LONG-TERM SECTORAL AND EMPLOYMENT PROJECTIONS FOR NORTHUMBERLAND

Prepared for

Northumberland County Council

by

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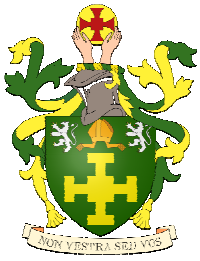

Northumberland InfoNet Working Paper 126

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1. Introduction

This document outlines four scenarios for potential future trajectories of economic activity in Northumberland. Essentially, a central 'business as usual' scenario is combined with three alternative scenarios. The 'alternatives' have been selected to highlight how different growth assumptions might push the county away from the central or 'expected' trend, along with an environmental scenario highlighting the effect of mitigating climate change and the effect this might have upon opportunities for growth in the Northumberland economy. The 'business as usual' scenario is considered the most realistic scenario for the County as it emerges from the recession.

1.1. Key Points

- Northumberland's Gross Value Added (GVA) is projected to grow in real terms by an average of 2.0% per annum over the next two decades.
- Over the five years to 2015, it is anticipated that Northumberland will experience slightly lower levels of FTE employment than in 2010. Beyond 2015 *growth* is expected to return to trend, resulting in a steady expansion of county level employment.
- There will continue to be significant change in the level of economic activity at sector level. Employment in Agriculture, hunting, forestry and fishing is expected to remain broadly stable. The industrial sectors including energy and construction are projected to decline, falling by 12% (2,300 FTE workers). However, the projected contractions in the industrial sectors are more than compensated by a solid expansion of 6.6% in Services (4,700 FTE workers).
- The County's long term economic path is heavily conditioned by its response to the current recession. If the national recession is longer & deeper than anticipated it could prevent the projected *long-term* increase in employment from occurring.

1.2. Summary

The report arrives at two broad conclusions, which are outlined in more detail immediately below. First, there will be significant sectoral restructuring in the county over the coming years. Second, since the county is a small area in economic terms it does not contain lengthy supply chains. Instead, it has strong *external* economic linkages, implying that the county's economic activity is highly conditioned by external economic events.

1.2.1. Sectoral restructuring

- The manufacturing sector is expected to continue to decline, in terms of employment numbers, over the coming years.
- The service sector is expected in the period ahead to continue to expand, in terms of employment numbers (this refers to a long-run trend discounting the impact of any shorter-term recession).
- That these expansions and contractions are in very different parts of the economy has implications for future skills, which will differ from those at present. The gradual shift towards services also implies an increase in the proportion of part-time employees.
- This report analyses the nature of these changes and quantifies the sizes of these effects.

1.2.2. Small economy effects

- Northumberland, in common with most small areas, does not contain significant or lengthy supply chains, especially in production industries. Hence changes to the demand for one product are unlikely to induce large changes in activity elsewhere in the county. This can be both advantageous and disadvantageous depending on the circumstances. The disadvantage is that any positive change to a sector is transmitted through the county only to a limited extent; the advantageous flip-side is that negative change typically has a limited effect upon other sectors.
- That the county does not have strong internal economic inter-linkages implies strong external linkages, with other parts of Great Britain especially. Thus a key driver of county level economic activity is the national growth rate, which, in turn, will be conditioned by international events.

1.3. Overview

This report is divided into three sections. Following the introductory and methodological section, the report outlines and explains the central Northumberland 'business as usual' scenario. This is divided in several sub-sections examining how:

- the Northumberland economy is projected to change
- sector level FTE worker demands are projected to change
- aggregate and sector level headcount worker demands are projected to change

Sections 2.1 and 2.2 relate to county level economic activity (production) and full-time equivalent (FTE) workers, these providing an understanding of how the county as a whole, along with its constituent sectors, may change in absolute and relative

terms. This is done using gross values added (GVA); - the regional development agency's preferred measure of economic activity - and FTE workers, i.e. the amount of labour effort required to produce that quantity of sector level production.

Finally, section 2.3 outlines the same scenario in terms of headcount worker numbers. Headcount numbers are typically greater than their FTE counterparts since the influence of part-time workers typically outweighs the influence of those working longer than 37 hours per week (i.e. more than full-time hours). Additionally, the proportion of part-time workers in each sector is anticipated to rise over the coming years, providing a further boost to the number of *jobs* in the county[1].

The third section of the report discusses the three 'alternative' scenarios in terms of worker headcount demands. These examine the impact upon Northumberland of specific changes in terms of:

- Lower' alternative scenario (1) - a longer/deeper recession with 'hysteresis'
- 'Higher' alternative scenario (2) - a shallower recession where the economy rebounds more sharply
- Sectoral effects of climate change mitigation

These alternative scenarios are set out in a manner that helps policy-makers assess the potential relative sizes of the effects of these drivers.

An ***Appendix*** is included that briefly outlines the nature of the North East Economic Model (NEEM), formally defines the sectors used within this report and identifies the various underlying data sources.

1.4. Methodology

This report contains employment and Gross Value Added (GVA) scenarios covering the two decades 2010-30[2]. These have been generated using a bespoke econometric model, created specifically for the County, combined with data obtained from the NEEM. The North East Economic Model is produced annually by the PRG (located at St Chad's College, Durham University) with funding from One North East.

It should be noted at the outset that any 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

[1] The increase in job numbers from rises in part-time worker proportions is not an entirely positive development; part-time work typically implies increased levels of job insecurity etc.

[2] These projections supersede those published in August 2007.

long-term planning. They show a likely baseline position for the area - were things to continue under the assumption of ***business-as-usual.***

One of the advantages of using projections of this type is that they are produced using both inward- and outward-looking methods. The changes in the Northumberland economy as a whole are thus identified by (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 the National Institute for Economic and Social Research (NIESR) – 'outward-looking'. This approach 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).

In order that high quality employment projections for Northumberland can be produced, it was also necessary to estimate figures for Gross Value Added (GVA) from which employment figures could be derived. The current core of ONE North East's regional economic strategy - like that of other RDAs, such as Yorkshire Forward and the North West - is an overarching target for GVA per head of population. This measure of economic activity is used as a starting point here.

GVA measures the contribution to the economy of each individual producer, industry or sector[3]. 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.*[4]

[3]http://www.statistics.gov.uk/CCI/nugget.asp?ID=254

[4] Lee, P (2008) *Office for National Statistics: Regional accounts Methodology Guide.* Office for National Statistics:

http://www.statistics.gov.uk/downloads/theme_economy/RegionalAccountsMethodologyGuide.pdf

2. Projected Change in Northumberland's Economy

2.1. Gross Value Added

Projections for Northumberland's GVA are shown in Table 1 (on a constant price basis[5]). The figures show the economy expanding by an average of 2.0% per annum over the 20-year period from 2010. As would be expected, the area's services are the main drivers of additional GVA, growing by, on average 2.3% per annum (p.a.), with Agriculture and related growing at 1.7% and the industrial sectors at 0.8% p.a. Table 1 also includes 2005 figures for comparison purposes[6].

These scenarios are a combination of two effects, (1) the impact of the current recession/contraction and (2) the impact of longer-term trends. In some sectors these are reinforcing effects, i.e. are both negative, whilst in others the effects are opposing. The county level impact of these effects can be seen in the FTE time series in Figure 8.

Table 1. Northumberland GVA: £million and percentage share

Year	Agriculture, forestry & fishing		Industry, inc. energy and construction		Services		Total	
2005	14	0.4%	805	26%	2,299	74%	3,119	100%
2010	12	0.4%	744	23%	2,415	76%	3,171	100%
2015	13	0.4%	723	21%	2,687	79%	3,423	100%
2020	15	0.4%	752	20%	3,059	80%	3,826	100%
2025	16	0.4%	816	19%	3,431	80%	4,262	100%
2030	17	0.4%	890	19%	3,828	81%	4,735	100%

GVA valued at constant 2005 prices. Percentages are of the area total and may not sum to 100% due to rounding.

2.1.1. The regional context

To place the county into a context we consider the most recent Office for National Statistics (ONS) GVA figures relating to 2007. In terms of absolute GVA Northumberland produces 10% of the regional total. When looking at GVA per head of resident population the county stood at 80% of the regional figure. See Tables 2 and 3[7].

[5] That is, excluding any anticipated increases in prices.

[6] 2005 Figures have been included in Tables for comparison purposes where they are available. 2005 FTE figures are not available.

[7] For further information on Northumberland in a regional context see the Northumberland InfoNet Working Paper 89 *Northumberland's Economy 2009* http://www.northumberlandinfonet.org.uk

Table 2. Comparison area GVA (£Million 2007)

	GVA	Proportion of North East
Darlington	1,807	5%
Hartlepool and Stockton-on-Tees	4,149	10%
South Teesside	3,980	10%
Northumberland	3,857	10%
Sunderland	4,880	12%
County Durham	6,121	15%
Tyneside	14,855	37%
North East	39,648	100%

Source ONS Regional Accounts.

Table 3. Comparison area GVA per head of population (2007)

	GVA per head	Percentage of North East Average
County Durham	12 124	78%
Northumberland	12 417	80%
South Teesside	14 312	93%
Hartlepool and Stockton-on-Tees	14 730	95%
Sunderland	17 411	113%
Darlington	18 071	117%
Tyneside	18 361	119%
North East	15 460	100%
England	20 458	n/a
United Kingdom	20 430	n/a

Source ONS Regional Accounts.

2.2. FTE workers

The majority of the figures referred to in this report are worker numbers, rather than GVA data. This is because worker numbers have a real meaning that can be readily interpreted, which is not the case for monetary GVA figures. A comparable set of North East employment projections have not been generated. This would require additional work on region level productivity which is beyond the scope of the current project.

