NORTHUMBERLAND
COUNTY COUNCIL

ECONOMIC SCENARIOS FOR NORTHUMBERLAND

Prepared for

Northumberland County Council

by

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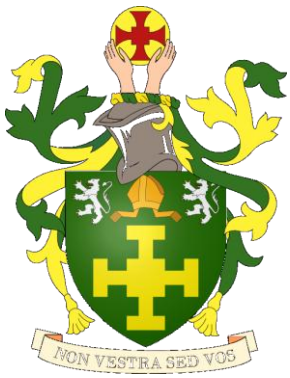


Contents

1. Introduction

- Northumberland's economy is expected to expand over the period to 2015. In real terms average GVA growth of approximately 0.9% per annum is projected with the County moving out of recession in 2012.
- Negative real GVA growth is projected for manufacturing sectors. Thus strong demand for the County's services output is needed to achieve modest GVA growth.
- FTE employment is expected to decline each and every year to 2015. Headcount employment is expected to expand slightly from 2012 due to an increase in the proportion of part-time workers.
- An appropriately supported intervention, such as improving broadband infrastructure, may be required to generate robust and sustainable long-term employment growth.
- The future path of the local, national and international economy is highly uncertain. A large number of factors may push the County away from our central projection.
- The realisation of a ten percent improvement in the demand for private services output, by 2015, would be expected to improve County GVA by 4.8% and FTE employment by 4.9%.
- The realisation of a ten percent improvement in the demand for manufacturing output, by 2015, would be expected to improve County GVA by 2.6% and FTE employment by 2.1%.
- Investing to improve the broadband infrastructure within the county offers opportunities for supply-side lead growth. Achieving close to 100% broadband coverage could raise county level GVA and employment by 1.7% by 2020, generating over 1,700 new jobs.

This document outlines a series of potential trajectories for Northumberland's economy; each scenario is based upon a different set of assumptions of changes occurring to the underlying drivers of County level economic growth.

The first three scenarios, outlined in Sections 2 and 3, are based upon differing levels of the level of demand for the County's goods and services. These scenarios are entirely driven by factors external to the County. We identify a neutral scenario where the national economy is assumed to grow at the speed currently assumed by HM Treasury (HM Treasury 2011; OBR 2011). To highlight the current uncertainties within the global and national economy we have also estimated two faster recovery scenarios; one based upon a recovery in the services sector and the other lead by manufacturing growth. These are intended to highlight the potential for growth emanating from the two sectors; rather than suggesting that these are two potential 'either or' growth paths.

The fourth scenario, outlined in Section 4, is based upon a supply side change to the economy. We assume that the Council and its partners successfully intervene in the economy and make significant improvements broadband infrastructure. We do not seek to assess the probability of the Council being able achieve this scenario; instead we seek to estimate the potential for both GVA and employment improvements were the council to be successful.

Finally there is an appendix briefly outlining the North East Economic Model, formally defining the sectors within this report and listing the data sources.

2. Baseline Scenario

2.1. Context

To place the county into a context we consider the most recent Office for National Statistics (ONS) GVA figures relating to 2008[1]. Northumberland generated £3,925 million of GVE in 2008, 9.6% of the regional total, see Table 1, this figure has declined from 10.4% ten years previously. The County generated around 0.3% of national GVA in 2008.

The County generated £12,624 of GVA per head of resident population in 2008, equivalent to 79% of the regional figure, see Table 2, declining from 87% ten years previously. The comparable figures for comparison with the UK as a whole are 68% and 60% respectively.

Table 1: GVA

	1998	2008
Northumberland	2,791	3,925
North East	26,653	40,988
United Kingdom	822,774	1,295,663
Northumberland as % NE	10.5%	9.6%
Northumberland as % UK	0.34%	0.30%

Table 2: GVA per head

	1998	2008
Northumberland GVA per head	9,083	12,624
Proportion of NE total	87.3%	79.2%
Proportion of UK total	64.8%	59.8%

2.2. Gross Value Added

Projections for Northumberland's GVA are shown in Table 3 (on a current price basis[2]). The figures project Northumberland's economy to expand by an average of 3.6% per annum over the period to 2015. However, much of this increase in GVA is due to the influence of inflation, i.e. price rises. Once the effect of price changes has been accounted for the growth rate in real terms is calculated at an average of approximately 0.9% per annum.

Table 3: Northumberland GVA

Year	GVA £million	Growth % (nominal)	Growth % (real)
2010	3,933	2.3%	-1.0%
2011	4,116	4.6%	0.4%
2012	4,270	3.7%	1.2%
2013	4,426	3.6%	1.6%
2014	4,583	3.5%	1.5%
2015	4,745	3.5%	1.5%

Unsurprisingly growth varies across the study period. The NEEM suggests that real County level growth in 2010 was negative at -1.0% (ONS do not publish real County GVA figures). Following this the scenario projects a small, but positive, real growth rate in 2011, indicating that the county moves out of recession. This is followed by more robust GVA growth of 1.2% in 2012 and a return to a long-run trend of around 1.5% per annum by 2013. These results are based on a number of key assumptions. Two of the most important are that the UK economy performs as anticipated by the Office for Budget Responsibility in terms of GDP growth and consumer price inflation. If national OBR projections change then NEEM county level projections will also change.

As would be expected, service expansions are Northumberland's main driver of

[1] The latest year for which figures are avaliable.

[2] i.e. some of the increase is due to anticipated increases in prices, in line with Bank of England expectations.

GVA growth, see Table 4 which decomposes current price GVA by broad sector.

In terms of broad sector level GVA growth rates agriculture & related and industry grow by between 0.9% and 1.7% per annum, depending on the year. Once inflation is removed from the figures it is likely that real growth rate will be negative (sector level inflation rates at the county level are unavailable from ONS). The comparable figures for services are between 4.2% and 5.6% per annum. The conclusion appears clear, strong demand for the County's service sector output is needed for modest GVA growth to be achieved. The alternative would be to require rapid (and recently unprecedented) manufacturing growth.

In relative terms the agricultural and related sector continues to decline in importance, falling from 2.7% share of County GVA in 2010 to 2.3% by 2015. This mainly reflects a continuation of the longer-term decline in the sector rather than major County level issues. The industrial / manufacturing sectors also continue to decline in relative importance, reflecting a combination of a continuation of past trends plus additional effects due to the anticipation of weak growth in global manufacturing export markets in the immediate future. Manufacturing declines from a 21.4% share in 2010 to 18.7% by 2015. Since Services continues to be the key driver of GVA growth it rises in relative as well as absolute amounts. Its share of GVA rises from 76.0% in 2010 to 78.9% in 2015. This change is driven by growth in several key sectors which are discussed in the employment sections below.

