase while all other variable stay the same, then the marginal increase in net exports equals the actual increase in regional GDP.

Conversely, if personal consumption falls, and net exports increase but by less than the decline in consumer spend, then GDP will fall by the excess of personal consumption reduction over the increase in net exports.

7.9     The formula outlined in paragraph 7.7 therefore provides a basis for measuring marginal increases and changes in economic activity within a region.  In order to apply this framework, there is a need to measure – or calculate, as accurately as possible – each component of GDP and then develop 'time series'.

7.10    **This presents a substantive methodological challenge for the region, because these data are not readily available**.  Development of a data set would require initial investment in a regional architecture for data collection and analysis, based on sampling techniques linked with a representative and robust modelling methodology to extrapolate to regional level.

**Applying the framework: relevance for regional economic policy choice**

7.11    The implication of this approach for regional economic development strategies is clear.  Growth can be generated by securing increases 'across the board', and this is likely to lead to substantial regional development.

7.12    However, growth can also be secured by increasing one or a small number of the components of regional GDP.  Incremental growth, in other words, can be generated by holding most components of GDP steady and increasing one or several individual components.  The 'net' effect of such an approach will be positive growth.

7.13    This points to two distinctive, and achievable, regional strategies for development and growth:

1.    Interventions aimed at <u>all</u> dimensions of the regional economy, and designed to increase each component, i.e. a 'breakthrough' or comprehensive regional development framework.
2.    Interventions designed to increase <u>one</u> or a <u>small number</u> of components, i.e. a targeted or 'incremental' development framework.

7.14    Both strategies are likely to lead to positive development trajectories for regions, and so present alternative strategies for interventions to stimulate regional economic expansion.  They also require different intervention logics and approaches (targeted vs. holistic/comprehensive), and suggest different levels of resource requirement and investment threshold.[24]

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[24] Although a targeted intervention around a single GDP component may be intensive in terms of resource requirement, particularly when the need or 'structural' constraint is high.

# Section 8 – Conclusions and Propositions

**Summary of findings**

8.1 A key challenge when applying GDP (and GVA) at the regional and sub-regional level is to determine the effects of particular dimensions of economic activity on growth. By re-framing GDP/GVA as driven by 'actors' who contribute to economic growth through changes in consumption and investment, a framework for understanding the drivers of regional development can be produced that has the scope to relate funded interventions with GDP growth.

8.2 The framework developed in sections 2 and 3 of the report identifies the following 'actors' as driving regional, and sub-regional, economic growth:

- Firms, through: (1) expenditure on consumables and other consumption items within a region; (2) investment in premises, equipments and other resources within a region; (3) capital investments coming into a region through re-location.
- Individuals, through: (4) personal consumption within a region/area.
- Public and non-private bodies through: (5) procurement expenditure within a region; (6) spend on infrastructure, both 'hard' and virtual.
- (7) net imports into a region.
- Policy interventions, both: (8) within a region, e.g. through regional strategies and frameworks; and (9) national and trans-national policies affecting a region.
- Other exogenous factors, i.e. economic, social, technological, natural, and political events, circumstances and conditions that affect a region.

8.3 In terms of regional strategy and intervention, components 1) to 8) represent the dimensions through which regional development can be influenced, <u>within</u> a region. These eight components therefore represent the 'opportunity set' for stimulating economic growth.

8.4    Section 7 explores how a re-formulation of national GDP measures to focus more clearly on specific economic 'actors' (firms, consumers, government and public spending) can be applied to regional economic development and GDP/GVA growth.

8.5    Existing data (section 4) indicates that the regions fall slightly behind their UK mean for most key performance indicators, but that the key cities in both regions out-perform both their own regions and the UK average overall.  This points to regions that have competitive regions within hinterlands and rural areas where performance is markedly lower.

8.6    There are differences between the two regions, with the East Midlands performing slightly better than Yorkshire & Humberside, in terms of: economic participation; productivity; and trade balance.

8.7    Given the concentration of economic performance in cities, which are distinguished by their 'agglomeration economies', i.e. the concentration of firms and labour in close proximity within urban areas, the report explored the structure of the regions' economies from an agglomeration perspective (section 5).

8.8    Key findings were:

- There is evidence of agglomeration effects across both regions; with concentrations of economic actors in key cities.
- Firms and labour tend to concentrate together in these key cities, and in many but not all smaller settlements.
- In Yorkshire & Humberside, Leeds is the dominant urban economy, but there are smaller cities that demonstrate stronger agglomeration effects (Bradford, York, Hull, Grimsby and Scarborough), suggesting that they are important 'sub-regional' economies in their own rights.
- In the East Midlands, three cities are particularly dominant (Nottingham, Leicester, and Northampton).  Derby and Lincoln appear to be key 'sub-regional' settlements, but with lower densities and sizes than the three

dominant settlements. The region has several settlements with particularly high firm densities, suggesting high levels of localised firm competitiveness (Kettering, Stamford, Loughborough, Boston, and Wellingborough). This region has a group of 'market towns' that are dynamic economically locally, and in some cases are likely to be regionally and cross-regionally significant in terms of firm competitiveness.