Before exploring the implications of these GVA projections upon worker numbers, a few explanations and definitions are necessary. 'Worker numbers' are quantified either by using headcounts or Full-time Equivalent (FTE) numbers. Headcounts are simply the number of people in work, including full- and part-time workers. 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 enable comparisons (1) over time and (2) across sectors. Neither of these comparisons is possible with headcount data, due to fluctuations in full- and part-time worker ratios over-time *and* between sectors

Finally, all worker numbers refer to jobs within Northumberland 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

2.2.1. FTE workers: county level

Over the five years to 2015, it is anticipated that Northumberland will experience slightly lower levels of FTE employment than in 2010 (see Table 4). This is due to below-trend GVA growth being expected at county, region and national geographies[8]. Following this initial period, *growth* should return to trend, allowing higher levels of output growth, assuming no unanticipated adverse shocks. Combining this output growth with solid productivity growth results in a steady expansion in FTE employment, continuing until the end of the projection period in 2030. This expansion is predicated on the county continuing to experience GVA growth at levels almost identical to that for the NE and not too far below the UK as a whole, as occurred over the recent past.

Overall, according to this scenario, Northumberland is projected to experience an increase in FTE employment of around 1% in the ten years to 2020, and a more robust increase of around 2.5% over 2020-30. The equivalent headcount figures are 4.4% and 9.5% respectively[9] (see the relevant section below for a discussion of headcount figures).

The increase in FTE numbers are effectively boosted by the recent downward revisions in estimates for national (and hence local) long-term productivity growth (relative to GVA growth) produced by the NIESR. This implies an employment increase. Relative to the entire economy, the area is expected to experience sector

[8] This is in contrast to projections produced in 2007, which indicated higher FTE numbers. This change is due to a shifts relating to the macroeconomic environment that have occurred during the past year. This highlights the key importance of external drivers for the level of activity in the Northumberland area.

[9] Note: this does not imply the same increase in the number of people working in the county, as increasing numbers will hold multiple jobs.

level productivity growth at similar rates to the UK, and hence maintain the existing productivity differential with the nation.

2.2.2. FTE workers: broad sector level

The county-level picture masks more significant changes at the level of sectors, which are typically more volatile than county level changes. This is because sectors do not all move in the same direction: some expand and some contract. The Northumberland figure overall is thus a less volatile average of these counteracting effects.

Table 4 splits the economy into three broad sectors: (1) Agriculture (including hunting forestry and fishing)[10]; (2) Industry (including energy and construction); and (3) Services. At the start of the period, the Agricultural sector contains 0.6% of Northumberland's employment, with Industry accounting for 22% and Services dominating with 75%. By 2030 these figures are projected to be 0.6%, 19% and 81% respectively. These changes represent significant structural adjustments and will have policy-related implications with respect to skill requirements, training and re-training programmes, as well as working patterns across the county.

Looking at changes within individual sectors, rather than across multiple sectors, the Agriculture, hunting, forestry and fishing experience remains broadly stable in terms of employees. Industry including energy and construction declines at a sharp rate, falling by 12% over the period, i.e. -0.6% per annum. This decline represents around 2,300 FTE workers and thus posses significant issues for policy-makers and the welfare of a large number of individuals and families.

The projected contractions in the industrial sectors are more than compensated for by a solid expansion of 6.6% in Services - equating to a long-term trend of 0.3% per annum, around 4,700 FTE workers. It should be noted that the largest Services sub-sector is Public services, where employment growth was purposely modelled to follow a lower (and eventually static FTE) trajectory than the other service sub-sectors, taking into account anticipated future changes to the county's public sector activities.

[10] We have not projected self-employment numbers for agriculture (although we have projected GVA), projecting this figure is extremely difficult and is thus not recommended. The past trend in self-employment data for the county is extremely volatile, partly reflecting measurement error, and is thus not a sensible basis for long term projections. Furthermore, this sector is excluded from the employment land component of this project brief.

Table 4. Northumberland FTE workers

Year	Agriculture, Forestry & Fishing		Industry inc. energy and construction		Services		Total	
2010	572	0.6%	19,915	21.8%	70,768	77.5%	91,256	100%
2015	570	0.6%	18,487	20.3%	71,826	79.0%	90,884	100%
2020	567	0.6%	17,929	19.5%	73,571	79.9%	92,067	100%
2025	559	0.6%	17,722	19.1%	74,542	80.3%	92,823	100%
2030	558	0.6%	17,599	18.8%	75,436	80.6%	93,594	100%

2.2.3. Projected change in demand for FTE workers by sector

In order to provide information at a finer level of sectoral detail, econometric methods were used to disaggregate the broad sector level data. The industrial sectors were disaggregated as follows[11]:

- **Agriculture, hunting, forestry and fishing.** This sector is not further disaggregated, being predominantly agriculture, with the non-agricultural components making up less than 15% of the total.
- **Manufacturing (1).** Consists of the more traditional manufacturing activities contained within SIC 15, 17-22, 24-29 & 35.3, the largest sub-areas of which, in terms of employment, are food production, wood & paper products, pharmaceuticals, chemicals & plastics, metals and general purpose machinery.
- **Manufacturing (2).** This sector (made up of SIC 16, 30-34, 36-37, light manufacturing activities including office and electrical machinery, medical & precision instruments, vehicles and furniture etc), is much smaller than the traditional manufacturing sector, employing only around 20% of number of people. The largest subsectors are *medical, precision and optical instruments*, and *furniture*.
- **Energy, water & quarrying**. Over two-thirds of this sector is currently contained under energy supply, water, waste and recycling. Energy extraction and production represents around 25% of the sector, with the remaining 5% of activities in other mining.
- **Construction.** This sector is not further disaggregated within the existing framework.

[11] Sectors such as the creative sector are not separately defined since they cannot be located within standard industrial classification (SIC) systems.

The large **Services sector** was disaggregated at follows:

- **Wholesale & retail trade.** Roughly 70% of this sector is retail, 20% wholesale and the remainder motor vehicle distribution and repair.
- **Hotels, restaurants & recreation.** The hotels and restaurants sector is around 75% of the total and recreational services around 25%.
- **Transport & communication.** This sector is dominated by coach and bus services, with cargo handling and storage and post services playing a less prominent role.
- **Finance.** Just under two thirds of this sector consists of banking and finance, with the remainder in auxiliary banking services.
- **Business services.** By far the largest sector under this heading is the diverse general SIC code 'other business services'. Additionally, one sixth of the sector consists of real estate activities, with a similar proportion made up of technical consultancy.
- **Public services.** 43% of those employed in this sector are in health and social work, with a just under a third in each of the 'public administration and defence' and education sectors.

  Included within the public services is the county council and related employment. This area of the public sector has been modelled slightly differently to the rest of the sector, in light of the likely impacts of future restructuring.
- **Other services.** 70% of this sector is membership organisations. The remainder of the sector is the diverse 'other services activities'.

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

Figure 1 displays county level FTE employment, broken down by sector into five-yearly increments of the projection period up to 2030. From this, it is clear that the primary, secondary/manufacturing sectors decline only slightly in absolute and relative in importance, while the various sub-sectors of services tend to expand over time. The county's reliance upon public services stands out in this diagram, as it is the largest employer by a considerable distance.

Figure 1. Projected FTE employment by sub-sector, 2010-30[12]

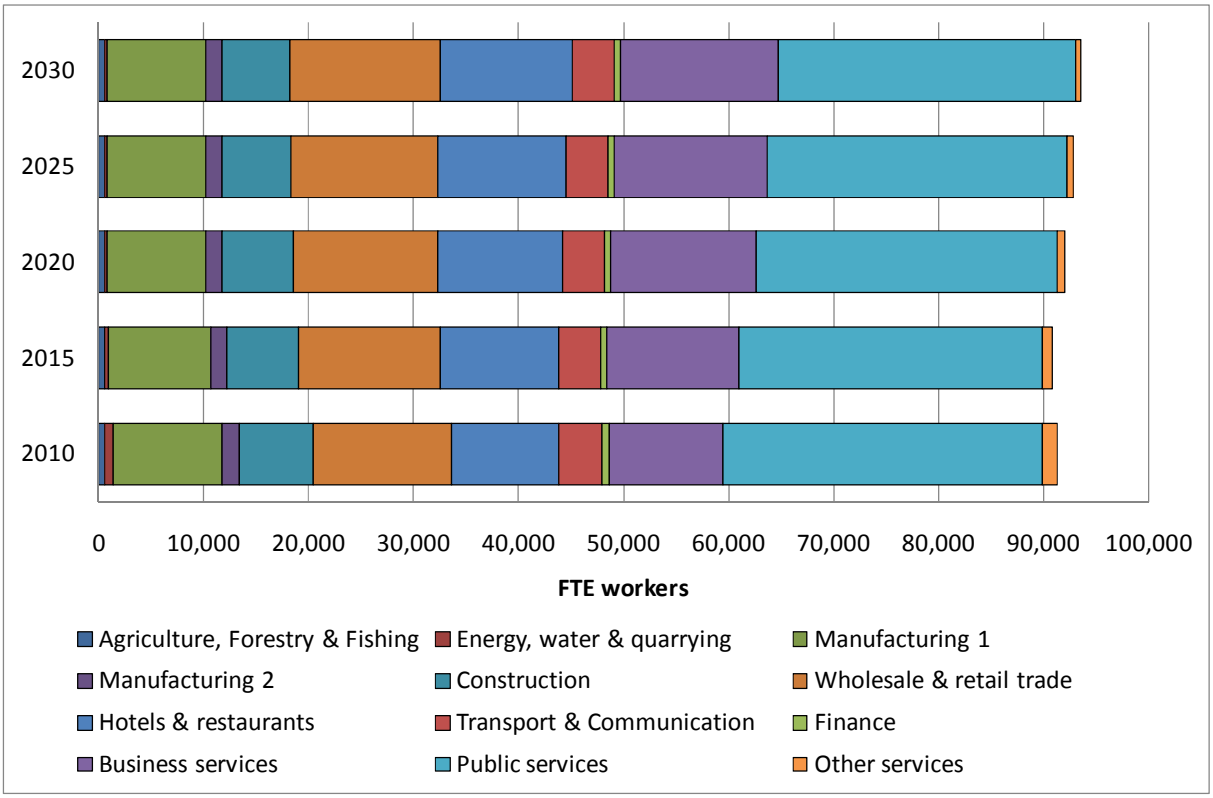


Table 5 displays the numerical estimates for the sub-sector FTE worker requirements that are graphically displayed in Figure 1. To allow a clearer pictorial view of the changes occurring within each sector, Figure 2 displays the same data for the non-service sub-sectors, and Figure 3 for the service sub-sectors (excluding the public sector, which obscures fluctuations elsewhere due to its sheer size).We now discuss each of the sub-sectors in turn, looking first at the non-service and, second, the service sectors of the county.