Table 4: Northumberland GVA and sector shares

Year	Agriculture, hunting, forestry and fishing		Industry, including energy and construction		Services		Total	
2010	105	2.7%	841	21.4%	2,987	76.0%	3,933	100%
2011	107	2.6%	855	20.8%	3,155	76.6%	4,116	100%
2012	108	2.5%	862	20.2%	3,300	77.3%	4,270	100%
2013	109	2.5%	871	19.7%	3,446	77.9%	4,426	100%
2014	110	2.4%	879	19.2%	3,594	78.4%	4,583	100%
2015	111	2.3%	888	18.7%	3,746	78.9%	4,745	100%

(GVA valued at current prices). Percentages are of the area total and may not sum to 100% due to rounding.)

2.3. Worker numbers

The majority of the figures referred to in the remainder of this report are worker numbers, rather than GVA figures. This is because worker numbers have a real meaning that can be readily interpreted; this is not the case for monetary GVA figures.

Before the implications of these GVA projections upon worker numbers are explored a few explanations and definitions are necessary. Worker numbers are quantified using both headcounts and Full-time Equivalent (FTE) definitions. Headcounts are simply the number of people in work, including

full- and part-time workers along with the self employed. FTE numbers adjust headcount data enabling a measure to be constructed that reflects the amount of human effort employed. One FTE worker represents 37 hours of work per week for 48 weeks of a year. Thus one full-time worker who works regular overtime will account for more than one FTE, just as one part-time worker will represent less than one FTE. FTE figures facilitate the ease with which labour demand / input comparisons can be made (1) over time and (2) across sectors. Neither of these comparisons are possible with unadjusted headcount data, due to variations in full- and part-time workers, both over-time and between sectors.

Finally, all worker numbers refer to jobs within the county and not the number of local residents in work. This is due to the following reasons;

- Some people will hold multiple headcount posts;
- Some of the posts will be filled by in-commuters;
- Some residents will hold posts outside of the County.

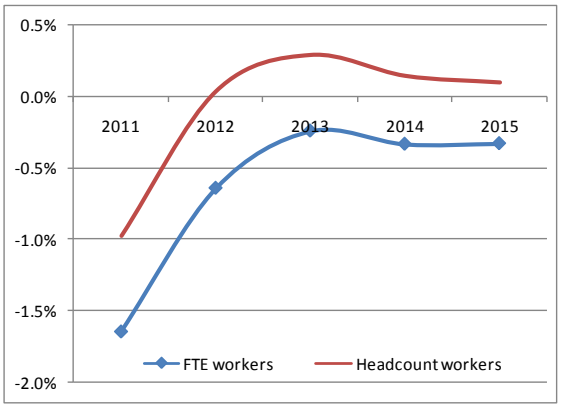
Over the period to 2015, it is anticipated that the level of FTE employment in Northumberland will decline every year. Falling from just over 91,000 in 2010 to just over 88,000 in 2015, a fall of 3,000 FTEs (see Table 5). In proportional terms this fall is most rapid in 2011 and 2012 due to the recession, see Figure 1.

The FTE declines are due to the interaction of GVA and productivity growth. We forecast below-trend GVA growth at county, and national geographies for the next two years. Following this initial period, economic growth should improve moving towards trend levels. Combining this output growth path with moderate productivity growth results in a declining demand for (FTE) labour within the County. As with all projections this assumes no further unanticipated adverse shocks occur.

Table 5: County level workers

Year	FTE workers	Headcount workers
2010	91,095	101,231
2011	89,596	100,240
2012	89,021	100,273
2013	88,805	100,561
2014	88,508	100,703
2015	88,216	100,798

Figure 1: Worker growth rates



In terms of headcount workers the results are subtly different. As would be expected growth rates of the two worker measures, headcounts and FTEs, are positively correlated, see Figure 1. In terms of levels, headcounts do indeed decline over the period 2010 to 2015. However they only decline by 400 workers, compared to the comparable figure of around 3000 in terms of FTE workers. Furthermore, post 2012 headcount employment in Northumberland is projected to be on an

upward trend, contrasting with the downward FTE trend.

The difference between the growth rates for the two measures is due almost entirely to sector restructuring. The County is continuing to transition away from traditional full-time manufacturing posts towards the services sector, where jobs in some sub-areas are more likely to be part-time. A smaller effect, operating in the same direction, is a fall in the average hours worked in many sectors.

Sector level FTE worker demands

In order to provide information at a finer level of sector detail econometric disaggregation techniques were applied to the broad sector level data. Before examining these results we provide a brief summary of the main activities currently within each sub sectors;

- **Agriculture, hunting, forestry and fishing.** This sector is not further disaggregated. The sector is predominantly agriculture, with the non-agricultural components making up less than on fifth of the total;
- **Traditional manufacturing**, includes SIC 15 to 29 (food, textiles, wood & paper, chemicals, rubber, metals and metal products etc). The largest sub-areas, in terms of employment, are food production, wood and paper products, pharmaceuticals, chemicals and plastics, metals and general purpose machinery;
- **Light manufacturing**, SIC 30 to 37 (office and electrical machinery, medical & precision instruments, vehicles and furniture etc). This sector is much smaller than the Traditional manufacturing sector, employing around one quarter of the amount of labour. The largest subsectors are electronic components and precision instruments;
- **Energy, water & quarrying**. Two thirds of this sector is quarrying and coal extraction. Water supply represents around one fifth of the sector with the remaining activities only accounting for small volumes of employment;
- **Construction.** This sector is not further disaggregated within the existing framework.

Services were disaggregated to;

- **Wholesale & retail trade.** Roughly 60% of this sector is retail, 25% wholesale and the remainder motor vehicle distribution and repair;
- **Hotels & restaurants.** This sector is not further disaggregated within the existing framework;
- **Transport & communication.** This sector is dominated by coach and bus services, with cargo handling and storage and post services taking a less predominant role;
- **Finance.** This sector is mainly banking and finance, with auxiliary banking services taking a less predominant role;
- **Business services.** The largest sector is the diverse SIC code covering 'other business services', around one sixth of the sector is the accounting and legal sector with another sixth from technical consultancy (including architecture etc);
- **Public services.** Around one third of those employed in this sector are in the education sector, with a little less in each of the 'public administration and defence' and health sectors. Around 10% are in social work.