▪ Settlements with higher concentrations of firms and attract in labour, whereas settlements with low firm densities tend to 'export' labour.

8.9 The mapping of the structures of the regional economies indicates that although the key cities are important foci for regional economic activity, smaller settlements in both regions are also key; both to local development and prosperity, and as 'magnets' for firms.

8.10 Consultation with agencies involved in economic and social development, regionally and locally, across both regions clarified how concepts relating to GDP/GVA could be used and applied (Section 6).

8.11 GDP/GVA was seen as broad concept that needed to be clearly defined in ways that are relevant to delivery and strategy development.

8.12 GDP/GVA is not a complete or single indicator for regional development, because it does not account for social, environmental and other non-economic 'externalities'. It should sit, as a result, within a wider 'basket' of measures of regional development – and prosperity and wellbeing.

8.13 Respondents identified six dimensions of GDP growth: the competitiveness of firms and market competition within the region; levels of investment into and within the region; levels of enterprise; labour market dynamics and the labour force's human capital; the economic structure of the region; and enablers of growth and development.

8.14 Although not a complete list, the broad framework identified from the interviews provides a comprehensive consideration of the factors likely to

influence and drive GDP growth.  Of particular interest, and note, to strategies to generate growth are the following points:

- Firms operate within, and contribute to, broader market dynamics – both firms and markets are significant contributors to and factors within regions, and firm-level targets and analysis should take into account the dynamics of markets within (and across) regions.
- Investment – both within the region and incoming – was seen as an important driver of growth and regeneration, with the capacity to effect substantive change and renewal within a regional economy.
- Skills and practical/applied knowledge was seen as a key aspect of regional labour market dynamics.
- Economic structures, including legacies from earlier activity, have a strong influence on current levels of economic development.

8.15    Many (if not most) of the responding organisations considered their contributions to GDP/GVA to be indirect, rather than direct; in the sense that they engaged indirectly with businesses and individuals.  In many cases, the direct attribution of their impact and contribution was difficult to determine or measure.

8.16    Some organisations defined indirect as a low impact, rather than as difficult to attribute or quantify.  In both cases, there was extensive evidence that organisations sought to 'leverage' additional funding from other agencies to match against or enhance their own funding streams and mechanisms.

8.17    In terms of strategy formulation and implementation – both regionally and sub-regionally – most organisations undertook some form of needs analysis, although approaches and scope of such analyses varied.  Most also led on or were instrumental in developing strategies, typically informed by needs analysis.  However, monitoring and evaluation (M&E) was under-developed, with only a small number of respondents indicating this was a primary or core function.

**Issues to consider**

8.18    Given the analytical nature of this study, the focus for the remainder of this section is on issues that are raised by the analysis.  The aim is to highlight key or notable findings from the research that merit greater exploration or could contribute to current thinking on regional development in the East Midlands and Yorkshire & Humber.  Issues are grouped according to the overall structure of the report.

*Defining and using GDP*

8.19    GDP is one of a series of measures that can be used to assess and measure regional development and performance.  Its 'narrow' focus on GVA and hence economic activity does not allow for this indicator to measure externalities (environmental, social) or broader conceptions of regional wellbeing or quality of life.  There is a clear case for GDP/GVA to be developed as one of a 'basket' of indicators to measure regional performance.

8.20    There is scope to agree on a 'dashboard' of headline indicators reflecting each category considered as valid measures of regional performance.  Based on the previous paragraph, four measures could be used:

- Re-based GDP/GVA, based on testing and validating the apportionment assumptions of current regional GDP calculations.
- A 'green' indicator of overall environmental performance.
- A social cohesion and health measure.
- A wellbeing measure; either as a sum of the previous three measures or as a separate calculation based on tested and validated methods.

8.21    Current calculations of regional GDP are an 'estimate of estimates', and are apportioned based on accounting assumptions.  Adopting a 'basket' of indicators approach suggests that regional GDP calculations would need to be tested for accuracy and appropriateness, and validated or calibrated accordingly.

*Targeting interventions*

8.22    Re-focusing regional GDP/GVA on economic 'actors' provides a possible means of re-calculating this performance measure (see sections 3 and 7 of this report).  This approach also offers an intervention logic for expenditure on regional economic development.   Framing interventions and development strategies around the 8 key dimensions of regional economic activity offers a targeting framework.  Impact can be measured by marginal increases in one or more dimension.

*Developing the evidence base*

8.23    There is the prospect for greater dissemination of regional and sub-regional analysis, and a more explicit linking in strategy and intervention with monitoring and evaluation (*ex ante* rather than *ex post*).  An increased focus on developing, disseminating and using established methodologies for justifying interventions, informing strategy development, and monitoring effects as well as impacts would involve capacity-building and experience exchange between provider organisations.