The trajectories of the ***non-services areas*** of the economy all experience a decline in terms of FTE workers, with the absolute fall being more rapid in the first decade of the 20-year period. This decline is typically driven by the same trends that are operating at the national level. These relate to issues such as, globalisation (resulting in higher levels of import penetration), and evolving consumption patterns (linked to rises in income and an ageing population). However, the impact may be felt more strongly in Northumberland than in many other areas, because its present services sectors are relatively under-represented as compared to the country as a whole. This said the projections for these sectors are more optimistic than in the recent past, due to two reasons, first; changes in the UK exchange rate raising import prices and

[12] Categories on legend are to be read from left to right starting with the top row. These relate to the shaded areas in the bar graph when read from left to right.

lowering export prices and second; the reductions in the sector that have already occurred as a result of the current recession.

Comparing the non-service areas of Northumberland, the proportional 20-year FTE worker contractions are: Energy, water & quarrying (-66%); Manufacturing 1 (-10%); Manufacturing 2 (-12%); and Construction (9%). Whilst none of the trajectories exhibit constant growth paths it is instructive to look at 2006-28 average growth rates (per annum) for the purposes of long-term planning. These are: Energy etc (-5.0%); Manufacturing 1 (-0.5%); Manufacturing 2 (-0.7%); and Construction (-0.5%).

These sub-sector level fluctuations in employment reflect a combination of two different factors (1) real GVA growth and (2) productivity changes. Such subtleties are not routinely brought out in an explicit manner within this report, but they are included within the underlying methodology. The sub-sectors are now discussed in-turn.

The falling numbers in **Energy, water and quarrying,** from 800 to 270 FTE workers, reflects a continuation of geographically broader long-term trends for mining and quarrying. The energy and water element of the sector represents a minority of the sector's overall employment and is thus less significant.

The activities within **Manufacturing 1** are expected overall to experience a substantial decline in size, from around 10,300 to 9,400 FTE workers. Within this overall contraction there is anticipated to be some growth areas (e.g niche areas of non-metallic mineral products), operating to slow down the rate of overall decline.

The sector identified as **Manufacturing 2** experiences a projected contraction from 1,700[13] to 1,500 FTE workers, which is proportionally slightly above to that of its more traditional counterpart, but gives rise to fewer job losses, reflecting its smaller initial size. These trajectories are (again) very much driven by global and wider UK factors, rather than causal factors emanating from within the Northumberland area *per se*.

In the recent past, activity among Northumberland's **Construction** firms has been marked by a high degree of volatility, around a roughly stable average. This pattern contrasts markedly with relative stability, and a generally upward trend, for the industry more generally within the North East region. The continuation of this stable trajectory, combined with an overall slowing of output growth as the UK economy returns to trend, produces a projected fall in Northumberland's Construction employment in terms of FTE figures (7,000 to 6,400).

Turning to the ***service areas*** of the economy, it can be seen from Figure 3 that most sub-sectors are expected to experience FTE worker gains over the period 2010-30 (not

[13] This sector is thought to have already declined substantially as a result of the current recession.

that headcount rises are in excess of FTE rises, see next section for details). Proportionally, this growth is anticipated to vary substantially across the different activities. After Public services, Wholesale & retail trade remains, in terms of the volume of employment, the most important service sector at the start of the period, with Business services becoming larger by 2020. The most significant growth areas, by volume, are Business services and Hotels and restaurants. The remaining service sectors Transport & communication remains static, Finance declines by about a quarter, largely reflecting the changes and consolidation in these activities in the UK as a whole.

The 20-year FTE worker expansions are: Wholesale & retail trade 10%; Hotels, restaurants & recreation 22%; Transport & communication 0%; Finance -23%, Business services 39%; Public services -7%; and Other services -58%. As in the non-services sector, none of the trajectories exhibit constant growth paths, but it is instructive to look at 2010-30 per annum growth averages. These are as follows: Wholesale & retail trade 0.5%; Hotels & restaurants 1.0%; Transport & communication 0.0%; Finance -1.3%, Business services 1.7%; Public services -0.4%; and Other services -4.2%.

The trends within sub-sectors are now discussed in turn:

Wholesale & retail trade sector has a trajectory that is fairly passive and ultimately derived from changes occurring elsewhere in the economy (e.g. household income levels/standard of living, expenditure by tourists, along with other sector expansions and contractions). This generates in a steady expansion in FTE numbers as aggregate GVA grows. The Wholesale and retail sector expands from 13,200 to 14,400 FTE workers[14].

Hotels, restaurants and recreation are projected to continue to expand at relatively high rates, rising from 10,200 to 12,500 FTEs, continuing a trend dating from 2001. This employment increase is assisted by the relatively low increase in productivity that typically occurs within this sector, which by its nature is labour intensive. The projection for this sector's substantial overall expansion is reliant in large part on the continuation of a robust past trend; the diverse nature of the sector means that it is difficult to identify some of the underying drivers, but Recreational services will need to continue to grow robustly for this growth figure to be realized.

Transport & communication, this sector has been relatively static within the County in recent years, and this is expected to continue into the future. Given the geographic location of the County it is not expected to gain substantially from anticipated UK growth in some markets within this broad sector.

[14] This is another sector that has been hard hit by the current recession.

The FTE expansions in **Finance** and **Business services** are anticipated to be strong drivers of growth at the UK level over the *longer-term* time horizon. Since this is an area of the economy where there is both a significant under-representation of activity and a productivity gap to the rest of the UK, it is anticipated that there will be opportunities for local growth in some sub-sectors of these industries (for example, *niche* markets, and back-office functions), with these opportunities falling mainly in business services. Whereas as in finance, the sector is expected to concentrate in areas where it already has a relatively high representation. Overall the (small) Finance sector falls from 800 to 600 FTEs whist Business services grows robustly from 10,800 to 15,000 FTEs.

Public services is a difficult sector to model since 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 Public Expenditure Statistical Analyses (PESA) projection and local knowledge, lowering the employment levels in the sectors and leaving them stable post 2015 (since there is no firm basis for producing a long term projection). The sector falls from 30,400 FTEs to 28,300.

Other services is a small sector that has been declining over the past decade, this decline is expected to continue with the sector falling from 1,300 to 600 FTE workers.

Table 5. Projected FTE workers by sector over period to 2030

	Agriculture, forestry & fishing	Energy, water & quarrying	Traditional manufacturing	Light manufacturing	Construction	Wholesale & retail trade	Hotels, restaurants & recreation	Transport & communication	Finance	Business services	Public services	Other services	Total
2005	676	1,576	10,341	2,280	8,271	13,310	11,532	4,396	920	7,998	33,238	1,650	96,188
	0.7%	1.6%	10.8%	2.4%	8.6%	13.8%	12.0%	4.6%	1.0%	8.3%	34.6%	1.7%	100%
2010	572	796	10,314	1,754	7,051	13,151	10,234	4,018	775	10,828	30,440	1,322	91,256
	0.6%	*0.9%*	*11.3%*	*1.9%*	*7.7%*	*14.4%*	*11.2%*	*4.4%*	*0.8%*	*11.9%*	*33.4%*	*1.4%*	*100.0%*
2015	570	406	9,674	1,505	6,902	13,491	11,223	4,025	635	12,547	28,926	980	90,884
	0.6%	*0.4%*	*10.6%*	*1.7%*	*7.6%*	*14.8%*	*12.3%*	*4.4%*	*0.7%*	*13.8%*	*31.8%*	*1.1%*	*100.0%*
2020	567	273	9,417	1,506	6,733	13,799	11,908	4,021	576	13,813	28,717	738	92,067
	0.6%	*0.3%*	*10.2%*	*1.6%*	*7.3%*	*15.0%*	*12.9%*	*4.4%*	*0.6%*	*15.0%*	*31.2%*	*0.8%*	*100.0%*
2025	559	270	9,401	1,522	6,528	14,032	12,257	3,994	581	14,576	28,507	594	92,823
	0.6%	*0.3%*	*10.1%*	*1.6%*	*7.0%*	*15.1%*	*13.2%*	*4.3%*	*0.6%*	*15.7%*	*30.7%*	*0.6%*	*100.0%*
2030	558	274	9,388	1,539	6,398	14,428	12,477	4,013	593	15,066	28,298	561	93,594
	0.6%	*0.3%*	*10.0%*	*1.6%*	*6.8%*	*15.4%*	*13.3%*	*4.3%*	*0.6%*	*16.1%*	*30.2%*	*0.6%*	*100.0%*