Included within the public services is the county council and related employment. This area of the public sector has been modelled slightly differently to other sectors, due to the likely impacts of future restructuring;

- **Recreational and other services.** Around half of this sector is the recreational services sector. Personal services and membership organisations comprise around one fifth of the total. The remainder of the sector is the diverse 'other services sector' and sewage / sanitary services.

Full SIC definitions for these sub-sectors are provided in the definitions section of the Appendix.

Figure 2 displays county level FTE employment, broken down by sector for each year to 2015. It can clearly be seen that the primary, secondary and manufacturing sectors are declining in importance. The various sub-sectors of services are expanding over time. The county's continued reliance upon public services, even after the public sector cuts, can easily be seen - it remains the largest employer by a considerable distance.

Figure 2: Projected FTE employment by sub-sector, 2011-2015

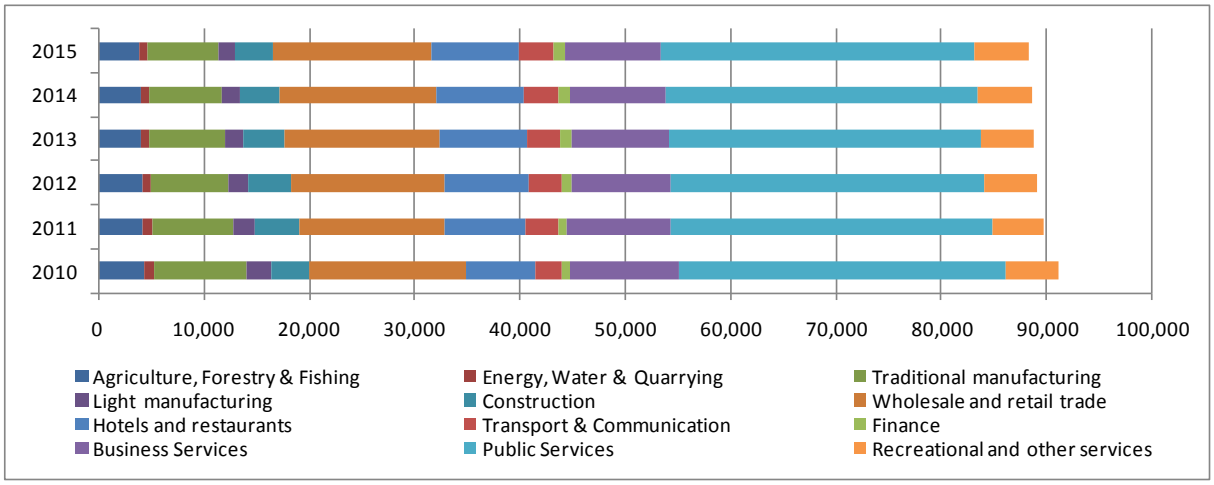


Table 6 displays numerical estimates for the sub-sector FTE worker requirements displayed graphically in Figure 2. To allow a clearer pictorial view of the changes occurring within each sector, Figure 3 displays this data for the manufacturing sub-sectors, and Figure 4 for the service sub-sectors. These figures exclude the public sector as its relative size obscures fluctuations in other sectors. Each of the sub-sectors are discussed in-turn below taking the non-service sectors first and the service sectors second.

With one exception the trajectories of the non-services areas of the economy experience a year-on-year declines in FTE worker numbers. The exception is construction which rises at the start of the period, recovering from a substantial decline during the recession. After this initial increase construction steadily declines, bringing it into line with other non-service sectors.

These declines are typically driven by the same trends operating at the national level, such as increases in globalisation resulting in higher levels of import

penetration for many manufactured goods. The impact of these declines in the non-service areas of the economy will be felt more acutely in Northumberland than in many other areas, due to the parts of the services sector being relatively under-represented in the county (e.g. business services) as compared to the nation as a whole.

For the non-service areas of Northumberland, the FTE worker contractions between 2010 and 2015 are; Agriculture, forestry & fishing -10%; Energy, water & quarrying -18%; Traditional manufacturing -24%; Light manufacturing -34%; and Construction -1%. As stated above these fluctuations in employment reflect a combination of two different factors (1) real GVA growth / decline and (2) productivity growth.

Agriculture, hunting, forestry and fishing is projected to experience a steady decline in FTE workers, from 4,400 to 4,000. This occurs due to a small expansion in current price GVA being combined with a larger, but still modest, productivity expansion. In other words, the sector maintains many of its existing markets, but struggles to expand into new areas.

The decline in **Energy, water and quarrying** from 900 to 750 FTE workers reflects a continuation of, geographically broader, long-term trends. Due to the small size of this sector it is very dependent on changes occurring at key business sites which can not be included in modelling of this type without primary survey work. The energy and water portion of the sector represents a minority of the sectors employment and is thus less significant.

The **Traditional manufacturing** sector is expected to experience a substantial decline in size, from around 8,700 to 6,650 FTE workers. Within this overall decline there are anticipated to be some growth areas. These growth areas should be viewed as capable of slowing the overall decline and not as capable of reversing it. Significant and sustained investment would be required to reverse the decline for more than a brief period. The **Light manufacturing sector** experiences a larger proportional decline, but with fewer job losses, due to its smaller initial size, falling from 2,400 to 1,600 FTE workers.

In the recent past the activity of Northumberland's **Construction** sector displayed a high degree of volatility, centred on a roughly stable trend. The continuation of this trend produces a modest recovery in the sector as the UK economy picks-up, leaving construction at the same level in 2015 as in 2010, approximately 2,600 FTE workers.

Turning to the private service areas of the economy. All but one of the service sub-sectors, (see Figure 4) are expected to experience FTE worker gains over the period 2010 to 2015, the exception is business services. Wholesale & retail trade remains, the largest service sector. The most significant growth areas, by volume, are Hotels & restaurants followed by Transport & communication. In proportional terms growth is anticipated to vary substantially across sub-sectors with the FTE worker expansions between 2010 and 2015 being; Hotels & restaurants 25%; Transport & communication 26%; Finance 45%; Business services -12%; and Recreational & other services 2%.

Wholesale & retail trade and **Transport & communication** have scenario trajectories that are fairly essentially derived from changes occurring elsewhere in the economy. For example, changes to income per household, tourism, along with other

sector expansions and contractions. These processes typically generate a steady expansion in FTE numbers as aggregate GVA grows. The Wholesale and retail sector expands slightly from 14,750 to 15,000 FTE workers. The Transport and communication sector increases more substantially from 2,600 to 3,300 FTEs. This larger proportional gain reflects a recovery in a sector which had declined substantially between 2009 and 2010.