*Regional performance*

8.24    GDP/GVA increased in both regions by more than double over fifteen years (from 1989 to 2004).  However, during that period both regions fell further below the UK mean (although Yorkshire & Humber increased in most recent years).  This suggests that relative regional competitiveness has declined over the period, even as growth has been positive.  This appears to be a key strategic trend, and issue, for both regions.

8.25    Sub-regional differences are significant in both regions.  The 'lead' cities (Leeds and Nottingham) have GDP per capita levels at 120 and 132 the UK mean.  Both regions also have areas where GDP levels are much lower than the UK average.  In Yorkshire & Humber, this includes the East Riding (73), Barnsley, Doncaster & Rotherham (68), and in the East Midlands, North Nottinghamshire (75), East Derbyshire (74) and South Nottinghamshire (72).

8.26    There is a 'lagging tail' of sub-regional areas that are below the region and UK mean.  However, performance of key cities and local areas of competitive advantage – around smaller cities, market towns and 'magnets' – partially offsets these lower performing areas – so masking variations within regions.

*Labour market*

8.27    Both regions have levels of vocational skills that are only very marginally below the UK average, and these are at higher level skills (3+).  However, the differences are small, suggesting that overall vocational qualifications are in line with national trend.

8.28    Productivity is below the UK mean, but not as far below as regional GDP per capita levels.  In addition, the East Midlands has increased productivity to close to the UK mean in recent years.  This suggests a scenario where workforce productivity has proven more resilient than overall GDP levels.

8.29    What is notable about both regions is the distribution of the workforce.  In both regions, a greater proportion of the workforce is in socio-economic groups 8 and 9 (manual, manufacturing and assembly) than in groups 1 to 3 (senior management, professional and technical) when compared with the UK mean.

8.30    These trends suggest a 'quality of job' issue in both regions, rather than a low productivity problem.  Productivity has held up more than GDP, but the profile of jobs suggests that employment opportunities are at the 'lower end' of the labour market.

*Regional variations and structure*

8.31    The East Midlands performs slightly better than Yorkshire & Humber on several counts.  Its productivity is higher and rising closer to the UK mean.  It has a positive trade balance, whereas Yorkshire & Humber has a trade deficit.  On trend, the future prospects for this region appear to be slightly more positive.

8.32 The East Midlands has four major settlements, of which one – Northampton – is growing rapidly and has historically not been seen as one of the region's (three) core cities. Derby, in contrast, has a slightly more patchy profile. High GDP per capita coupled with low firm and labour densities and a smaller overall economy.

8.33 The region also has around a dozen mid-size settlements that appear to be economically vital and a focus for firms and labour (e.g. Lincoln, Wellingborough). The region also has a group of 'market towns' in rural areas that are competitive, and appear to function as important local economic drivers; as well as some 'magnets' where firm densities are high and labour is attracted in (e.g. Buxton, Loughborough).

8.34 The region also has a series of settlements that appear to be dependent on larger cities. These settlements lack 'critical mass' in local economic activity, and in particular do not have high firm densities or populations.

8.35 Yorkshire & Humber has five major settlements. However, it has one particularly important area of concentration of economic activity, namely 'Greater Leeds'. This conurbation, when incorporating Bradford, Halifax, Huddersfield, Wakefield, and Castleford-Pontefract, makes up a significant proportion of regional economic activity.

8.36 Sheffield-Rotherham has lower densities of firms and – along with Barnsley and Doncaster – lower levels of GDP. Southern Yorkshire appears to be facing a 'structural' weakness in its local economy.

8.37 Conversely, Hull and Grimsby demonstrate high firm and labour densities, and GDP levels slightly above the regional average (but below the UK mean). This suggests that these 'post-industrial' urban economies are performing relatively well.

***Stimulating GDP growth – support and services provision***

8.38 Interviews with agencies in both regions suggested that strategies were informed by baseline analysis and that there was conversion of strategy into

implementation in many cases. However, they also raised several issues that may be worth considering and exploring in more detail:

- Agencies indicated a level of general, and in some cases specific, awareness of the activities, capabilities and 'offer' of other agencies, suggesting 'supply-side' information flows. However, there was less indication of joint provision and engagement in stimulating GDP, suggesting 'arms-length' coordination between agencies rather than 'joined up' provision. An exception to this tended to be the established city partnerships, such as those in Leeds, Sheffield and Leicester, where considerable effort had been applied to bring partners together.

- Most agencies indicated indirect rather than direct impact on regional GDP. A wider consideration of regional GDP indicates that its growth is a product of multiple dimensions that extend beyond firm creation and growth.

- M&E is less developed than other aspects of strategy development and implementation.

- There is some indication that needs analysis and other baseline evidence is collected and used by the agencies commissioning it, rather than being proactively circulated and used across the network; for example, through Regional Observatories.