Figure 2: Projected FTE employment in non-service sub-sectors, 2010-30

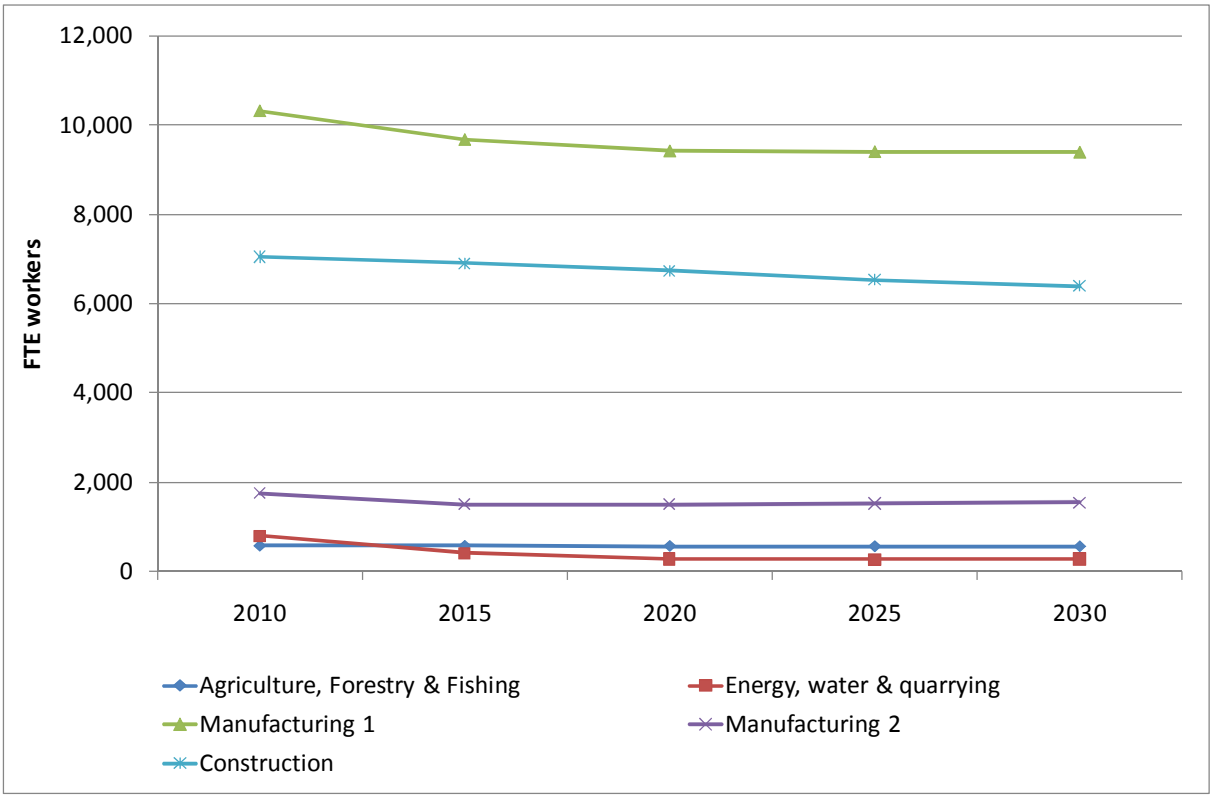
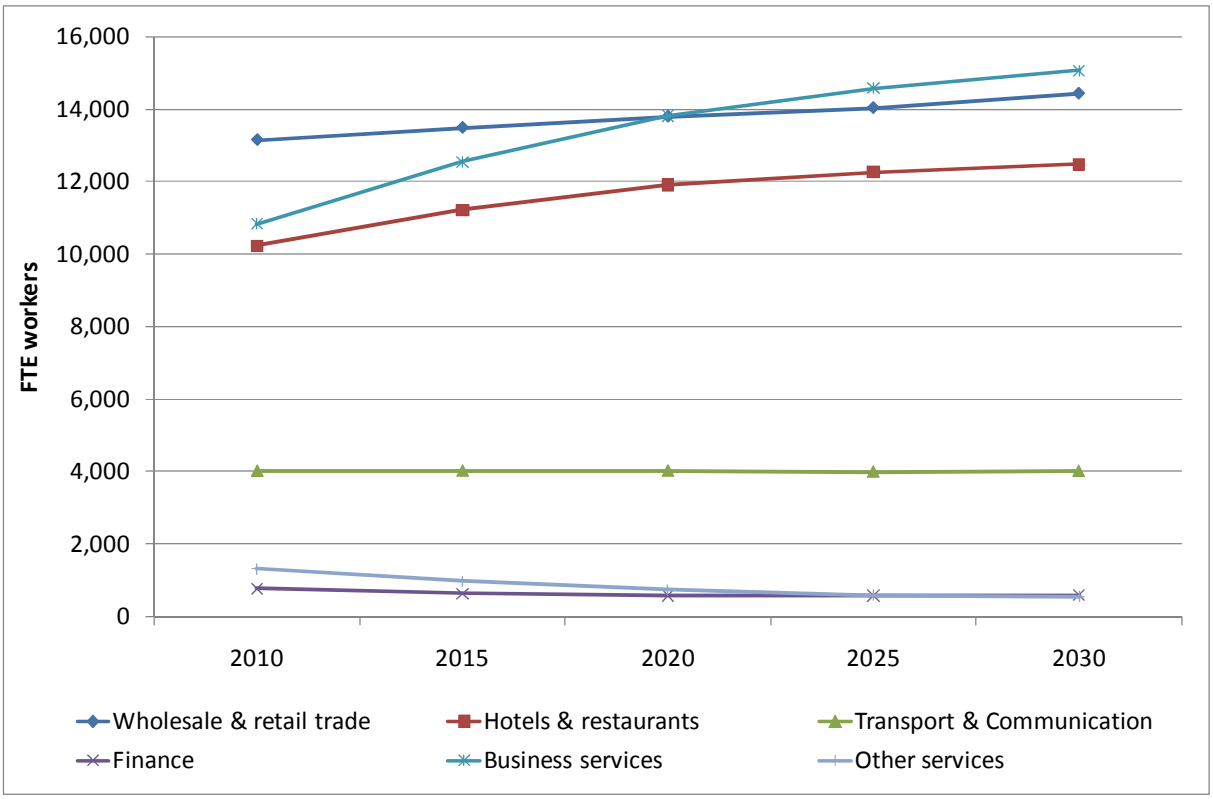


Figure 3: Projected FTE employment in service sub-sectors, 2010-30



Excluding the public sector since its size dwarfs the remaining sectors

2.3. Projected aggregate demand for headcount workers by sector

This section adds an extra level of modelling to the above results. It moves from the examination of FTE worker projections, which are directly related to GVA via productivity, to an examination of headcount worker projections. Overall Northumberland is projected, in this scenario, to experience an increase in headcount employment of around 4% to 2020, and 10% by 2030 (from the 2010 level, the equivalent FTE figures were 1% and 3%). These changes differ from the FTE changes because average hours of work are projected to fall over the period. This implies that the proportion of part-time jobs as a proportion of total jobs rises.

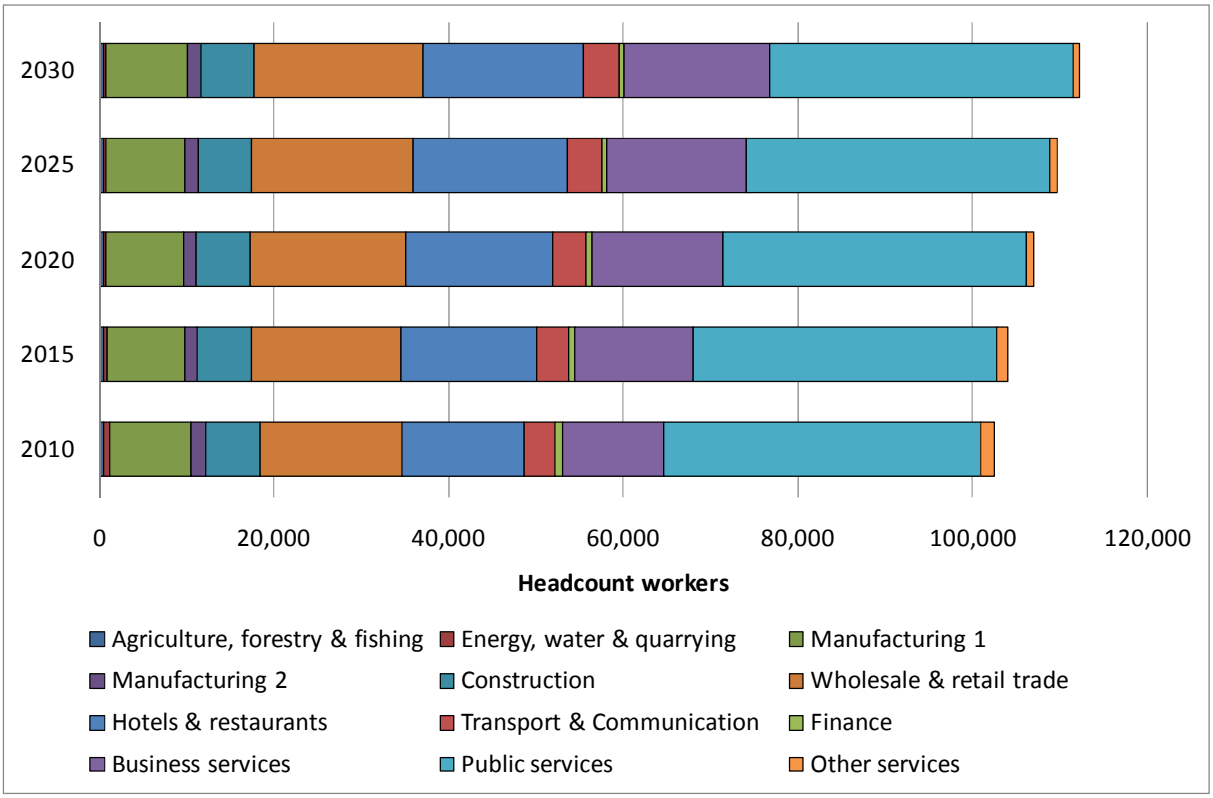
In order to produce headcount figures at sector level, hours of work have been modelled. This adds an additional level of uncertainty to the projections. However, since the proportion of part-time workers, by sector, has been evolving in a steady and predictable manner the projections are considered to be a reasonable guide over the two decade time period considered here.