The **Hotels and restaurants** sector is projected to expand at a relatively high rate, rising from 6,500 to 8,300 FTEs. This employment increase reflects a strong recovery from the losses felt during the recession. The sector is anticipated to move slightly above pre-recession levels. Since the **Recreational and other services sector** includes Recreational, cultural and sporting activities, it has considerable growth synergies with **Hotels & restaurants**. However it only rises by 100 workers moving from 5,100 to 5,200 FTEs. This is due to the rise in the recreational and cultural activities being off-set by falls in others areas (including those supported by the public sector).

The FTE expansions in **Finance** and **Business services** are anticipated to resume their place as strong drivers of growth at the UK level over the *longer-term* time horizon. However, the path of these sectors in the coming years is uncertain. This uncertainly reflects a combination of uncertainly over the speed of the recovery and Northumberland's ability to recover jobs lost during the recession. The Finance sector rises from 700 to 1,000 FTEs, recovering its recessionary losses (note: prior to the recession an expansion had been anticipated). Business services declines from 10,300 to 9,100 FTEs. The decline in Business services is partly a reflection of unusually high employment within the sector during 2009 and 2010[3].

Public services remains a difficult sector to model. Its employment level is ultimately determined by an administrative process and is dependent on government funding rather than an ability to sell products. The projections for this sector are driven by a combination of PESA[4] projections, figures in the Comprehensive Spending Review and local knowledge. The sector contracts from 31,000 FTEs to 29,600.

[3] Which may be due to underlying ABI measurement errors.

[4] Public Sector Statistical Analyses (http://www.hm-treasury.gov.uk/pespub_index.htm)

Table 6: Sub sector FTE workers

	Agriculture, Forestry & Fishing	Energy, Water & Quarrying	Traditional manufacturing	Light manufacturing	Construction	Wholesale and retail trade	Hotels and restaurants	Transport & Communication	Finance	Business Services	Public Services	Recreational and other services	Total
2010	4,418	902	8,717	2,446	3,626	14,750	6,536	2,611	723	10,289	30,998	5,081	91,095
	4.8%	1.0%	9.6%	2.7%	4.0%	16.2%	7.2%	2.9%	0.8%	11.3%	34.0%	5.6%	100.0%
2011	4,277	818	7,755	2,026	4,257	13,742	7,592	3,163	846	9,802	30,467	4,850	89,596
	4.8%	0.9%	8.7%	2.3%	4.8%	15.3%	8.5%	3.5%	0.9%	10.9%	34.0%	5.4%	100.0%
2012	4,180	795	7,425	1,868	4,110	14,469	7,932	3,155	924	9,426	29,764	4,970	89,021
	4.7%	0.9%	8.3%	2.1%	4.6%	16.3%	8.9%	3.5%	1.0%	10.6%	33.4%	5.6%	100.0%
2013	4,111	779	7,167	1,765	3,932	14,714	8,166	3,247	986	9,289	29,558	5,091	88,805
	4.6%	0.9%	8.1%	2.0%	4.4%	16.6%	9.2%	3.7%	1.1%	10.5%	33.3%	5.7%	100.0%
2014	4,042	762	6,910	1,679	3,759	14,938	8,283	3,287	1,025	9,186	29,478	5,159	88,508
	4.6%	0.9%	7.8%	1.9%	4.2%	16.9%	9.4%	3.7%	1.2%	10.4%	33.3%	5.8%	100.0%
2015	3,978	744	6,664	1,604	3,599	15,015	8,331	3,306	1,048	9,099	29,642	5,188	88,216
	4.5%	0.8%	7.6%	1.8%	4.1%	17.0%	9.4%	3.7%	1.2%	10.3%	33.6%	5.9%	100.0%
2010 - 2015 change	-439	-158	-2,053	-841	-27	265	1,795	694	325	-1,191	-1,356	107	-2,878

Figure 3: Projected FTE employment in manufacturing sub-sectors, 2010-15

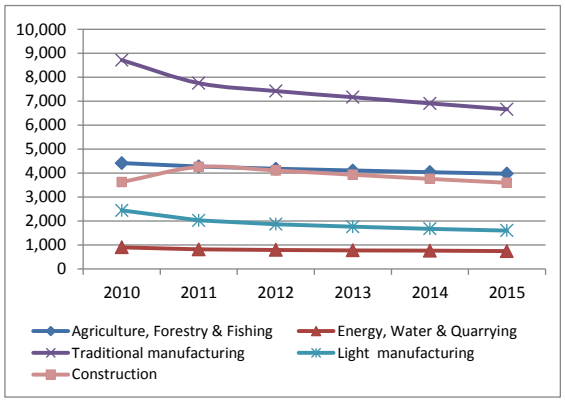
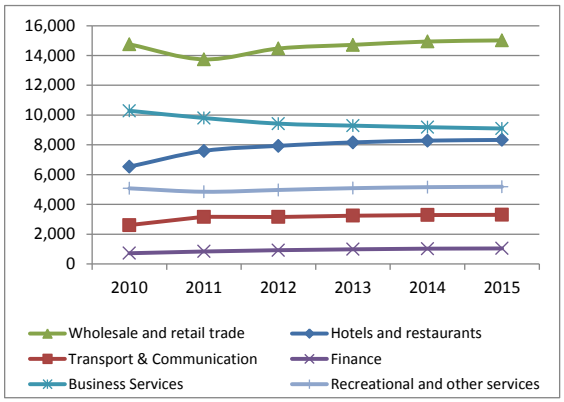


Figure 4: Projected FTE employment in services sub-sectors, 2010-15



Excluding the public sector

3. Alternative growth paths

3.1. Uplift scenarios

The scenario outlined in the above sections is our central projection for Northumberland's economy. There are a multitude of alternative paths, each based on different assumptions for the growth in components of demand, productivity etc.

In order to shed some light on the potential for the County to be pushed away from our central projection two alternative growth paths have been estimated. The first of these is based upon growth within Northumberland's manufacturing sectors, the second on growth within private service sectors.

Both of the uplift scenarios have the same driver, a 10% increase in gross output and GVA, within the sector. For the manufacturing uplift this was applied to all manufacturing sectors including construction. For the services uplift the 10% boost was applied to all private service sectors i.e. excluding public services. We assume that the growth increase influences all the County's manufacturing or services sectors equally, i.e. we have not assumed that growth is driven by specific sub-sectors.