Comparing the FTE and headcount results show that the sectors fall into two clear groupings: first, those where the two sets of worker growth rates are very similar; and second, those where the results differ. The sectors with similar growth rates are those where average hours are not projected to fall by a large amount, Energy, water and quarrying, Finance and Business Services and the Public sector. The sectors with differing growth rates are those where average hours are projected to fall more substantially, Manufacturing, Construction, Wholesale and retail trace, Hotels etc and Transport and communication. All sectors in the second group exhibit significant swings towards part-time working patterns.

This section utilises the same approach as for the sector level FTE section, but in terms of headcount workers. While it omits some of the underlying reasons and numerical detail, this is shown in Table 6.

Figure 4 displays total FTE employment within Northumberland, broken down by each of the five-year increments of the projection period. It can clearly be seen that the industrial sectors are declining in terms of worker numbers. The various sub-sectors of services are tending to expand with the largest sector being public services, which exhibits a small contraction.

Figure 4. Projected headcount employment by sub-sector, 2010-30



For guidance, Table 6 shows sub-sector headcount worker requirements for the Northumberland economy. Figure 5 displays these changes for the manufacturing sub-sectors and Figure 6 for the service sub-sectors (excluding the public sector which employs so many workers that it obscures the fluctuations in other areas). These sub-sector level fluctuations in headcount employment reflect a combination of three different factors (1) real GVA growth; (2) productivity changes; and (3) changes in average hours of work.

Examining the trajectories in the non-service ***areas*** of the county's economy, all of these sectors are projected remain relatively constant in terms of headcount workers, with the exception of Energy water and quarrying which declines by over 50%. In effect the declines in FTE numbers are being offset by lower hours of work to maintain headcounts. The largest sector, traditional manufacturing, (Manufacturing 1) is expected remain almost constant at a headcount of 9,300 over the 20-year period, although within this some sectors expand and some decline and the sector as a whole declines to 2020, before expanding in the next decade (this is due to sector mix effects). The next largest sector, Construction, remains stable over the whole period. The 20-year headcount worker contractions are: Energy, water & quarrying -62%; Manufacturing 1 -0.5%; Manufacturing 2 -5%; and Construction -1%. Whilst none of the trajectories exhibit constant growth paths, it is instructive to look at 2006-31 growth averages for the purposes of long-term planning. These are indicated the

following changes: Energy etc. -4.7%; Manufacturing (1) -0.0%; Manufacturing (2) – 0.2%; and Construction -0.1%.

With regard to the ***service area*** of the economy, on the whole this sector is expected to experience headcount worker gains over the period 2010-30. Proportionally, this growth is expected to vary substantially across sub-sectors. The 20-year headcount worker expansions are: Wholesale & retail trade 19%; Hotels, restaurants and recreation 32%; Transport & communication 10%; Finance -21%; Business services 44%; Public services -4%; and Other services -55%. Again, whilst none of the trajectories exhibit constant growth paths, it is instructive to look at 2010-30 annual growth averages: Wholesale & retail trade 0.9%; Hotels, restaurants and recreation 1.4%; Transport & communication 0.5%; Finance -1.2%, Business services 1.8%; Public services -0.2%; and Other services -3.9%.

After Public services, Wholesale & retail trade remains, in terms of the volume of employment, the most important service sector, followed by Hotels, restaurants and recreation and Business services. The most significant growth areas, in terms of volume, are Business services (5,000) and Hotels, restaurant and recreation (4,500). It is important to remember that a portion of these projected headcount growths are due to decreases in average hours of work per job (i.e. proportional fewer full-time workers). The remaining service sectors largely reflects the anticipated general expansion in these activities in the UK as a whole.

Table 6. Sub-sector headcount workers

	Agriculture, forestry & fishing	Energy, water & quarrying	Traditional manufacturing	Light manufacturing	Construction	Wholesale & retail trade	Hotels, restaurants & recreation	Transport & communication	Finance	Business services	Public services	Other services	Total
2005	548	1,388	9,112	2,064	7,157	16,178	15,447	3,876	1,006	8,435	40,294	1,928	107,433
	0.5%	*1.3%*	*8.5%*	*1.9%*	*6.7%*	*15.1%*	*14.4%*	*3.6%*	*0.9%*	*7.9%*	*37.5%*	*1.8%*	*100%*
2010	477	733	9,327	1,609	6,225	16,287	13,967	3,622	855	11,519	36,344	1,565	102,529
	0.5%	*0.7%*	*9.1%*	*1.6%*	*6.1%*	*15.9%*	*13.6%*	*3.5%*	*0.8%*	*11.2%*	*35.4%*	*1.5%*	*100.0%*
2015	489	391	8,946	1,405	6,218	17,029	15,611	3,712	706	13,464	34,841	1,176	103,988
	0.5%	*0.4%*	*8.6%*	*1.4%*	*6.0%*	*16.4%*	*15.0%*	*3.6%*	*0.7%*	*12.9%*	*33.5%*	*1.1%*	*100.0%*
2020	500	270	8,904	1,436	6,194	17,759	16,889	3,795	646	14,952	34,841	898	107,084
	0.5%	*0.3%*	*8.3%*	*1.3%*	*5.8%*	*16.6%*	*15.8%*	*3.5%*	*0.6%*	*14.0%*	*32.5%*	*0.8%*	*100.0%*
2025	509	271	9,089	1,484	6,135	18,420	17,732	3,862	657	15,915	34,841	733	109,648
	0.5%	*0.2%*	*8.3%*	*1.4%*	*5.6%*	*16.8%*	*16.2%*	*3.5%*	*0.6%*	*14.5%*	*31.8%*	*0.7%*	*100.0%*
2030	524	279	9,287	1,535	6,144	19,328	18,419	3,976	677	16,592	34,841	701	112,303
	0.5%	*0.2%*	*8.3%*	*1.4%*	*5.5%*	*17.2%*	*16.4%*	*3.5%*	*0.6%*	*14.8%*	*31.0%*	*0.6%*	*100.0%*

Figure 5. Projected headcount employment in the non-service sub-sectors, 2010-30

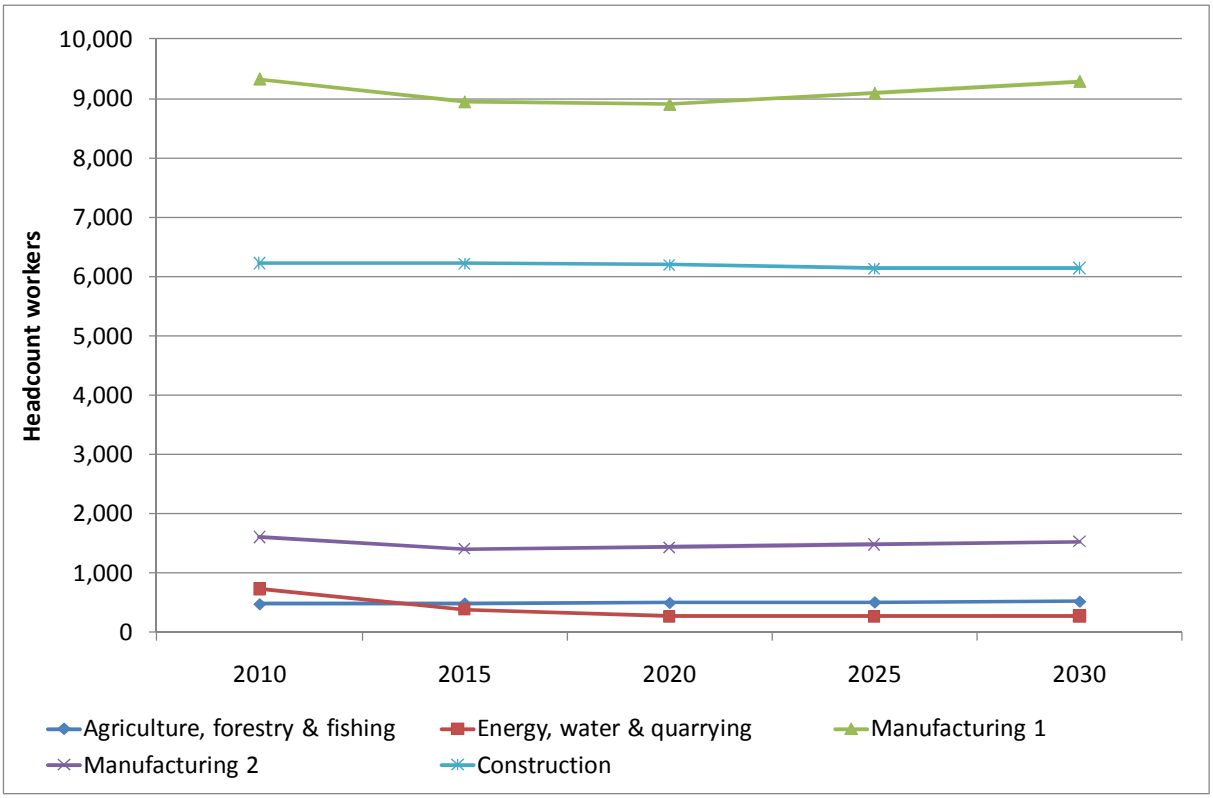


Figure 6. Projected headcount employment in service sub-sectors, 2010-30

3. Alternative scenarios

The scenario used in the above sections presents future trajectories for Northumberland based upon a set of realistic and likely assumptions regarding likely key influences upon the economy. It must be recognised, however, that there is considerable uncertainty over the accuracy of any long-term economic projection, not least, given the uncertainty relating to the present recovery. In order to address such uncertainty, we have produced a number of additional scenarios. These alternative scenarios offer an indication of the range of possible trajectories, in the event that different circumstances prevail.

A***lternative scenarios 1 & 2*** are based upon less and more propitious general circumstances, associated in turn with the following conditions:

1. 'Lower' alternative scenario (1) - a longer/deeper recession with lasting / long-run effects or 'hysteresis' (long run headcount growth of 0.4% p.a. c.f. 0.7% in the main scenario).
2. 'Higher' alternative scenario (2) - a shallower recession where the economy rebounds more sharply, although with the same long-term growth

These two variant scenarios are based upon alternative growth assumptions for the county namely. They are assumed to have the effect of raising/lowering the GVA, headcount and FTE levels in each of the 26 modelled sectors by the same proportion i.e. avoiding *ad hoc* assumptions that force some sectors to be more resilient (in the case of the lower growth scenario) or able to take advantage of opportunities (in the cast of the higher growth scenario) than others. These scenarios are intended to highlight the sort of variation that could plausibly occur around the central scenario at the level of the County and broad sector, rather than at a detailed sector level.

Figure 7 shows the estimated outcomes for these two alternative scenarios[15], comparing the results to the 2030 'business as usual' scenario[16]. The results can be summarised in terms of county level worker headcounts:

- The longer/deeper recession scenario with lower long-term growth results in a 5.7% lowering of the worker headcounts[17]

[15] These scenarios look solely at the effects of the driving 'shock', and do not attempt to predict any policy response that may be instigated to mitigate any adverse effects.

[16] The impact of the climate mitigation scenario has not been included in this section as no approximate headcount numbers exist.

[17] The lower growth scenario has associated with it a larger change than the higher growth scenario because small growth rate changes over long periods are more important than one-off jumps, even if those shifts are relatively large in size.

- A shallower recession within the framework of the same long-term growth rate generates a 3.2% additional demand for headcount workers

Figure 7a depicts the same scenario results, displaying the headcount employment *changes* (by sector), rather than the total employment.

A***lternative scenario 3*** provides yet another, and very different, view of the future course of the Northumberland economy. It seeks to incorporate the potential impact of action to mitigate climate change and the effect this might have upon opportunities for growth in the Northumberland economy. This scenario is based upon work that Cambridge Econometrics has carried out at regional level, essentially exploring the effect of the Climate Change Act (aimed at reducing by 2050 greenhouse gas emissions by 80%, compared to 1990 levels). This scenario examines the impact of such action upon Northumberland, taking into account of both competiveness effects and market opportunities.

The next section outlines each of the additional scenarios in more detail.

Figure 7. Projected 2030 headcount employment – comparison of scenarios 1 & 2

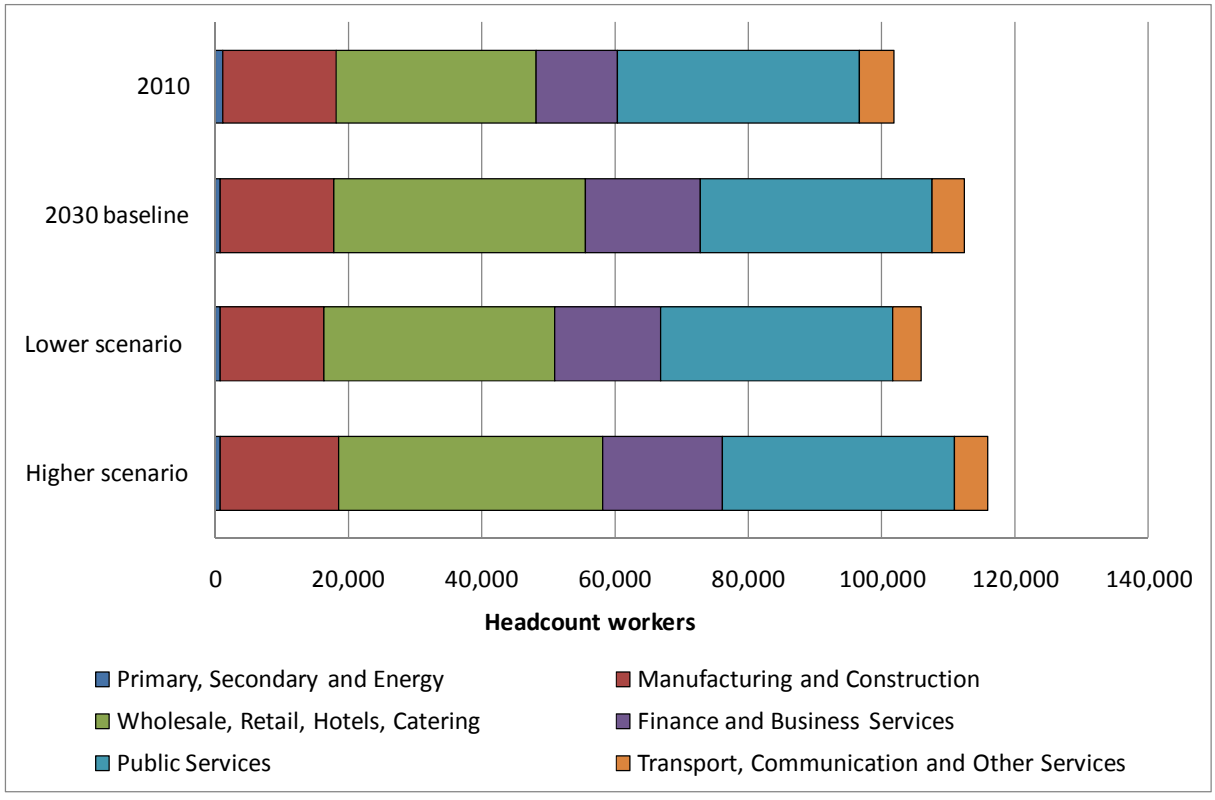
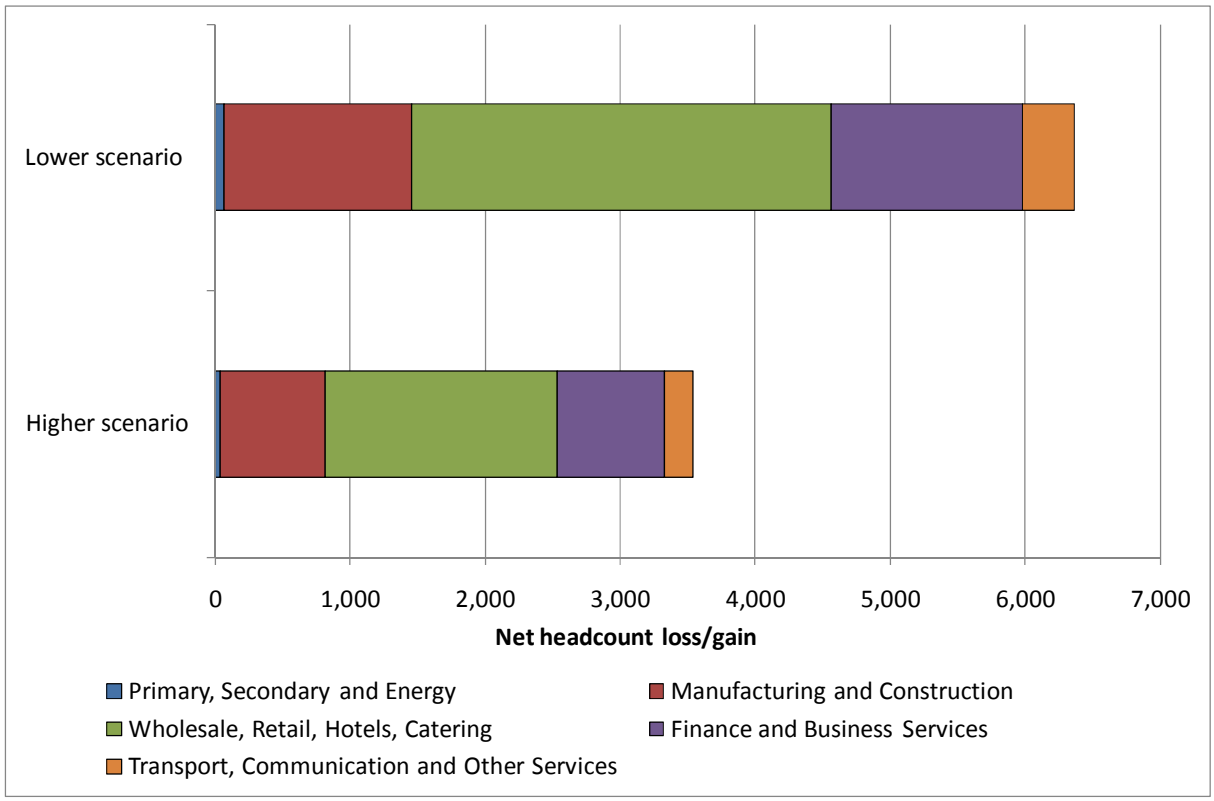


Figure 7a. Projected 2030 change in headcounts– differences between the higher and lower scenarios and the baseline scenario