The manufacturing uplift numbers can be interpreted as being driven an increase in the demand for Northumberland's manufactured products from the rest of the UK *and* overseas. In contrast, the services uplift scenario needs to be driven by demand from the rest of the UK, and / or internal County level factors, as only a small proportion of service production is exported (a significant services export will be tourism purchased by overseas tourists).

The final impact from the demand increases within these two uplift scenarios arises from two effects. The largest impact is the direct effect; the increase in production and employment within the sector itself. The second effect is the indirect effect; this is due to expansions in both supply chains and household spending.

The impact of the two uplift scenarios upon Northumberland's GVA is shown in Figure 5. By 2015 the baseline scenario projects GVA of £4,745 million. The manufacturing uplift scenario has a GVA level of £4,867 million, equivalent to a 2.6% increase. The Services uplift scenario places GVA at £4,952 million an increase of 4.8%. The difference between the two results is mainly due to the larger overall size of the services sector. This implies that the 10% demand increase has a much larger absolute effect. The manufacturing uplift scenario contains a larger proportion of indirect / supply chain effects but this is dwarfed by the influence of the sector's smaller absolute size, this is discussed below.

The manufacturing boost moves the economy from a declining FTE path to one that is slightly positive, see Figure 6. The services boost places Northumberland on a robust upward trend. The baseline projected FTE employment of 88,216 workers in 2015. For the Manufacturing uplift scenario this figure is 2.1% higher at 90,107. For the Services uplift scenario the figure is 4.9% higher at 92,522.

In terms of headcount employment the baseline scenario contained a slight increase over the period to 2015. Hence the two uplift scenarios show larger

headcount increases, see Figure 7. In 2015 there are 100,798 headcount jobs in the baseline. This can be compared to 102,715 posts in the manufacturing uplift scenario and 106,026 in the services uplift scenario. The manufacturing scenario is 1.9% above the baseline and the services scenario is 5.2% above the baseline.

As stated above the differences between headcount and FTE numbers are due to differences in average hours of work across sectors.

Figure 5: Alternative paths for GVA (£million)

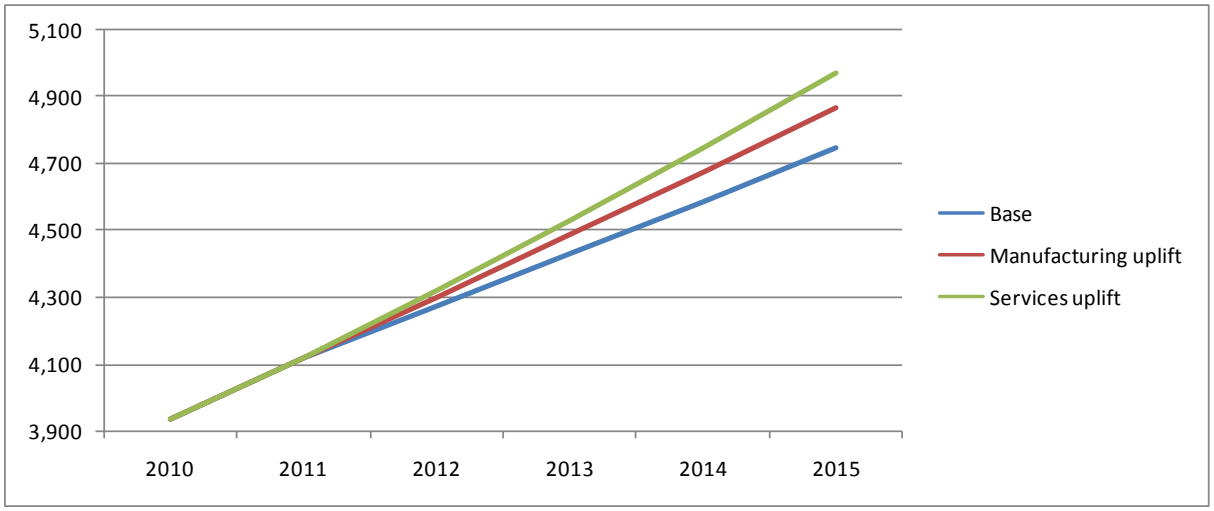


Figure 6: FTE employment

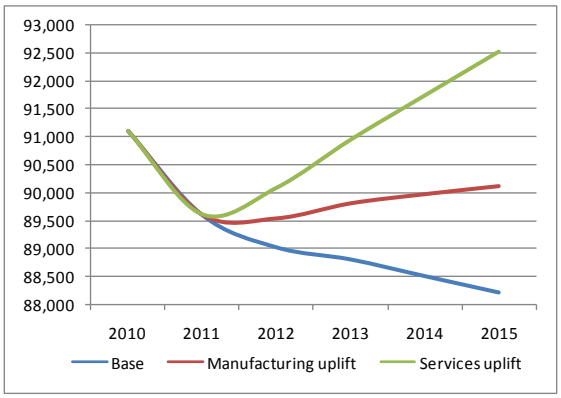
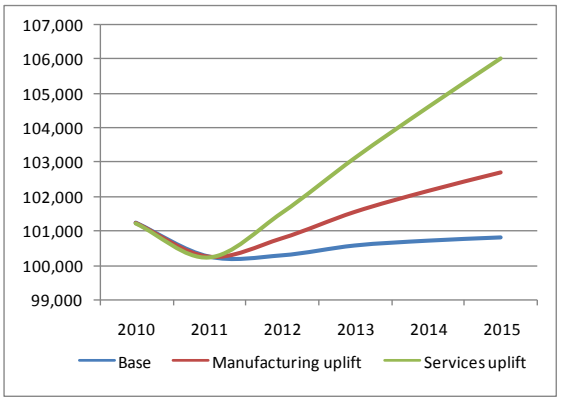


Figure 7: Headcount employment



Excluding the public sector

3.2. Sector level impacts

Figure 8 shows the number of FTE workers by sector within each of the three scenarios. The differences between sector employment between the baseline and the two uplift scenarios are shown in Figure 9. These two figures clearly show the importance of the larger absolute size of the service sector in determining difference in growth between the two scenarios.

The largest service sectors are Wholesale and retail trade, followed by Business services and Hotels & catering. Thus the job gains within the services uplift scenario are dominated by these sectors. The services uplift scenario does have some impact on the manufacturing sectors, however these impacts are small due to comparatively small service supply chains, only around 100 FTE posts.