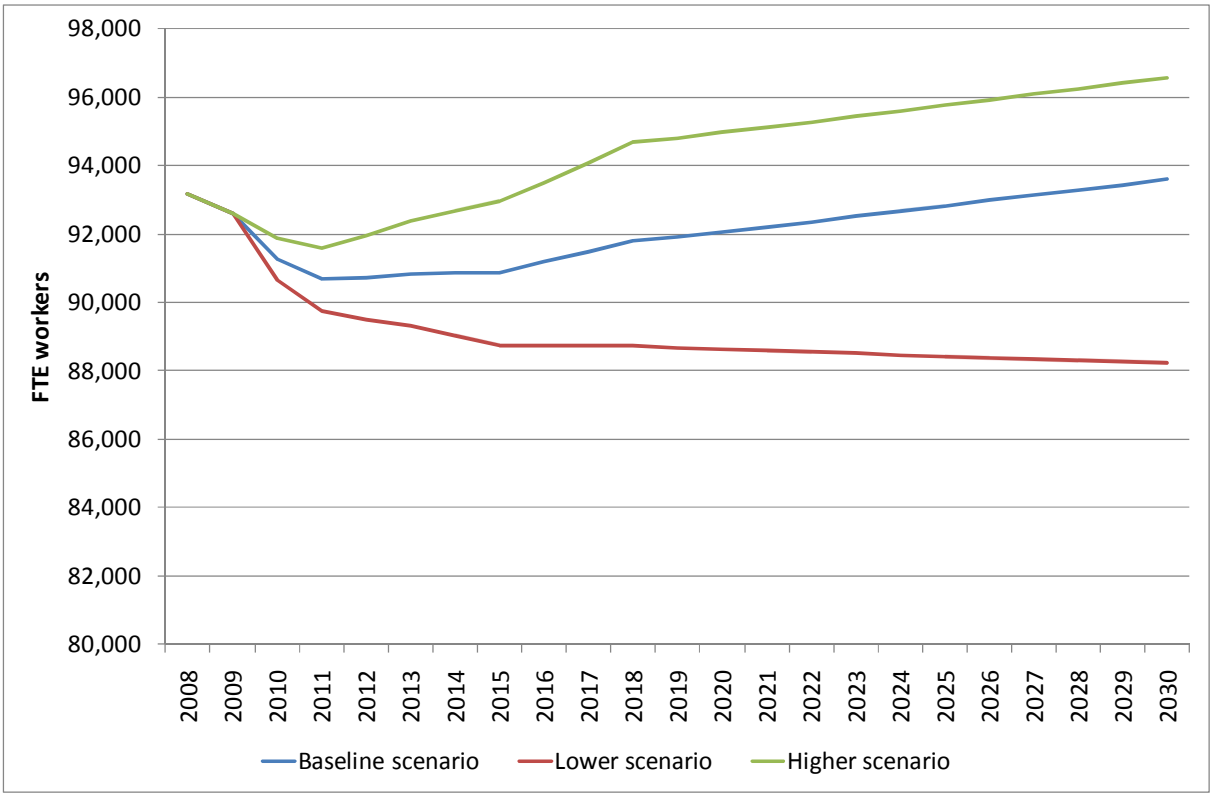


3.1. Alternative Scenario 1 - deeper recession/lower long-term growth

A deeper recession with the hysteresis (i.e. implying that it is followed by a lower long-term growth rate) causes the county's employment to diminish by 5,400 FTE workers, equivalent to a 5.7% County wide reduction (compared to the central or baseline scenario) in the 2030 employment projection. The baseline scenario implies an FTE employment figure of 93,600 at the end of the period, whereas under this alternative scenario the employment projection is 88,230.

Figure 8 highlights the projected effect of deeper recession and lower long-term growth in terms of FTE employment. It illustrates the extent of deviation from the baseline scenario. In particular, it shows clearly the tendency, under Alternative Scenario 1, not only for a lower trajectory over time, but for its continuing divergence from the main scenario. While the FTE numbers start to rise from 2011 in the main scenario, they continue to fall under the 'lower' Alternative Scenario 1. The FTE fall is generated by modest GVA growth combined with reasonable assumptions for productivity, and slight headcount growth through increases in part-time employment, which, altogether, give rise to a fall in FTE numbers. Part of this fall in FTE, and subsequent slow increase in FTE, is associated with a fall in the number of public sector workers, which occurs after the turning point in the recession as it affects the 'private sector'.

Figure 8. FTE employment projections for Main and Alternative Scenarios 1&2

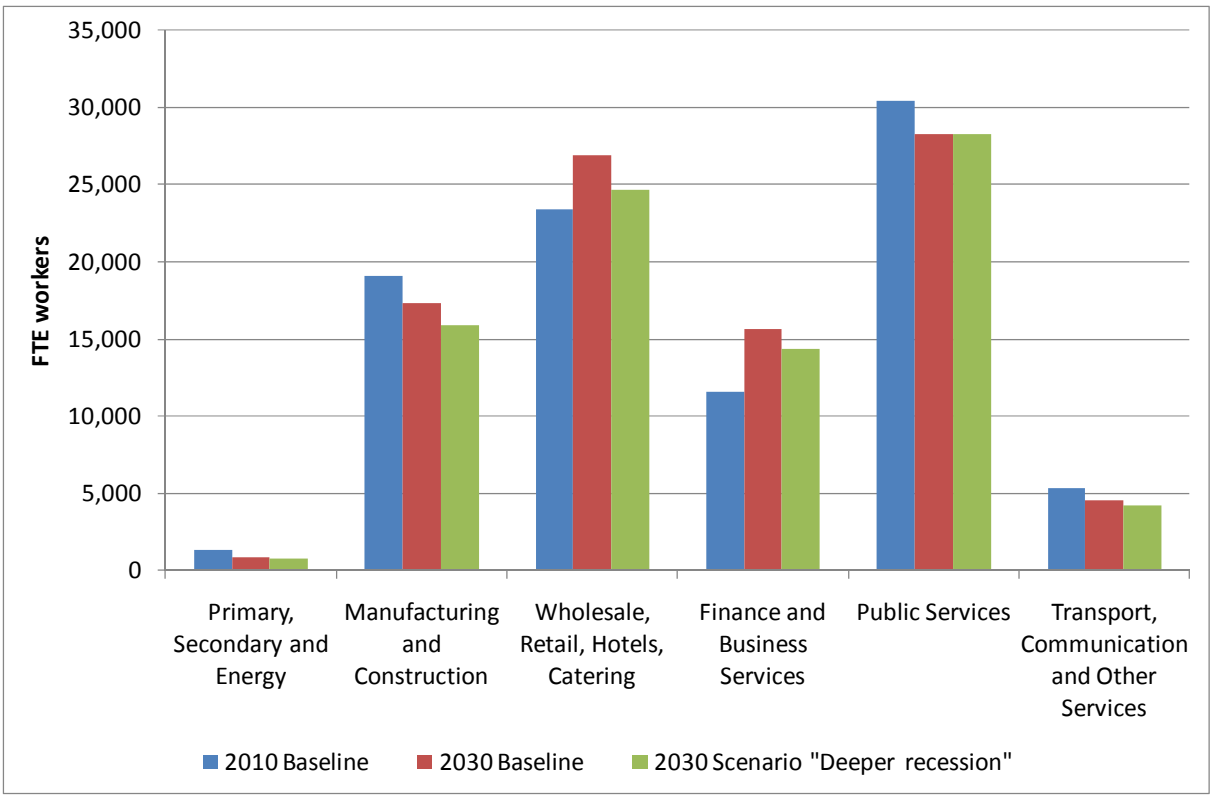


In terms of sectors, all sectors decline by 8.2% *from* the baseline scenario (apart from the public sector which has been kept at a constant throughout all scenarios). This fall in FTE employment exerts its largest *absolute* impact on the Wholesale, Retail, Hotels and Catering sector, where 2,210 fewer FTEs workers would be employed within the sector compared with the 2030 central projection.

Figure 9 shows that, in terms of sector growth paths, the majority of sectors now experience a loss of FTE jobs, compared to the county's current position. Only Wholesale & retail, Hotels & catering and the Finance & business services experience an increase in employment[18].

[18] In terms of the 26 individual sectors within the underlying model, the only sectors to achieve higher employment in 2030 compared to the 2010 baseline scenario are: Machinery, Automotive, Glass, Ceramics, Clay, Cement & concrete, Miscellaneous manufacturing, Wholesale & retail trade, Hotel, restaurant & recreation, and Business services.