The manufacturing uplift scenario shows a similar pattern of results, in that its largest impact occurs in the Traditional manufacturing sector, the manufacturing sector with the largest current employment level. However, the manufacturing uplift scenario also has measurable effects in the services sector of the economy, around 600 FTE workers. This is due to manufacturing supply chains clearly penetrating into service sectors, combined with manufacturing employees spending wages and salaries in the service sectors of the County. The largest service effects are felt in Wholesale & retail trade (due to business and household spending), Hotels & restaurants (due mainly to household spending), Business services (due mainly to business spending) and Recreational and other services (due to business and household spending).

The raw data for **Error! Reference source not found.** and Figure 9 are included in Table 7 and Table 8 respectively.

Figure 8: Scenario FTE workers by sector

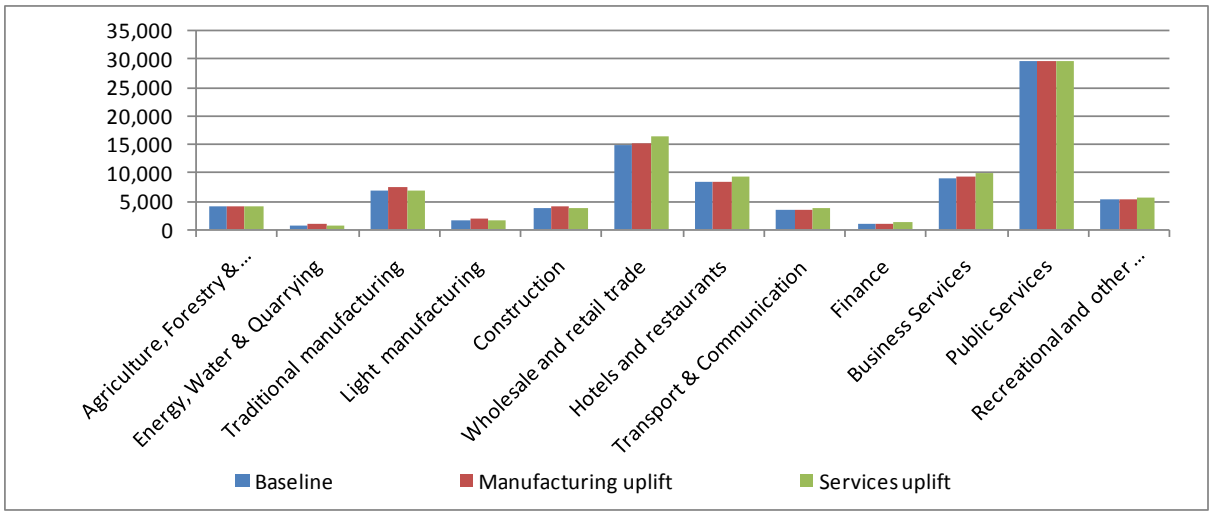


Figure 9: FTE worker deviations from baseline, by sector

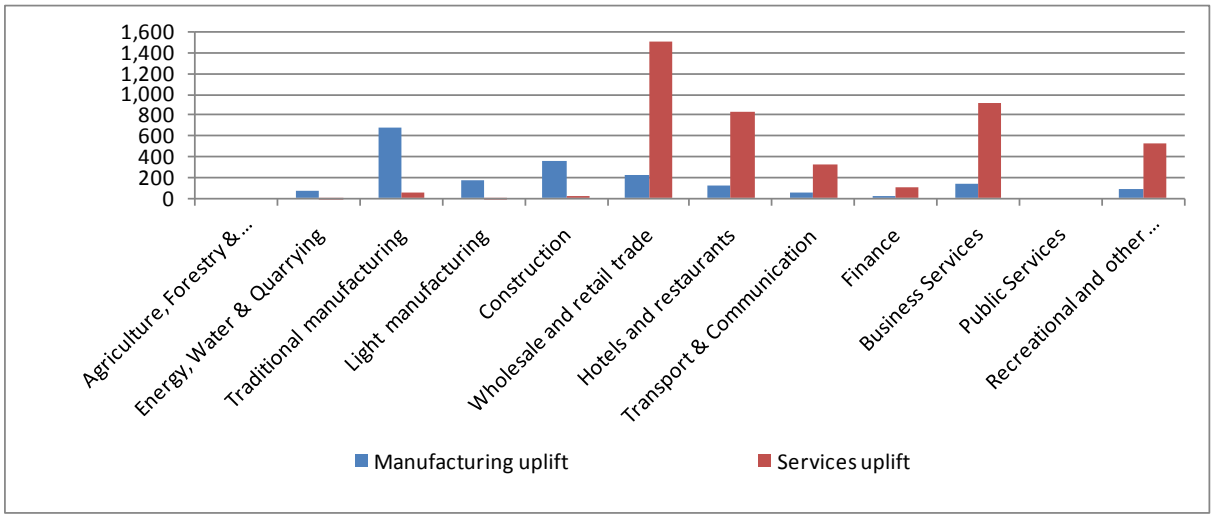


Table 7: Scenario FTE workers by sector

	Baseline	Manufacturing uplift	Services uplift
Agriculture, Forestry & Fishing	3,978	3,978	3,978
Energy, Water & Quarrying	744	818	750
Traditional manufacturing	6,664	7,330	6,720
Light manufacturing	1,604	1,765	1,618
Construction	3,599	3,958	3,629
Wholesale and retail trade	15,015	15,240	16,516
Hotels and restaurants	8,331	8,456	9,164
Transport & Communication	3,306	3,355	3,636
Finance	1,048	1,064	1,153
Business Services	9,099	9,235	10,008
Public Services	29,642	29,642	29,642
Recreational and other services	5,188	5,265	5,706
Total	88,216	90,107	92,522

Table 8: FTE worker deviations from baseline, by sector

	Manufacturing uplift	Services uplift
Agriculture, Forestry & Fishing	0	0
Energy, Water & Quarrying	74	6
Traditional manufacturing	666	57
Light manufacturing	160	14
Construction	360	31
Wholesale and retail trade	225	1,501
Hotels and restaurants	125	833
Transport & Communication	50	331
Finance	16	105
Business Services	136	910
Public Services	0	0
Recreational and other services	78	519
Total	1,891	4,306

4. Broadband infrastructure scenario

4.1. Overview

The scenario outlined below is based upon improved to broadband infra-structure within the County. This scenario is driven by supply side change rather than demand side change which the driver of the manufacturing and services uplift scenarios within Section 3.

The scenario is based upon the assumption that Northumberland significantly improves its broadband coverage over the period to 2015. We assume that by 2015 the County's broadband coverage reaches close to 100% of business premises.

The impact of these infrastructure improvements upon Northumberland's economy arise from three separate processes that would not have existed without the infrastructure improvement;

- Employment growth experienced by firms already incumbent in Northumberland;
- Increases in business counts within the county as a result of new firm formation and relocation;
- Induced supply chain and household spending effects arising as a result of (1) and (2).

We assume that the infrastructure investments take place from the start of 2012 and are completed by 2015. We further assume that it takes another 5 years, to 2020, for the full effects of the infrastructure improvements to be felt; this assumption is based on prior research findings (e.g. DTI 2003; Koljo 2010).

The scenario is based upon the premise that there is an existing 'gap' within Northumberland's economy that has opened up due to a combination of poor broadband coverage and an under-realisation of economic benefits from the infrastructure. We estimate the potential effect, upon both gross value added (GVA) and headcount worker numbers, of removing this 'gap'. If these benefits are to be realised then both the infrastructure investment and the take-up of opportunities made available needs to occur. Quantifying the likelihood of this occurrence is beyond the scope of this study; we simply assume that the investment occurs alongside appropriate endogenous responses and / or supply-side interventions which enable businesses to grasp the opportunities available to them.

The baseline should be interpreted as an assessment of the most likely path for the county were it not to realise close to 100% of business coverage. If the investment is not made *and* coverage improves in other areas then there is a possibility that some footloose business may relocate away from Northumberland. We argue that this effect will be small for at least two reasons. First, if poor internet access is a critical barrier to the survival or growth of a particular set of businesses, and they are footloose, many will have already relocated. High speed broadband is currently widely available and has been for some time, including in many parts of Northumberland. Second, many incumbent businesses who have a high demand for broadband improvement are not footloose and can not easily consider relocation. For example, much of the tourism and 'rural' sector is semi-permanently tied to the County due to

assets contained in the natural environment.

In addition to the effects estimated below the improvements in broadband infrastructure will have many additional positive effects within the County. These include numerous benefits to households such as; improved access to learning for both children and adults; facilitating job search; improved access to media and online content; service delivery; and improved ease of home working. These impacts are beyond the scope of this study which solely examines the impact on business growth and labour demand.

4.2. Headline worker and GVA impacts

As stated above, the full impacts from the improvements in broadband infrastructure will occur by 2020, five years after the achievement of close to 100% premises coverage. We assume a linear pattern of economic improvement. In reality this path would be dependent upon business reactions and the impact of policy relating to broadband promotion and take-up. Once infrastructure is in place the County will still be battling against barriers to new firm formation and growth created by having a reputation for being a peripheral area with poor rural internet provision. If this reputation can be dispelled quickly then scenario results could be brought forward. If this reputation cannot be dispelled then a proportion of the results will simply not occur.

The scenario indicates that the broadband infrastructure improvements could improve county level GVA and headcount worker numbers by up to 0.8% by 2015 and 1.7% by 2020. These numbers should be treated as very approximate and subject to a high degree of uncertainly. However, the headline conclusion is that improving infrastructure is capable of having a meaningful impact upon the level of economic activity in terms of variables such as GVA and employment as well as new firm formation and growth rates.

Employment

In employment terms the broadband infrastructure improvements have the possibility of leading to an additional 1,754 jobs within the county, with 780 of these being realised by 2015, see

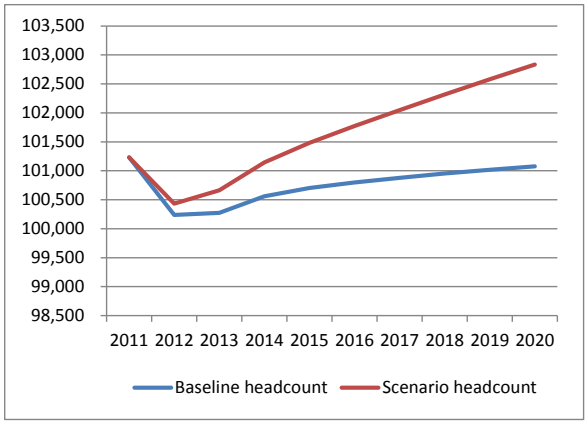
Table 9. The County's baseline employment level is just over 100,000 headcount workers and is expected to decline slightly next year (2012) due to a continuation of the recession in the private sector combined with the public sector cuts outlined in the comprehensive spending review. Post 2012 the economy is expected to improve but only to the point of capturing lost ground. The local economy is only capable of supporting a similar number of posts in 2020 as currently sustained, see Figure 10. The impact of the improved broadband infrastructure places the County on a modest upward trajectory.

In summary, in terms of headcount employment, the County is expected to recover ground lost during the current recession under the assumption of the resumption of 'business as usual', i.e. without the intervention of a 'step-change' intervention. In the absence of an external shock (such as higher than anticipated UK growth) an appropriately supported intervention, such as improving the broadband infrastructure is required to generate modest but steady and sustainable headcount employment growth.

Table 9: Headcount employment

	Baseline	Infrastructure impact	County total
2011	101,231	-	101,231
2015	100,703	780	101,483
2020	101,078	1,754	102,832

Figure 10: Headcount employment



Gross value added

In GVA terms the broadband infrastructure improvements have the possibility of leading to an addition of £97million of current price GVA in 2020 (i.e. including the impact of inflation). Without the broadband improvements GVA is projected to grow at a slow rate, with the majority of the typical increase of around 3.5 percent per annum being driven by price rises (i.e. inflation), see Figure 11. Furthermore, it must be noted that the GVA increase in 2011 is due entirely to prices rises, real output is projected to have fallen. Over the subsequent period to 2014 this balance is reversed with CPI inflation returning to the Bank of England target of 2.0% per annum and real growth in Northumberland approaching a long-run trend of 1.5 percent. The impact of improving broadband infrastructure is to raise the real and nominal GVA growths rate by 0.2 percentage points per annum, over the period 2012-2020.