Figure 9. Projected effects of Alternative Scenario 1 (deeper recession) on the county's sectors in terms of FTE employment



3.2. Alternative scenario 2 - shallower recession/unchanged growth trend

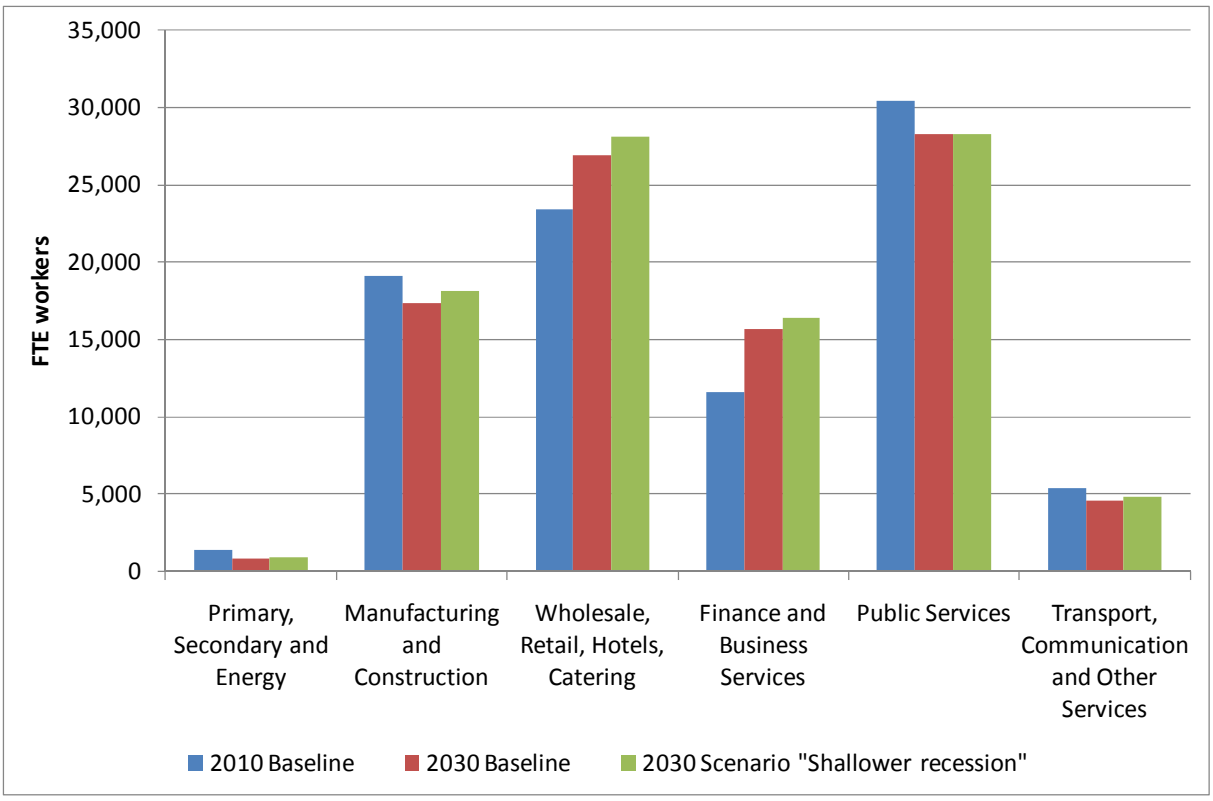
A shallower recession with unchanged long-term growth trend overall, causes the county's workforce to expand overall by 3,000 workers, equivalent to 3.2% above the result in the central 2030 projection.

In terms of sectors, all sectors expand by 4.6% *from* the baseline scenario (apart from the public sector which has been kept at a constant throughout all scenarios).

Figure 10 illustrates that Wholesale & retail, Hotels & catering, and Finance & business services experience a large increase in FTE employment, implying the need for more workers to enter these sectors (and associated changes in skills requirements needed if that future demand is to be met).

Even in this 'higher' scenario, FTE employment in Manufacturing and Construction still declines, indicating a fall in demand for certain skills, although this impact is limited in scale. The Primary, Secondary and Energy, Transport & communication, and Other services are the only sectors to remain fairly flat despite the shallower recession and same long-term growth.

Figure 10. Projected effects of Alternative Scenario 2 (shallower recession) on the county's sectors in terms of FTE employment



3.3. Alternative Scenario 3 – Mitigation of climate change

This scenario is based upon the Cambridge Econometrics (CE) report 'The Impact of Climate change Mitigation on the North East' Feb 2010. We have applied the sector level effects from this report to our baseline scenario. These results cover the period 2010 to 2020[19] (rather than the 2010-30 period of the rest of this report).

The overall effect of climate change mitigation, taking into account both competitiveness effects and market opportunities, causes the county's employment to decline by just under 100 workers, equivalent to just -0.1% of the 2020 projection. The baseline scenario has employment of 92,067. This scenario has employment of 91,980.

In terms of individual sectors, as in the CE report, Wholesale, Retail, Hotels and Catering and Finance and Business Services are unaffected by climate change mitigation during the period in question. All other sectors differ very little from the 2020 baseline scenario. The only subsector out of the 26 underlying model sectors to

[19] This model has a baseline of 2007. We have rebased the model from 2010. Therefore, any effects that occurred prior to 2010 and are predicted to no longer affect the sector have not been applied.

achieve higher growth than the 2020 baseline is E*nergy supply, water, waste, recycling* which had 313 FTE workers by 2020 in comparison to 239, equivalent to 31% more FTE workers than the 2020 baseline (see Table 6). However, in both scenarios the sector remains on a downward trend. Subsectors which would experience a marginal negative effect (approximately -1%) due to the climate change legislation are Agriculture, forestry and fishing; Automotive; Textiles; Glass, ceramics, clay, cement, concrete; Electrical; Misc Manufacturing; Construction and Transport and Communications. The rest remain unaffected.

That the effects are so small is partly due to the sectoral composition of the County and partly because the CE report asserts that that a large proportion of the climate change act mitigation effects will have occurred by 2010. However, the study omits the impact of any sector effects which arise from additional and new activity to adapt to climate change (c.f. mitigate).

The original report should be consulted for more detailed information on the drivers of these effects. The CE report does not consider carbon capture and storage (CCS) since it was believed that this technology is 'very unlikely to emerge before 2020 without additional Government support'.

Figure 11. Projected effects of climate change mitigation action

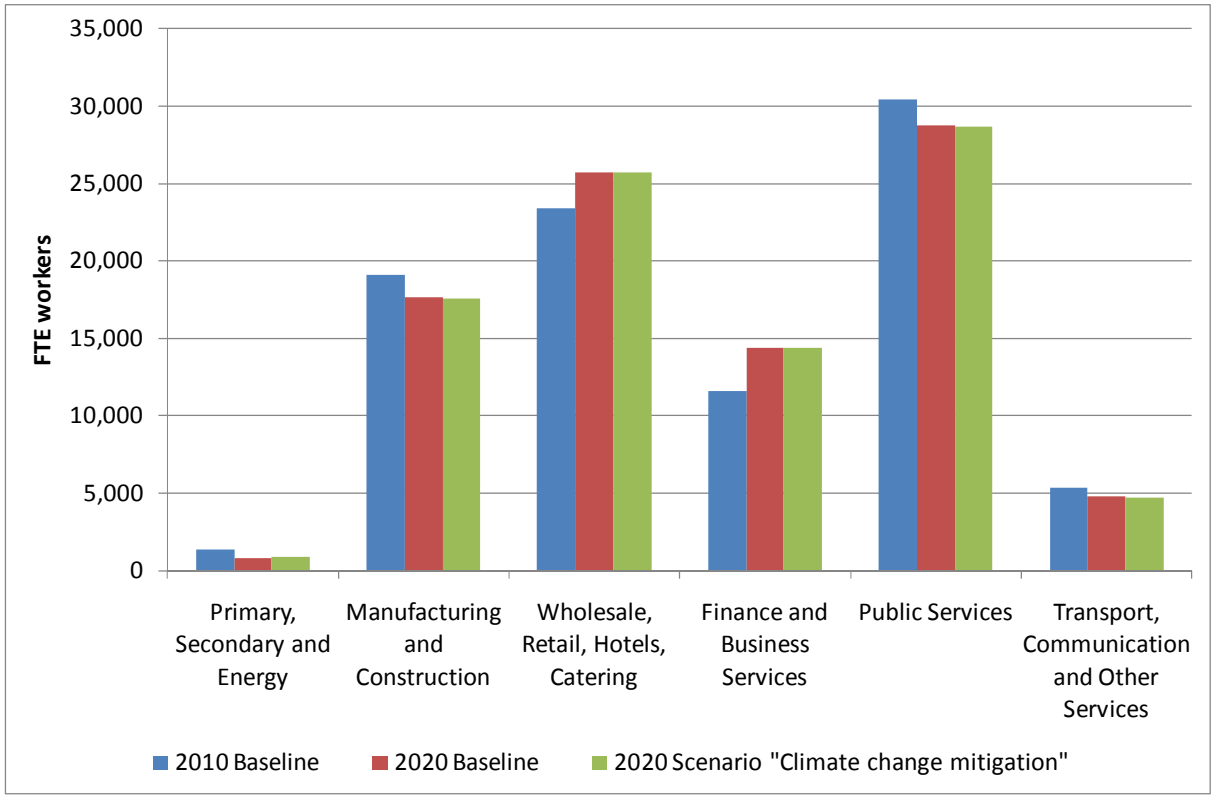


Table 7 highlights the changes applied to different sectors over the period. The 2010 baseline is set to zero. When figures for rural areas of Northumberland and Tyne and Wear region differed a ratio has been taken between to reflect the proportion of FTE workers drawn from each area type.

Table 7. Extent to which sectors are affected by Climate Change legislation

	% of baseline in 2020		
	Competitiveness effects GVA	**Competitiveness effects FTE**	**Market opportunities GVA**
Agriculture	-0.7	-0.7	0.0
Mining etc	-0.2	-0.1	0.0
Manufacturing	-1.6	-1.3	1.0
Utilities	-1.0	-0.7	31.2
Construction	0.0	0.0	-0.7
Transport & Communication	-0.5	-1.0	0.0
Government and other services	-0.1	-0.1	0.0

Definitions

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, 23, 40-41 & 90
- Manufacturing 1 SIC 15, 17-22, 24-29 & 35.3
- Manufacturing 2 SIC 16, 30-34, 36-37
- Construction SIC 45
- Wholesale and retail trade SIC 50-52
- Hotels, restaurants and recreation SIC 55 & 92
- Transport & Communication SIC 35 (excluding 35.3), 60-64.2
- Finance SIC 65-67
- Business Services SIC 70-74
- Public Services SIC 75-85
- Other services SIC 91 & 93 (excl. 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.

These definitions are aggregations of a 26 sector list used by One North East to integrate the North East Economic Model (NEEM).

The 'North East Economic Model' (NEEM)

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 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.

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