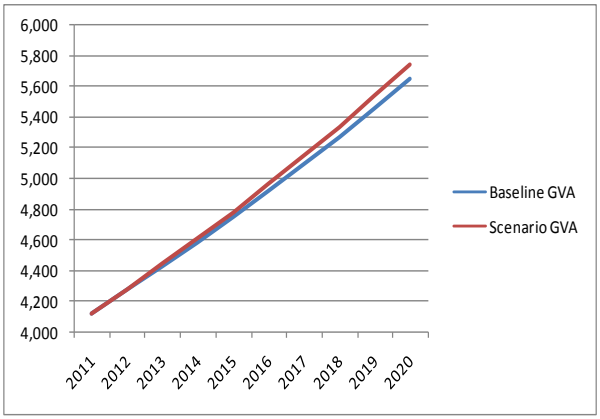
This increase of 0.2% per annum may initially sound small. However, in the context of a long-run trend of 1.5% this is a substantial amount. Over the period to 2020 we estimate that the impact of improving the infrastructure will be to generate a possible £442million of GVA (the area between the two lines on Figure 2 that otherwise would not have occurred. These figures need to be considered within any cost-benefit analysis used to determine the appropriate level of public subsidy towards the infrastructure's installation).

Table 10: Gross Value Added

	Baseline	Infrastructure impact	County total
2011	4,116	-	4,116
2015	4,745	36	4,781
2020	5,649	97	5,746

(£ million at current prices)

Figure 11: GVA (£m at current prices)



4.3. Sector level impacts

The total headcount worker impacts of the broadband infrastructure improvements are disaggregated by broad sector in Table 11. As stated above, these impacts reflect a combination of the direct effects of the infrastructure improvements on businesses, plus the smaller indirect effects occurring in supply chains and induced by increases in household spending.

In proportional terms the largest gains are felt in the Business services sector (4.8%) followed by Recreational & other services (2.8%), Transport & communications (2.7), Wholesale & retail trade (2.5%) and Finance (2.5%). In absolute terms the picture is slightly different, due to differences in baseline sector sizes. The largest job gain is in Wholesale and retail trade (470 posts), followed by Business Services (435), Recreational and other services (195), Hotels and restaurants (185) and Public Services (149). Note that the 149 jobs in public services is being caused almost entirely by the large absolute sector size, the sector has the smallest job increase when expressed in proportional terms.

Table 11: Headcount employment by sector

	Baseline headcount	Scenario headcount	Change (absolute)	Change (proportion)
Agriculture, Forestry & Fishing	4,023	4,083	60	1.5%
Energy, Water & Quarrying	561	567	6	1.0%
Traditional manufacturing	5,244	5,318	74	1.4%
Light manufacturing	1,221	1,246	25	2.0%
Construction	2,713	2,753	40	1.5%
Wholesale & retail trade	18,920	19,390	470	2.5%
Hotels and restaurants	13,304	13,489	185	1.4%
Transport & communication	3,155	3,241	87	2.7%
Finance	1,160	1,189	29	2.5%
Business services	9,154	9,589	435	4.8%
Public services	34,613	34,763	149	0.4%
Recreational & other services	7,066	7,261	195	2.8%
Total	101,133	102,888	1,754	1.7%

Appendix

This report contains employment and GVA scenarios running out to 2015 or 2020, depending on the scenario[5]. These have been generated using a bespoke econometric model, created for specifically for the county, combined with data obtained from the North East Economic Model (NEEM). The North East Regional Economic Accounts and Economic Model are produced annually by St Chad's College at Durham University (having been previously funded by One NorthEast).

It should be noted that any medium- or long-term projections at a local level are subject to an extremely high degree of uncertainty. The longer the time horizon the higher the uncertainty involved. However, provided the user is aware of the assumptions involved in the creation of such projections they form a useful tool for medium- and long-term planning.

The 'North East Economic Model' (NEEM)

One of the advantages of using projections of this type is that they are produced using inward- and outward-looking methods. The changes in the Northumberland economy as a whole are produced using a combination of these approaches (1) examining the previous path of the area - inward-looking - and also (2) nesting the local model within the projections for the United Kingdom, produced by HM Treasury – outward-looking. This is important as it anchors the projections and recognises that Northumberland is not operating in a vacuum (as would be the case if only past employment/GVA trends of the area were examined).

This measure of economic activity is used as a starting point for this study. GVA measures the contribution to the economy of each individual producer, industry or sector . The Office for National Statistics defines GVA as follows:

> *GVA is the difference between the value of goods and services produced (output) and the cost of raw materials and other inputs which are used up in production (intermediate consumption), i.e. the value added by any unit engaged in production. This is calculated gross of any deductions for depreciation or consumption of fixed capital. Regional GVA is measured at current basic prices which is: Gross Domestic Product (GDP) less taxes on products plus subsidies on products*. (Lee, 2008)

This modelling undertaken out for this report was based upon an econometric analysis of the Northumberland economy, combined with data drawn from the North East Regional Accounts and Economic Model. This model is produced by Durham University with funding from One NorthEast.

NEEM is based upon an input-output methodology. This re-constructs the regional economy using a large amount detail, by quantifying who buys what from whom in each sector of the economy.

The results presented here are feasible because the model contains information at a high level of sectoral and sub-regional disaggregation. This covers variables such as sector level GVA, gross output, GVA

[5] These projections supersede those published in 2010, (Hunt, et al., 2010)

per worker, occupations of worker by sector etc.

Results quoted here refer to

- Gross value added (GVA);
- Full-time equivalent workers (FTEs);
- Headcount workers.

The framework draws upon the leading data sources for regional modelling. These include data extracted from a re-analysis of several Office for National Statistics (ONS) surveys and products including the

- Labour force survey;
- Annual business inquiry 1 and 2;
- Expenditure and food survey;
- General household survey;
- Regional accounts;
- Input-output balances;
- Supply and use tables;
- Annual survey of hours and earnings.

The resulting model contains information on all key economic flows within the region including 110 sector level GVA, gross output, exports by country, intermediate purchases, compensation of employment etc.

Additional data is available relating to sector level worker headcounts, FTE employees, qualification and occupational structures, business sites etc.

Further information on the model, its methodology and derivation is available on request.

Sector Definition

Industries were modelled using the 2003 Standard Industrial Classification System (SIC 2003). Sectors were defined as follows.

- Agriculture, Forestry & Fishing SIC 01-05
- Energy, Water & Quarrying SIC 10-14 & 40-41
- Traditional manufacturing SIC 15-29
- Light manufacturing SIC 30-37
- Construction SIC 45
- Wholesale and retail trade SIC 50-52
- Hotels and restaurants SIC 55
- Transport & Communication SIC 60-64
- Finance SIC 65-67
- Business Services SIC 70-74
- Public Services SIC 75-85
- Recreational and other services SIC 90-95

Other sector definitions used within the report are aggregated versions of these sectors, hence their definitions should be clear and derivable from the above list.

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